<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
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<th>Comment</th>
<th>Response</th>
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<tbody>
<tr>
<td>1302</td>
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<td></td>
<td>General comment on the whole chapter. Chapter 1 sets up a conceptual framework for the SR with a strong focus on issues of equity and justice, but this emphasis is not carried through into Chapter 3 where there seems to be a particularly strong focus on changes in the natural systems without an equivalent consideration of the meaning of these changes for achieving a more sustainable, just and equitable world. As a result this chapter is unbalanced with insufficient attention being given to assessing the social implications of changes in natural systems and the multidimensional social impacts of climate change. Establishing this balance is critical, as this chapter must be accessible to policy makers and practitioners who need to understand not only the scale of the problem, but what this might mean for the communities they are accountable to. [Debra Roberts, South Africa]</td>
<td>Noted. Chapter 3 focuses on the impacts that are likely at 1.5°C on human and natural systems. The evidence is carefully assessed and policy prescription avoided.</td>
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<td>3608</td>
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<td>The chapter completely ignores the issue of the monetary and non monetary assessment of the value to humanity of keeping temperature below 2°C [Valentina Bosetti, Italy]</td>
<td>Noted. Reference included.</td>
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<tr>
<td>3609</td>
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<td>No reference is made to SSPs but for water and health impacts, what are the implications of future socio-economic scenarios on the impacts from climate change? [Valentina Bosetti, Italy]</td>
<td>Noted. Reference included.</td>
</tr>
<tr>
<td>20781</td>
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<td></td>
<td>Number of the figures must be revised with that written in the text. [Amal Hussein, Egypt]</td>
<td>This is the focus of other chapters in the report.</td>
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<tr>
<td>20782</td>
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<td>Some figures are clear as example Figures 3.18, 3.20, ...so on [Amal Hussein, Egypt]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<td>2620</td>
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<td>Impacts have been reported on a purely natural science basis, with limited reference to socio-economic factors and how these would affect the intensity of impacts/resilience? [Zoha Shawoo, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>These elements are covered in chapter 4 and fire.</td>
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<td>171210</td>
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<td>The executive summary should mention, in a quantitative way, relevant feedbacks in global warming such as the release of methane to the atmosphere by the melting of permafrost, both in 1.5 and 2 degrees scenarios. [Carlos Garcia Soto, Spain]</td>
<td>We explore this issue and whether or not it qualifies for executive summary. Note that statements included in the executive summary have to relate to the question of impacts in human and natural systems at 1.5°C and 2°C. Not all the issues mentioned are actually suitably qualified to be included.</td>
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<td>171213</td>
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<td>The executive summary could also include information about the relationship (or not) between the intensification of hurricanes and typhoons with climate change, given the recent extreme events and the increased societal concern. [Carlos Garcia Soto, Spain]</td>
<td>We explore this issue and whether or not it qualifies for executive summary. Note that statements included in the executive summary have to relate to the question of impacts in human and natural systems at 1.5°C and 2°C. Not all the issues mentioned are actually suitably qualified to be included.</td>
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<td>20588</td>
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<td>I mainly focus on chapter 3 and 4 as I believe my expertise is more relevant here. [Vera Barbosa Araujo Soares shinehotta, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Ok.</td>
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<td>6223</td>
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<td>The chapter gives a comprehensive detailed account of the observed and projected impacts of 1.5°C and 2.0°C warming on various natural and human systems. The authors have taken great pains in collecting the relevant data. The differences in some of the natural systems between 1.5 and 2.0°C are far thin. Some of the changes are still unanswered (e.g. in Table 3.1) and some of the papers are various stages of publication. Hopefully the answers will be found and the papers will be published by the time SOD or subsequent drafts. [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Noted.</td>
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<tr>
<td>6224</td>
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<td>Some of the Tables (e.g. Table 3.2-3 to 3-6) are not reader-friendly in the present form. Their printed versions can hardly be read without using a magnifying lens. [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<td>20567</td>
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<td>In general again: given the impacts on climate change and its impacts on SIDS it would be good if this report could stir future actions by the international political and general community. What will happen with the affected populations if the sea levels are so high that these deliberate the country? I agree that it is better not to contemplate the worst case scenario, but if it happens will there be a concerted action? In the worst case scenario: there will be a bigger number of refugees, where will this people be relocated? Or will we passively see them perishing? Or being used by human traffickers? It would be important for the future to have plans in place and agreed by all on how to deal with these situations. Considering the most nefarious consequences might keep nations focused on what needs to be done given the human and economic costs associated with the worst case scenarios. These plants could be drawn in consultation with the population and then put to the UN. It is crucial to be prepared. It might never happen, but if it happens there will be a legal framework that acknowledges that we are all inhabitants of the same planet, and that borders are a relativelly recent concept in his history. [Vera Barbosa Araujo Soares shinehotta, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>We thank the reviewer for their comments. We would look at the particular ideas that have been presented - Noting that the IPCC assessment process cannot be policy prescriptive - and we must stick with the dry facts and assess their implications.</td>
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<td>1403</td>
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<td>There is potential for novel effects from SRM, but suppress some climate system feedbacks, the bulk of the effects of SRM are direct offset of the effects of carbon dioxide. (See MacMartin et al., 2015, “On solar geoengineering and climate uncertainty” or the recent review by Irvine et al., 2016.) [Ben Kravitz, United States of America]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft of this chapter.</td>
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<td>1404</td>
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<td>I think this chapter is where being pipedreamed the ‘frameworks’ framing set up in Chapter 1 is doing the report a disservice. You rightly say that you can’t talk about the climate effects of 1.5°C without talking about the path to getting there. But because the pathways don’t include SRM, you can’t talk about the effects of SRM, which I think is missing a huge portion of the conversation. [Ben Kravitz, United States of America]</td>
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<td>1405</td>
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<td>This chapter suffers from the lack of integration of SRM. It needs sort of like “well, we had better say something about SRM, so here is a small section.” This is disatisfaying. [Ben Kravitz, United States of America]</td>
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<td>10879</td>
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<td>Chapter 4 talks about 1.5 or 2°C world, while chapter 3 uses other names (see comment 8), shouldn’t all chapters call it in a same way? [Carolina Vera, Argentina]</td>
<td>Agreed. We have taken this on board.</td>
</tr>
</tbody>
</table>
The assessments of the attribution and detection the impacts of the past climate change on natural and human systems are not inadequate. In addition, the effects of climate change on environmental pollution is being concerned, including air pollution, water pollution, and soil pollution, so add some assessments for these aspects. [Jianguo Wu, China]

The risk tables presented in Chapter 3 are useful and should be further developed. They potentially provide a useful X-chapter summary mechanism – in this case, equity, poverty and sustainable development issues could be integrated into these tables - this could be discussed with Chapter 5. [Penny Ungaroth, South Africa]

If those subsections in 3.5 and 3.6 that COMPARE 1.5 with 2 degrees coordinate with authors of chapter 4 and 5 – either each chapter should

be aware of the comparison or allow authors to discuss the comparison in an Annex. That would mean that chapter 3 is extremely valuable and the author team is to be congratulated for the impressive level of detail, despite lack of targeted literature. However, it is already very long and some sections are still very contrived, necessitating careful condensing of the text. [Penny Ungaroth, South Africa]

The authors also mention that this report is assessing the evidence or impacts on human and natural ecosystems. As noted, this is a valid point. We are meeting to develop a better narrative between the various chapters - using the same

way of integrating the biological and human implications is one of the key things that we want to do in the next set of drafts. [Susan Clayton, United States of America]

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way of integrating the biological and human implications is one of the key things that we want to do in the next set of drafts. [Susan Clayton, United States of America]
### Comment No 20659
**Comment:** Make more clear in chapter 3 the trade-offs, co-benefits (not consistently represented), and impacts associated with the different pathways. Of particular concern, methods of assessment section could be better placed in Chapter 2, and written in a way that can be hard for a decision maker or non-specialist to make sense of. 

**Response:** Agreed, including this is the rewriting of the chapter.

### Comment No 20660
**Comment:** Box 3.2 and Box 3.3 could better organize content. Title of Box 3.2 is not helpful because it doesn’t describe the content of the box. Move Box 3.3 behind section 3.3.6 which also talks about snow and permafrost for the ease of the reader. 

**Response:** We will consider this in the light of the other comments about this sequence.

### Comment No 20661
**Comment:** Similar to Chapter 1, it is also allowed under IPCC chapter outline rules, IF sections 3.3, 3.4, 3.5, and 3.6 stay in chapter 3 (suggest author teams coordinate to reduce redundancies and strengthen overall storyline of the special report), consider moving section 3.5 ahead of 3.3 and 3.4. This suggestion (if possible) would put society and people first, and then proceed to explain how the physical impacts and ecosystem impacts must be paid attention to because they contribute to the societal impacts associated with the possible different pathways that decision makers could “select”. 

**Response:** We will consider this in the light of the other comments about this sequence.

### Comment No 20148

**Response:** We have assessed these and will include those that are relevant but are missing.

### Comment No 20150
**Comment:** Braun et al. 2017 Public perception of climate engineering and carbon capture and storage in Germany: survey evidence, in: Climate Policy, doi:10.1080/14693062.2017.1304888 - show how SRM is “wicked rejected” among the German public. 

**Response:** We have assessed these and will include those that are relevant but are missing.

### Comment No 20153
**Comment:** Geoengineering also does nothing to challenge the systems of production and consumption that might be considered unsustainable for reasons other than greenhouse gas emissions associated with them. 

**Response:** Noted.

### Comment No 20155

**Response:** Noted.

### Comment No 20158

**Response:** Noted.

### Comment No 20530
**Comment:** general comment on chapter [Sylvia Sander, Monaco]

**Response:** Comment incomplete?

### Comment No 20535
**Comment:** entire chapter: the boxes are in a very premature draft version making their review impossible. [Sylvia Sander, Monaco]

**Response:** Noted.

### Comment No 20512
**Comment:** On attribution of impacts, see Carleton and Hsiang (2016) and references therein. 

**Response:** Noted. Reference included.

### Comment No 20536
**Comment:** entire chapter: often words are repeated in one sentence but with different meanings, e.g. increasing… more specific comments below [Sylvia Sander, Monaco]

**Response:** Noted.

### Comment No 20787
**Comment:** This chapter is very long and promises to get longer when missing sections are drafted and anticipated research results become available. Despite its length it does not use the regional summaries found in WG II reports (there are a few regional boxes). Perhaps sections 3.3 through 3.7 could take the form of summary tables (already drafted) with no more than a page of key points for each table. Then there would be space for regional summaries that I think would be appreciated by governments and lay readers. [Eric Hales, Canada]

**Response:** We are undergoing rewriting and a process by which we will shorten chapter. Considering tables plus online material - reducing page. We are also adding a table that summarises regional impacts.

### Comment No 20838
**Comment:** No comments [Mats Wrinch, Sweden]

**Response:** Noted.

### Comment No 20764
**Comment:** Consider summarizing in the executive summary if the difference between 1.5 °C and 2 °C of warming is only a matter of a gradual increase in climate risks and impacts or also includes some non-linear effects [Iulian Florin VLADU, Germany]

**Response:** Substantial amounts chapter have been rewritten, reducing overlap, typographical errors, and repetition of sections of the chapter. 

### Comment No 20879
**Comment:** This chapter is very long and promises to get longer when missing sections are drafted and anticipated research results become available. Despite its length it does not use the regional summaries found in WG II reports (there are a few regional boxes). Perhaps sections 3.3 through 3.7 could take the form of summary tables (already drafted) with no more than a page of key points for each table. Then there would be space for regional summaries that I think would be appreciated by governments and lay readers. [Eric Hales, Canada]

**Response:** We are undergoing rewriting and a process by which we will shorten chapter. Considering tables plus online material - reducing page. We are also adding a table that summarises regional impacts.

### Comment No 20976
**Comment:** We agree and tightened the text around this particular issue - further developed in the TOD. 

**Response:** Noted.

### Comment No 20947
**Comment:** I think this chapter is in excellent shape for a first order draft - It brings many pertinent findings together in a clearly expressed and coherent manner. I hope these come to hand in time. [David Wratt, New Zealand]

**Response:** We are grateful for your suggestion, and will be including consideration of it in the next draft.

### Comment No 20231
**Comment:** While the report focusses on a comparison of air temperature increases of 1.5 °C and 2 °C by 2100 (compared to the reference period), it is not always clear in the discussion of impacts what the timing of these impacts will be. Responses in natural systems are also transient in nature and can lag behind the change in climate and it is not clear at times in the text whether we are considering an equilibrium response (the projected impact may occur well after 2100) or the impact that will occur in 2100. Is the idea to consider impacts that might occur over the next few decades (50-100yrs) to provide information on adaptation that may be required? Additional specific comments regarding this issue are also offered below [Sharon Smith, Canada]

**Response:** We agree and tightened the text around this particular issue - further developed in the TOD.
In section 1.6, it is proposed to use specific confidence language. Throughout Chapter 3, different words are used to refer to levels of evidence, not necessarily in concordance with the three categories presented in Figure 1.7 (limited, medium, robust evidence). For example, substantial evidence (page 3-17, line 26), insufficient evidence (page 3-28, line 44), strong evidence (page 3-37, line 14), considerable evidence (page 3-43, line 26), etc [Vanessa Pánaro, Argentina]

We also agreed that we have been inconsistent with the use of language and are working on rectifying that in the SO. We are also going to eliminate loose use of the words associated with the competence language, as much as is possible.

We assume resolution of the figures will be improved for the final version since some of them are difficult to read. For example: reference on the right in Figure 3.2 (page 3-18), lines in Figure 3.19 (double caption in Figure 3.19) [Vanessa Pánaro, Argentina]

LTTG. 'well below 2°C' is also problematic throughout the report as this legally interpretative. These elements are indivisible parts of the Paris Agreement this special report which appears to be have been overlooked in the way that the 'well below 2 °C' has been interpreted. Disconnecting 1.5°C from and likelihood by which warming is held well below 2 °C compared to 'hold below 2 °C' (e.g. Schleussner et al. 2016). This is the very raison d'etre of The expression 'holding … well below 2 °C, pursing 1.5' in the legally binding long term temperature goal (LTTG) of the Paris Agreement is a CO2 in the atmosphere. [Klaus Radunsky, Austria]

The description of the risks of SRM does not mention the need to use that approach for the lifetime of CO2 in the atmosphere. The reader should be global scale at the political level. [Klaus Radunsky, Austria] was not the case for SRM, e.g. because of the large uncertainties in impacts, unintended side effects, lack of any recognition as a viable option at the contribution of SRM to meet the goals of the Paris Agreement. Whereas CDR has been implicitly assumed to be deployed in the future in the past this the inertia of the climate system. All emissions of GHGs in the atmosphere therefore would have to be compensated by CDR later on if we want to proofing of infrastructure projects - very challenging and might result in significant maladaptation! [Klaus Radunsky, Austria]

It would be important to highlight that the current atmospheric concentration of GHGs would ultimately result in a warming of about 1.5 degrees given the inertia of the climate system. All emissions of GHGs in the atmosphere therefore would have to be compensated by CDR later on if we want to limit climate warming to 1.5 degrees. Chapter 2 should indicate the required investments that would be needed to achieve this. Current estimates are in the range above 150 USD per ton CO2 [Klaus Radunsky, Austria]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

This is a good point we have adopted this in places.

There are some other major assessment reports, in particular related to the Arctic, that are relevant to this discussion of impacts and should probably be consulted. These include AMAP assessment reports which are in press (with the policy summary and overview reports already available); update to 2011 Snow Water Ice and Permafrost in the Arctic (SWIPA 2017), regional reports for Adaptation, Actions for a Changing Arctic; Information on changes in natural systems is provided in the latest State of the Climate (published in BAMS) and Arctic Report Cards. Other recent assessments that might be of interest include Canada's Changing Coasts and Climate risks and adaptation practices for the Canadian transportation sector 2016 both of which are available at adaptation.miccan.gc.ca [Sharon Smith, Canada]

GREGORY INSAROV, Russian Federation

Communicating of confidence for statements on risks, opportunities and consequence for 1.5 °C versus 2 °C warming is virtually absent, confidence language should be used in SOD. If a statement based on one paper and authors' judgement, this should be clear for readers. Low/medium evidence and low/medium agreement to determine the level of confidence in a key findings may be rather common in this SR because of lack of literature. [GREGORY INSAROV, Russian Federation]

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We thank the reviewer for some useful comments here. We are working to reduce the amount of AR5 and discussion on non-1.5 °C versus 2 °C comparisons. We are developing significant block of SOM material online. We appreciate we have not used competence language consistently across FOD-CHS and have worked on systematically adding language throughout the chapter where appropriate.

General comments to the whole Chapter 3. Authors team have done great job composing the FOD. Comments below hopefully can help in preparation to the SOD. In spite of the fact that literature on impacts, risks, opportunities and consequence for 1.5 °C versus 2 °C warming is scarce, authors team may want to focus on it preparing SOD. The greater part of the 165 pages of FOD is description of the ARS results and subsequent papers not dealing with 1.5 °C versus 2 °C warming effects, there are whole sub-sections with no focus information. Authors team may want to cut these parts of the Chapter giving references to chapters and sections of the ARS and other literature, where appropriate. Another way for decreasing size of the Chapter 3 is to avoid repetitions, see specific comments please.

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We have significant different parts of the report and reduced the overlap. Further streamlining of the manuscript would occur as we also reduce the length of chapter 3.

We have addressed these comments significantly reorganised and rewritten the last and box on tipping points. We still have considerable work to do in order to smooth out repetition and confusion that exists around tipping points.

The initial section of chapter 3 has attempted to take this issue on board. These are relevant comments.

The whole chapter 3 is in my opinion to worry and not really well organized. It could be much shorter and with clearer statements. As you already wrote in the beginning of chapter 1, there are only well known things presented. Then you add some findings from new publications. Which is in general fine to me. But it should also be stated at the beginning of chapter 3 that also them do not lead to any groundbreaking news. [Sabine Wurster, Germany]

Noted.

Overall, Chapter 3 needs much more work, including completing many subsections, deleting the repetitions, and streamlining the text for coherence. [Hong Yang, Switzerland]

Noted.

# Tipping points: This issue is very confusingly dealt with. There's a box on it (that could be improved considerably), there are abrupt changes (e.g. 3.4.3.2.2), there is RFC5, and there are 'regional tipping points' 3.6.6. This needs to be improved.

# Adaptation potential: There is no mention of reduced adaptation pressure, or exceeded limits to adaptation at 1.5°C or beyond. 

# Key concepts: RFCs, hot spots, key risks. All side by side. This does not help to streamline the chapter.

# Treatment of regional issues: Similarly, the level of detail on which regional information is treated differently between the sections making it difficult to assess it and leading to a lot of repetition (I don't know, how often I read about the Med region drying or the Arctic sea ice melt...). Plus, key conclusions from the AR5, like 2°C warming for Africa are left unmentioned. Obviously, a comprehensive regional coverage cannot be done. But maybe the key risks from the regional chapters in the AR5 could be revisited and updated where appropriate? 

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[3/4] [Bill Hare, Germany]

We have addressed these comments significantly reorganised and rewritten the last and box on tipping points. We still have considerable work to do in order to smooth out repetition and confusion that exists around tipping points.

The initial section of chapter 3 has attempted to take this issue on board. These are relevant comments.

The whole chapter 3 is in my opinion to worry and not really well organized. It could be much shorter and with clearer statements. As you already wrote in the beginning of chapter 1, there are only well known things presented. Then you add some findings from new publications. Which is in general fine to me. But it should also be stated at the beginning of chapter 3 that also them do not lead to any groundbreaking news. [Sabine Wurster, Germany]

Noted.

Overall, Chapter 3 needs much more work, including completing many subsections, deleting the repetitions, and streamlining the text for coherence. [Hong Yang, Switzerland]

Noted.

# Tipping points: This issue is very confusingly dealt with. There's a box on it (that could be improved considerably), there are abrupt changes (e.g. 3.4.3.2.2), there is RFC5, and there are 'regional tipping points' 3.6.6. This needs to be improved.

# Adaptation potential: There is no mention of reduced adaptation pressure, or exceeded limits to adaptation at 1.5°C or beyond. 

# Key concepts: RFCs, hot spots, key risks. All side by side. This does not help to streamline the chapter.

# Treatment of regional issues: Similarly, the level of detail on which regional information is treated differently between the sections making it difficult to assess it and leading to a lot of repetition (I don't know, how often I read about the Med region drying or the Arctic sea ice melt...). Plus, key conclusions from the AR5, like 2°C warming for Africa are left unmentioned. Obviously, a comprehensive regional coverage cannot be done. But maybe the key risks from the regional chapters in the AR5 could be revisited and updated where appropriate? 

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[3/4] [Bill Hare, Germany]
### IPCC WGI SR15 First Order Draft Review Comments and Responses - Chapter 3

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<tr>
<td>12360</td>
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<td>The use of temperature stabilization framing in relation to 1.5°C and the Paris Agreement LTGT is policy prescriptive. The Paris Agreement LTGT in Article 2.1 does nowhere refer to this, nor does it directly imply that temperature stabilization is the goal. In fact reference to the term stabilization was specifically rejected by a large number of countries in the formulation of this goal. Whereas there are scenarios in the literature that may stabilize warming at some level this does not mean they are consistent with the PA LTGG. There are several different ways in which A.2.1 can be interpreted, but one important way relevant to the vulnerable countries who sought 1.5°C as a limit in extremis. This means that it is an upper bound not to be exceeded and in the longer term to warming to be limited below this level. Consequently the stabilization framing of this section cuts across this interpretation and is hence policy prescriptive. [Bill Hare, Germany]</td>
<td>We accept the point being made here and have modified some of the language in the report. However, we are planning to revisit this issue in the next round of edits.</td>
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<tr>
<td>12361</td>
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<td>(14) A lot of work remains in this chapter. The current state made it quite difficult to review, with key elements (i.e. boxes) missing and limited consistency between the sections. Some general comments/remarks: # A WGI/WG2 divide is very apparent in the chapter. WG1/WG2 approaches stand side by side and little to no integrations is achieved. By doing so, the chapter comes close to what was to be avoided—a mini-AR5. Just to illustrate my point. There are different concepts used between i.e. 3.3. and 3.4— one linking back to the SRES, the other updating the key risks from WGI. One is using ‘hot spots’, other aggregate RFCs. There are very different ways evidence from the AR5 is being reviewed or build upon (sometimes not at all). I understand that this such an integration is a very challenging task in particular given the limited time left, but I am also optimistic that it can be achieved. While reading it, I felt that many sections could benefit from referencing back more clearly to the AR5. The scoring of the AR5 and just focus on new science that would alter the AR5 conclusion on the matter or that is of key relevance for 1.5°C. [Elvira Poloczanska, Germany]</td>
<td>We have been working on integrating the narrative across the different sections and across the special report. We plan to work on this further in the next draft, with plans for a special report to improve the flow of the narrative.</td>
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<td>6520</td>
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<td>For the whole chapter, from the way it is written right now, it is not always clear, where this report gives additional updated info compared to earlier IPCC reports. That should be kept in mind when further working on it. Also, the same information is repeated sometimes from one subchapter to the next. [Heike Hellinghaus, Germany]</td>
<td>Accepted. Text revised and improved.</td>
</tr>
<tr>
<td>8824</td>
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<td>Figures need to be cleaned. 3.2, 3.7, 3.12, 3.17, 3.18, 3.20 [Luba Alam, Bangladesh]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
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<td>8833</td>
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<td>Many figures are inserted with captions. Therefore the figures are now too too captions. [Luba Alam, Bangladesh]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<td>13699</td>
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<td>Use of upper and lower case inconsistent throughout chapter (e.g. cross- chapter Box vs Cross-chapter box, vs. cross-chapter box, Pre-Industrial vs pre-Industrial vs Preindustrial). HAPPI vs HAPPI [Envia Poloczanska, Germany]</td>
<td>Accepted. Text revised.</td>
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<tr>
<td>8836</td>
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<td>Most of the Tables are in picture format. It should be written uniformly. [Luba Alam, Bangladesh]</td>
<td>Accepted. Text revised and improved.</td>
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<td>13702</td>
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<td>make sure that somewhere in the text it is referred to the Boxes (e.g. not done for Box 3.2) [Envia Poloczanska, Germany]</td>
<td>Accepted. Text revised.</td>
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<td>1417</td>
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<td>Overall, I feel like large parts of this report do not focus on the +1.5°C target specifically, it is more like an intermitative AR5 but less detailed. This is maybe due to the lack of studies focusing on that target but I am afraid that this work and the forthcoming AR5 will be too similar. Moreover it seems that many results/findings are based on few papers [Philipp Roudier, France]</td>
<td>We agree and have been reducing the non-relevant 1.5°C and 2°C material and to improve the text so it doesn’t sound like it’s trying to be AR5!</td>
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<td>12364</td>
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<td># Pathway dependencies, reversibility, overshoot, impacts beyond 2100. These issues are not really addressed consistently throughout the report, but limited to only a few pages at the end. # Section that would benefit most from targeted improvements (from those which are already in a state that allows to comment on them): 3.3.10, 3.4.5.3.5. # There is no information on the impacts of climate change on mitigation potentials (e.g. carbon sinks or agricultural production), which would be very useful. [Bill Hare, Germany]</td>
<td>Accepted. Text revised and improved.</td>
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<td>14986</td>
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<td>The chapter could be tightened significantly. Several findings are repeated several times in multiple subheadings. Streamlining the report will improve its readability [Farhan Akhtar, United States of America]</td>
<td>Accepted. Text revised and improved.</td>
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<td>8843</td>
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<td>Reference has major problem as most of the references do not include &quot;ISSUE NUMBER&quot; [Luba Alam, Bangladesh]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<td>14887</td>
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<td>Throughout this chapter, it is important to focus on effects specifically to the mandate and scope of this report i.e. on warming of 1.5 deg C. If there is no specific literature relating effects at 1.5 deg C, authors should only note the information gap. Areas where there is currently insufficient literature could be addressed by the later special reports or by the working group contributions if this information becomes available. There is no need to reiterate AR5 findings on higher temperature levels including 2.0 deg C in this report. This appears to happen most often in the impacts on human systems section and in particular in the discussions on conflict and migration. This may mean that consideration of important topics will have to be taken up when information is available potentially in later reports this cycle. [Farhan Akhtar, United States of America]</td>
<td>Accepted. Text revised and improved.</td>
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<td>There is no discussion on possible macro-economic impacts in this chapter. Perhaps there is not enough information about this, but I would at least expect a discussion on this given recent literature on this topic (for instance Dell et al. 2014 in JEL, Burke et al. 2015 in Nature) [Andreas Hof, Netherlands]</td>
<td>We will explore the literature - we thank the reviewer for pointing this out.</td>
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<td>My main concern with the chapter is that all or less this is for the physical climate analysis, such as temperature extremes it is mainly done for the CMIP5 transient method (as described in James et al., 2017). I think some of the primary figures could be replaced by initiatives that have done the same analysis, but that were specifically designed for Paris Agreement. Such as &lt;NAME&gt;. [Elvira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
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Chapter 3 has done very well to provide this much content in such a short amount of time! Undoubtedly there is more work to be done, particularly as new literature becomes available. Three areas that need to be addressed: (1) to reduce repetition (i.e. section 3.6 seems to repeat much of what has already been stated in section 3.4 and 3.5), (2) strengthen evidence on human systems, beyond health; and (3) adapt potential synergies and limits to adaptive capacity need to feature much more strongly, particularly throughout section 3.5. The danger throughout the chapter is to slide towards a mini-AR6 - too much material and not always well balanced. To make it more user-friendly (and shorter), consider summarizing the major findings from the AR5 upfront rather than in every sub-section. [Petra Tschakert, Australia]

We have moved away from using the AR5 risk tables and have included other tables which we plan to use to drive consistency and rigor and the SOD and beyond.

We have added summary tables as well as new tables in each of the "system" sections which capture and summarise adaptation option. These are picked up by chapter 4 which specifically looks at adaptation options - feasibility etc - and the potential for helping in a transition to a 1.5°C world.

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We are grateful for your suggestion, and will be including consideration of it in the next draft.
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**IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3**

We have taken this comment on board and have reduced policy prescriptiveness.

We will strive to be more inclusive.

We agree and are working to address this balance.

We agree with the reviewer and have taken on many of these recommendations in substantial revisions of the entirety of many of the sections. We are also continuing to work to remove text and shorten the overall narrative.

We agree and will be including consideration of it in the next draft.

We will work to improve the narrative consistency; see comments regarding workshop.

We agree and are addressing this balance.

We have considered this possibility and have partially adopted it.

We agree. Part of the text has been moved to S1.

We agree and have started with in the submitted SOD, the intention to have a special workshop in Paris sometime soon to help achieve this end.

We have taken this comment on board and have reduced policy prescriptiveness.

We have considered this possibility and have partially adopted it.

We agree and have started with in the submitted SOD, the intention to have a special workshop in Paris sometime soon to help achieve this end.

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We have taken this comment on board and have reduced policy prescriptiveness.

We will work to improve the narrative consistency; see comments regarding workshop.

We agree and are working to address this balance. One possibility is to move some of this material into the SOD, thereby reducing physical material.

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We agree and are working to address this balance. One possibility is to move some of this material into the SOD, thereby reducing physical material.

We will be including consideration of it in the next draft.
The AR5 and the subsequent Structured Expert Dialogue under the UNFCCC concluded that the science on 1.5°C is limited and that assessing differential impacts is very challenging. There was a scientific debate about the feasibility of attributing differential impacts to climate change. Only two years later this draft of the SR1.5 reports with high certainty a significant difference in risks and impacts across scales and systems. This rapid increase in knowledge and certainty needs to be more carefully explained. (Christiane Textor, Germany)

Chapter 2: I have reviewed Section 2.3 (which I am more familiar), I think this chapter is very long compared to IPCC-AR5 chapters (which are typically 80-100 pages long). Too many details are present and the section level and overall can be considerably reduced if there is a stronger focus on changes at 1.5°C rather than a scan of all the existing literature since AR5 (which more the focus of AR6). [David Docquier, Belgium]

Chapter 3: I think much more reference should be made to Table 2 of Box 3.12. These storylines are a very nice way to explain the impacts of different emission scenarios. [David Docquier, Belgium]

Chapter 3: This chapter has described impact of global warming on fisheries, but still lack of information related to aquaculture and Aquaculture sub sectors are included to Marine and Fisheries sector. Aquaculture sector is very influenced by global warming, not only on water and environment quality but also on the cultured species, e.g. the physiological process in aquatic organisms which depend on water temperature, acidity, salinity, and also several oceanic conditions and its change. Aquaculture activities are also very influenced by climate condition and its change, for example seaweed culture is conducted seasonally, group culture in North Bali (Indonesia) is interfered by salty fish population which appear in particular season; fish breeding process (duration and frequency) is changed by seasonal change; etc. [Elifani Ariesta, Indonesia]

This chapter includes a great deal of potentially useful information regarding the likely impacts of 1.5°C global warming, and the likely increases in impacts that would arise from an additional 0.5°C warming over the 1.5°C warming. However, the impact and utility of the chapter could be improved as discussed in my following comments. As well, the authors do tend to overstate the confidence they have in some of their statements, considering the paucity of evidence on many of the topics they consider. [Neville Nicholls, Australia]

Please do not allow confusion between "statistical signicance" and the common interpretation of the word "significant". [Wei Zhang, United States of America] We agree and we are working on making our competence language more consistent and robust.

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<tr>
<td>362</td>
<td>2</td>
<td>6</td>
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<td>There are too many title levels in the table of contents: in the ARS report, 3 levels are usually used (chapter, section, sub-section), while up to 5 levels are used in the SR15 report. This makes the variability of this table of contents very hard. I suggest to reduce the number of title levels to 3 as in the ARS report (and a fourth level can still be used in the text without appearing in the table of contents). [David Docquier, Belgium]</td>
<td>Noted.</td>
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<tr>
<td>363</td>
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<td>6</td>
<td>Consider shortening some sub-titles, which are very long. Reducing the number of title levels would partly solve this issue. [David Docquier, Belgium]</td>
<td>Noted.</td>
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<td>10</td>
<td>The table of contents is too long (5 pages), in large part due to the too high number of title levels. Please consider comments above (especially 9 and 10). In the ARS report, tables of contents are typically one page long. [David Docquier, Belgium]</td>
<td>Noted.</td>
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<td>6</td>
<td>Fonts are different in numbering of subchapters [Dmitry L. Rustin, Russian Federation]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<td>354</td>
<td>2</td>
<td>22</td>
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<td>24</td>
<td>Shorten the title of this sub-section by removing &quot;Observed changes (including paleo); attributed changes; projected risks; avoided risks at 1.5°C&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
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<td>Shorten the title of this sub-section by removing &quot;including extremes and urban climate&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
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<td>30</td>
<td>Shorten the title of this sub-section by removing &quot;in regional temperature means and extremes, including urban climate&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
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<td>2</td>
<td>32</td>
<td>Shorten the title of this sub-section by removing &quot;in regional temperature means and extremes, including urban climate&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
</tr>
<tr>
<td>358</td>
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<td>2</td>
<td>33</td>
<td>Shorten the title of this sub-section by removing &quot;including heavy precipitation and monsoons&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
</tr>
<tr>
<td>359</td>
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<td>2</td>
<td>34</td>
<td>Shorten the title of this sub-section by removing &quot;in regional precipitation&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
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<td>360</td>
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<td>2</td>
<td>35</td>
<td>Shorten the title of this sub-section by removing &quot;in regional precipitation&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
</tr>
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<td>361</td>
<td>2</td>
<td>38</td>
<td>2</td>
<td>38</td>
<td>Shorten the title of this sub-section by removing &quot;in drought and dryness&quot;. [David Docquier, Belgium]</td>
<td>Rejected. To be considered in next draft.</td>
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<tr>
<td>362</td>
<td>2</td>
<td>43</td>
<td>2</td>
<td>43</td>
<td>Remove &quot;including upwelling&quot; [David Docquier, Belgium]</td>
<td>Accepted. Text revised.</td>
</tr>
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<td>Islands is missing from the title [Entra Poloczanska, Germany]</td>
<td>Noted.</td>
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<tr>
<td>21280</td>
<td>3</td>
<td>165</td>
<td>3</td>
<td>165</td>
<td>the authors of this chapter should give more importance to scientific research papers about the impact of climate changes on Ilmos and regional systems, also they should refer to international bibliography like (GEO 8 report). in chapter 3 the authors ignore a very important phenomena related to climate change which is desertification. [Wael EL ZEREY, Algeria]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
</tr>
<tr>
<td>7451</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>Difficult to understand the headings of 3.4.1.2, 3.4.2.2, 3.4.3.2 etc. The respective chapters do not seem to contain much information about projected adaptation. Does one mean &quot;Projected risks and adaptation needs...&quot;? [Sylvyn Christoffersen, Norway]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
</tr>
<tr>
<td>1077</td>
<td>3</td>
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<td>3</td>
<td>9</td>
<td>All the very light bold key takeaway sentences in the Executive Summary in the front of each chapter for media and amplifiers. This was a great aspect of ARS suggest it be repeated in this 1.5SR [Martin Catherine, United States of America]</td>
<td>Noted.</td>
</tr>
<tr>
<td>365</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>It’s strange to have a supplementary sub-section after the global synthesis. I suggest to put this sub-section before the sub-section ‘Global synthesis’. [David Docquier, Belgium]</td>
<td>Accepted. Improved in SOD.</td>
</tr>
<tr>
<td>15668</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Add: &quot;The likelihood of such abrupt termination of SRM is debated, which some pointing out that incertitudes to continue SRM would be overwhelming resulting in any capable entity to jump to the occasion if a deploying entity were to cease deployment.&quot; Study forthcoming by Parker and Irvine. [Matthias Honegger, Germany]</td>
<td>Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.</td>
</tr>
<tr>
<td>15669</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>Statement is incomplete and as a consequence inaccurate - insert &quot;global model experiments suggest that in case of SRM implementation to compensate for the full amount of GHG induced warming...&quot; [Matthias Honegger, Germany]</td>
<td>Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.</td>
</tr>
<tr>
<td>7825</td>
<td>3</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>There are some impacts which affect both in natural and human systems (e.g., coastal erosion in Box 3.4). The impacts in natural and human systems might be summarized before the contents of sections 3.4 and 3.5. [Koeki Udo, Japan]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
</tr>
<tr>
<td>619</td>
<td>3</td>
<td>11</td>
<td>3</td>
<td>12</td>
<td>The current text &quot;Impact studies on agricultural crops were focused on several components that contribute to food productions (crop suitability and yield, CO2 fertilization, biotic and abiotic stresses)&quot; is true, but I would suggest to add the text describing the fact that climate also influences harvested area and number of annual harvesting. An example of the text may be &quot;However, most studies focus on the impacts on yields, and the climate impacts on remaining component of crop production, such as harvested area and number of annual harvesting are under-studied ([Izumi and Ramankutty, 2016]). A few available studies reveal that climate impacts on harvested area is comparable in the magnitude to those on yield (Cohn et al., 2016; Lesk et al., 2015).&quot;. [Matthias Honegger, Germany]</td>
<td>Accepted. Improved in SOD.</td>
</tr>
<tr>
<td>1581</td>
<td>3</td>
<td>14</td>
<td>3</td>
<td>14</td>
<td>Use the same degree symbol as above. Use only one degree symbol throughout the report. [Alan Robock, United States of America]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>15660</td>
<td>3</td>
<td>14</td>
<td>3</td>
<td>14</td>
<td>A statement on the effects of fully compensating for 4xCO2 needs to be complemented with more recent study results on partial compensation of elevated CO2 levels, in particular since the results indicate that such type of SRM deployment would be much more meaningful for most if not all climate variables. [Matthias Honegger, Germany]</td>
<td>Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.</td>
</tr>
<tr>
<td>9858</td>
<td>3</td>
<td>16</td>
<td>3</td>
<td>16</td>
<td>I wonder if it would not make sense to add a section on projected changes in phenology as this is a key element for several ecosystem processes [Christopher Reyer, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
</tr>
<tr>
<td>15661</td>
<td>3</td>
<td>18</td>
<td>3</td>
<td>18</td>
<td>Reference unicassamty complex - suggest to replace &quot;with further improvements regarding coastal flood levels due to the attenuating effect on sea level rise&quot;. [Matthias Honegger, Germany]</td>
<td>Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.</td>
</tr>
<tr>
<td>386</td>
<td>3</td>
<td>20</td>
<td>3</td>
<td>20</td>
<td>Remove [inc. small islands]; [David Docquier, Belgium]</td>
<td>Noted.</td>
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</tbody>
</table>
### Comment Response

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>15662</td>
<td>Insert: &quot;surprisingly and perfectly stable...&quot; In fact what Hicks et al. have shown is that precipitation would be slightly overcompensated compared to temperature. Meaning that there is a point of optimization of both, which is not at pre-industrial levels, but closer to pre-industrial by far compared to the non-SRM climate to be expected at corresponding levels of GHG-concentrations! Additional reference on this: Moreno-Cruz, J. B., Ricke, K. L., &amp; Keith, D. W. (2012). A simple model to account for regional inequalities in the effectiveness of solar radiation management. Climatic change, 110(3), 449-468. (Matthias Honegger, Germany)</td>
</tr>
<tr>
<td>620</td>
<td>As for the current text &quot;what the effects on rice and soybean yields have been smaller...&quot;, another global modeling study (Izumi et al., 2017) shows the consistent result on rice (small effects or even positive effects on rice) whereas it shows the opposite results for soybean (negative effects on soybean). The tendency that less negative impacts or even slightly positive impacts on rice is consistent across global modeling studies (Müller et al., 2014).</td>
</tr>
<tr>
<td>15663</td>
<td>Insert: &quot;that global mean temperature would by itself not be a good proxy for...&quot; (Matthias Honegger, Germany)</td>
</tr>
<tr>
<td>621</td>
<td>The current text &quot;Crop productions are strongly affected by increases in extreme events, but the quantification of these changes is more difficult.&quot;] would read that &quot;Crop productions are strongly affected by increases in extreme events, but the quantification of these changes is limited in the number of studies.&quot; However, available global analyses detected the climate change signals in yield variability (Osborne and Wheeler, 2013, Izumi and Ramankutty, 2016).</td>
</tr>
<tr>
<td>10704</td>
<td>The space around line 35 should be deleted (Seyed Muhammadreza Tabatabaei, Iran)</td>
</tr>
<tr>
<td>15664</td>
<td>I know from the authors personally that the motivation behind the study was that they expected the results of partial SRM application to be much more meaningful than full compensation (which turned out false). Therefore the sentence is incorrect and I suggest to reformulate as follows: &quot;Because it was to be expected that moderate deployment to compensate only partly for GHG-induced warming would result in a better attenuation of climate change across most if not all climate variables, more recent studies have assessed whether this was true. They have indeed found SRM deployment for such partial compensation to be a much more realistic option than full compensation.&quot; (Matthias Honegger, Germany)</td>
</tr>
<tr>
<td>387</td>
<td>Remove [quantity and quality]! (David Docquier, Belgium)</td>
</tr>
<tr>
<td>15665</td>
<td>Do not think this is a &quot;main issue&quot; as described in this sentence. In my reading of the literature, SRM deployed for partial compensation moves regional climates almost without exception significantly closer (while not fully) toward their pre-industrial states. Mitigation of GHG emissions also does not have a uniform impact on regional climate outcomes since inherently historical climate change does not have a uniform impact, yet this is obviously not a &quot;major issue&quot; for mitigation. (Matthias Honegger, Germany)</td>
</tr>
<tr>
<td>15666</td>
<td>Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.</td>
</tr>
<tr>
<td>15667</td>
<td>How is this statement substantiated? If there is evidence to support this it should be referenced and put into context. The body of literature on this is too thin, to partially favor local SRM over global. The language here therefore should absolutely avoid favouring one over the other. There might be very severe changes in local climate or weather patterns due to local or regional alleviation changes (potentially much worse than in case of globally uniform changes to albedo via stratospheric intervention). Taking an earth systems perspectives would in fact suggest this to be the case. (Matthias Honegger, Germany)</td>
</tr>
<tr>
<td>968</td>
<td>O'is missing, it must be &quot;1.5°C warmer worlds&quot; (Mustafa Tuğan, Turkey)</td>
</tr>
<tr>
<td>653</td>
<td>Floods may also have an impact in coastal ecosystems, changing the sedimentation rates, coastal morphologies, nutrient availability, risk of red-tides, etc, which may have undesirable ecological, social and economics effects in some regions (Castor Muñoz Sobrino, Spain)</td>
</tr>
<tr>
<td>15657</td>
<td>Why is compensation of a quadrupling of CO2-levels chosen as illustration of what SRM could be doing? There's recent literature that illustrates why earlier modelling studies which have been conducted at such high compensation levels are inadequate representations of how SRM policies could actually look like. Such policies would much more likely aim to only partially compensate for elevated concentrations of GHGs. (Matthias Honegger, Germany)</td>
</tr>
<tr>
<td>368</td>
<td>Remove [including fisheries]. (David Docquier, Belgium)</td>
</tr>
<tr>
<td>10706</td>
<td>Partial compensation to vs. (Seyed Muhammadreza Tabatabaei, Iran)</td>
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<td>10706</td>
<td>vs should change to vs. (Seyed Muhammadreza Tabatabaei, Iran)</td>
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<td>10707</td>
<td>Partial compensation to vs. (Seyed Muhammadreza Tabatabaei, Iran)</td>
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<td>10708</td>
<td>Partial compensation to vs. (Seyed Muhammadreza Tabatabaei, Iran)</td>
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<td>10709</td>
<td>The space around line 47 should be deleted (Seyed Muhammadreza Tabatabaei, Iran)</td>
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<td>10710</td>
<td>Box on should be deleted (Seyed Muhammadreza Tabatabaei, Iran)</td>
</tr>
<tr>
<td>10711</td>
<td>The space between lines 2 and 3 should be deleted (Seyed Muhammadreza Tabatabaei, Iran)</td>
</tr>
<tr>
<td>369</td>
<td>While it is scientifically interesting to compare impacts at 1.5°C vs. other warming levels, why do you also compare to 3 and 4°C as the section title mentions 2°C only? (David Docquier, Belgium)</td>
</tr>
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<td>Comment No</td>
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<td>13156</td>
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</tbody>
</table>
Overview: Pathways to 1.5°C warming

We are grateful for your suggestion, and will be including consideration of it in the next draft.

It is clear that the Executive Summary is not complete and needs more substantial work. All the three sub-titles do not reflect the theme of the chapter. The ES ends prematurely and does not cover the full range of content covered in the chapter. Where are the human systems (beyond health)?

Chapter 3 has got many information and results. But the executive summary did not show well. Suggestion is to rewrite the executive summary. It should show more information and results than now. [Zong-Ci Zhao, China]

Chapter 3 has got many information and results. The executive summary is well written and clear. It should possibly be made even more explicitly that the impacts are highly non-linear hence the impacts of a 1.5°C warmer planet are rather different from those of a 2.0°C warmer planet. [Marco Muzzioli, Switzerland]

The choice of topics in E3 is odd. It has a long introduction and then a short section on floods - I guess this is a preliminary draft. [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]

The choice of topics in E3 is odd. It has a long introduction and then a short section on floods - I guess this is a preliminary draft. [Elvira Polsucazeka, Germany]

The choice of topics in E3 is odd. It has a long introduction and then a short section on floods - I guess this is a preliminary draft. [Alina Kupych, Austria]

The choice of topics in E3 is odd. It has a long introduction and then a short section on floods - I guess this is a preliminary draft. [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]

The choice of topics in E3 is odd. It has a long introduction and then a short section on floods - I guess this is a preliminary draft. [Klaus Radunsky, Austria]
2015
Reduce this section to a single short paragraph. It is far too detailed for the ES and it means you have less room to discuss the important matters that should be in the ES (impact) [Neelke Niethammer, Australia]. Accepted. Text revised.

3870
Because there are some duplicates of text in the next paragraph and also very generic, deleting them is recommended. The executive summary can start with the current line 8. [Patrick González, United States of America] Accepted. Text revised.

9699
It really needs to be said first (at least early on, but this seems to be best place to make the point) that a 1.5°C world will not fulfill the objective of the UNFCCC, namely to avoid dangerous anthropogenic interference with the climate and therefore should not be the warming level that we are aiming for. At 1.5°C, the world is likely committed to ongoing sea level rise at a rate that will require relocation of many coastal cities and abandonment of low-lying islands, that marine food chains are disrupted, and that leads to additional pressures for further warming as a result of the permafrost thawing and the CO2 and CH4 that may be released. In addition, it may well be that many forests are doomed to die and further CO2 will be released. So, it seems to me this chapter, and this report, simply make clear that 1.5°C warming is not a level that is scientifically defensible as a non-dangerous level, that instead 1.5°C is mainly a political choice, and that every effort should be made to get back to something like 0.5°C or less above preindustrial. [Michael MacCracken, United States of America] We are grateful for your suggestion, and will be including consideration of it in the next draft.

1071
The point should move before braces, so: ...related impacts. [3.2.1. ...] [Seyed Mahamadreza Tabatabaei, Iran] We are grateful for your suggestion, and will be including consideration of it in the next draft.

1072
cross-editary and an “1.5°C warmer world” should be deleted, so we will have: [3.2.1.3.3. Box 3.12] [Seyed Mahamadreza Tabatabaei, Iran] Accepted. Text revised.

16219
Not only will there be uncertainties, but there will be ongoing change for likely many millennia as the physical and biological systems try to adjust to the warmer conditions. The sentence here just says there will be uncertainties–it does not make clear that these uncertainties are with respect to quite serious impacts that will be the new baseline, the world will be very different than the preindustrial baseline and still changing, and this needs to be emphatically stated (and this will be the case independent of the pathway that is involved–though, of course, as the next paragraph indicates, there will be differences. [Michael MacCracken, United States of America] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20803
Might need to clarify that (d) and (e) refer to stabilization by 2100 (compared to (c) that refers to stabilization after millennia) [Sona Semenvalieva, Switzerland] We are grateful for your suggestion, and will be including consideration of it in the next draft.

5486
Written in a too complicated way. I suggest to simplify; not... whether global temperature reaches 1.5 (a) temporarily... (b) after greenhouse gas... (c) after greenhouse gas... but including an overshoot; or (d) as part of long-term... [Saisel Nouzil-Ribon, Germany] Accepted. Text revised.

1022
Classification of 4 cases here is quite relevant and this sentence should be kept. [Miisutose Yamaguchi, Japan] We are grateful for your suggestion, and will be including consideration of it in the next draft.

5243
...not only the pathway is important, also the natural variability of the climate system gives rise to considerable uncertainty of assessed impacts of 1.5 degree warming [Bart Van den Hurk, Netherlands] We are grateful for your suggestion, and will be including consideration of it in the next draft.

5286
It is pathway a) defined in chapter 17 the pathway definitions should be coherent with those included in chapter 1 [Carolina Vera, Argentina] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20471
This list is currently incomplete. I would suggest strikethrough “or” in line 14 after “after several millennia” in (c) or (e) through a mixture of emissions control and solar radiation management (SRM), for example with SRM deployed in such a way that the radiative forcing due to the peak atmospheric level of greenhouse gases is not felt to its full extent in terms of global mean temperature (this possibility is not discussed further in this report). Without some such addition this sentence fails to capture all the possible variations which it seems to be enumerating. This is especially the case because in Box 3.12 the Special Report does specifically address SRM as a route to a 1.5°C world. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)] We are grateful for your suggestion, and will be including consideration of it in the next draft.

10719
The should change to: (in braces, so: [3.2.1.3.3] [Seyed Mahamadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

10720
(15°C world is important, also the natural variability of the climate system gives rise to considerable uncertainty of assessed impacts of 1.5 degree warming [Bart Van den Hurk, Netherlands] Editorial - copyedit to be completed prior to publication

20094
Can be very large for others (e.g. sea level rise). The largest differences for sea level rise would be between cases (b) (a) or (b) (d). Would be good to emphasize this also here (the example only mentions (a) vs (b) vs (c) vs (d) [Sona Semenvalieva, Switzerland] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20095
This sentence should be before the first sentence. [Seyed Mahamadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

20096
In the paragraph, sea level rise as an example, mention should also be made regarding the fate of the marine food system will be affected by peak CO2 concentration, and mention simply has to be made that biodiversity will be very path dependent if one allows overshoot. And mention should also be mentioned that the duration of the overshoot will matter. In the terminology phase giving sea level as an example, mention should also be made regarding the fate of ice sheets—which would be the likely causes of the real difference in sea level results. [Michael MacCracken, United States of America] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20097
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20098
...and include mention that the duration of the overshoot will matter. In the terminology phase giving sea level as an example, mention should also be made regarding the fate of ice sheets—which would be the likely causes of the real difference in sea level results. [Michael MacCracken, United States of America] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20099
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20100
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20101
This list is currently incomplete. I would suggest strikethrough “or” in line 14 after “after several millennia” in (c) or (e) through a mixture of emissions control and solar radiation management (SRM), for example with SRM deployed in such a way that the radiative forcing due to the peak atmospheric level of greenhouse gases is not felt to its full extent in terms of global mean temperature (this possibility is not discussed further in this report). Without some such addition this sentence fails to capture all the possible variations which it seems to be enumerating. This is especially the case because in Box 3.12 the Special Report does specifically address SRM as a route to a 1.5°C world. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20102
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20103
This statement somehow contradicts the statement about the “2017 warming” of 1°C in chapter 3, page 7 Line 45-46 [Christopher Reyer, Germany] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20104
Not only the pathway is important, also the natural variability of the climate system gives rise to considerable uncertainty of assessed impacts of 1.5 degree warming [Bart Van den Hurk, Netherlands] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20105
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20106
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20107
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20108
This point should move before braces, so: ...millennia. [3.2.1.3.3] [Sayed Mahamadreza Tabatabaei, Iran] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20109
...should change to: (in braces, so: [3.2.1.3.3] [Sayed Mahamadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

20110
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20111
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20112
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20113
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20114
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20115
...should change to: (in braces, so: [3.2.1.3.3] [Sayed Mahamadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

20116
...should change to: (in braces, so: [3.2.1.3.3] [Sayed Mahamadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

20117
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20118
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20119
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20120
This point should move before braces, so: ...millennia. [3.2.1.3.3] [Sayed Mahamadreza Tabatabaei, Iran] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20121
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20122
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20123
This point should move before braces, so: ...millennia. [3.2.1.3.3] [Sayed Mahamadreza Tabatabaei, Iran] We are grateful for your suggestion, and will be including consideration of it in the next draft.

20124
We are grateful for your suggestion, and will be including consideration of it in the next draft.

20125
We are grateful for your suggestion, and will be including consideration of it in the next draft.
This mix of global GMT signal with regional warming is very confusing and should not be done. Same is true for indices other than GMT. [Bill Hare, Canada]

The earliest and the most late years of 1.5 global warming should be provided. [Zong-Ci Zhao, China]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

We are grateful for your suggestion, and will be including consideration of it in the next draft.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>14982</td>
<td>7</td>
<td>45</td>
<td>7</td>
<td>46</td>
<td>A single year’s temperature should not be used as an indication of global temperature increase. It should not be related to the 1.5 degree goal, as that would not be comparable. This does not meet the IPCC standards for science. “approximately 1 degree C” is unclear when compared with IPCC AR5: “The globally averaged combined land and ocean surface temperature data as calculated by a linear trend, show a warming of 0.85 (0.65 to 1.06) °C, over the period 1880 to 2012, when multiple independently produced datasets exist. The total increase between the average of the 1850–1900 period and the 2003–2012 period is 0.78 (0.72 to 0.85) °C, based on the single longest dataset available.” This report should perhaps appreciate the difference that is implied between 0.78 and 1 degree C. The role of natural climate variability is a critical element missing from this discussion. [Farhan Akhtar, United States of America]</td>
</tr>
<tr>
<td>7590</td>
<td>7</td>
<td>45</td>
<td>7</td>
<td>46</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>8987</td>
<td>7</td>
<td>45</td>
<td>8</td>
<td>12</td>
<td>Needs to highlight sea level rise. [Sae Ming Lee, China]</td>
</tr>
<tr>
<td>7627</td>
<td>7</td>
<td>46</td>
<td></td>
<td></td>
<td>This statement is obvious, possibly could be deleted [Sophia Fauset, United Kingdom (of Great Britain and Northern Ireland)]</td>
</tr>
<tr>
<td>17988</td>
<td>7</td>
<td>46</td>
<td>7</td>
<td>46</td>
<td>is this &quot;global mean temperature of 1.5°C&quot; or &quot;global mean temperature rise of 1.5°C&quot;? [William Moultons Okio, France]</td>
</tr>
<tr>
<td>20006</td>
<td>7</td>
<td>46</td>
<td>7</td>
<td>46</td>
<td>Add &quot;°C&quot; before &quot;global mean temperature of 1.5°C&quot; [Simos Sverar, Switzerland]</td>
</tr>
<tr>
<td>13247</td>
<td>7</td>
<td>46</td>
<td>7</td>
<td>46</td>
<td>add &quot;warming&quot; after 1.5°C [Wei Zhang, United States of America]</td>
</tr>
<tr>
<td>9851</td>
<td>7</td>
<td>47</td>
<td>7</td>
<td>47</td>
<td>does &quot;present&quot; here refer to 2017 or to some time period? [Christopher Ney, Germany]</td>
</tr>
<tr>
<td>14983</td>
<td>7</td>
<td>47</td>
<td>7</td>
<td>47</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13607</td>
<td>7</td>
<td>49</td>
<td>7</td>
<td>50</td>
<td>'record' is better to change to 'records' [Seyed Muhammadreza Tabatabaei, Iran]</td>
</tr>
<tr>
<td>1375</td>
<td>7</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>Box 3.12 is often cited in the executive summary. Consider removing some citations to this box. [David Docquier, Belgium]</td>
</tr>
<tr>
<td>13249</td>
<td>7</td>
<td>50</td>
<td>7</td>
<td>50</td>
<td>1.5°C [Wei Zhang, United States of America]</td>
</tr>
<tr>
<td>10733</td>
<td>7</td>
<td>50</td>
<td>7</td>
<td>50</td>
<td>cross-chapter and 'on '1.5C warmer world' should be deleted, so we will have: 3.2.1, 3.3.3, Box 3.12] [Seyed Muhammadreza Tabatabaei, Iran]</td>
</tr>
<tr>
<td>10734</td>
<td>7</td>
<td>50</td>
<td>7</td>
<td>50</td>
<td>The, should change to: in breezes, so. (3.2.1, 3.3.3, Box 3.12] [Seyed Muhammadreza Tabatabaei, Iran]</td>
</tr>
<tr>
<td>3658</td>
<td>7</td>
<td>52</td>
<td>7</td>
<td>62</td>
<td>the impacts of observed warming to date are likely to be underestimated... What is the evidence to back this up? In some cases, responses to warming are likely to non-linear..., so this is probably correct, but some references are needed. &quot;Having said that, the assumption in many parts of the chapter is that responses ARE linear between 1.5 and 2... [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)]</td>
</tr>
<tr>
<td>2107</td>
<td>7</td>
<td>52</td>
<td>7</td>
<td>52</td>
<td>The evidence rather obvious. I suggest rewriting even if some explanation is given in preceding paragraphs]. [Jan Fuglevoll, Norway]</td>
</tr>
<tr>
<td>12592</td>
<td>7</td>
<td>52</td>
<td>7</td>
<td>53</td>
<td>This para refers to 0.5C of additional warming compared to present levels, while chapter 1, page 12, line 23, speaks of 0.8 degrees C above the present decade 2010-2019. For final version of the report it would be good to ensure consistency here [Even Harrming, Germany]</td>
</tr>
<tr>
<td>18779</td>
<td>7</td>
<td>52</td>
<td>7</td>
<td>54</td>
<td>The sentence is very hard to understand. Does it mean that from past observations one can estimate what a 0.5°C global warming adds as effects? [Robert Vautard, France]</td>
</tr>
<tr>
<td>12780</td>
<td>7</td>
<td>52</td>
<td>7</td>
<td>54</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>17703</td>
<td>7</td>
<td>52</td>
<td>8</td>
<td>4</td>
<td>It might be relevant adding the timing at which differences between 1.5°C and 2°C are detectable for each impact [Ana Bastos, France]</td>
</tr>
<tr>
<td>5244</td>
<td>7</td>
<td>53</td>
<td>7</td>
<td>83</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13806</td>
<td>7</td>
<td>53</td>
<td>7</td>
<td>53</td>
<td>0.5°C warmer than present decade according to chapter 1 section 1.2 [Eva Poloczanska, Germany]</td>
</tr>
<tr>
<td>13809</td>
<td>7</td>
<td>53</td>
<td>7</td>
<td>54</td>
<td>Reference unclear, are you generalizing saying that past 0.5°C had an effect so future 0.5°C will too? Or Are you saying that some regions have already experienced 1.5? see chapter 1 section 1.2 [Eva Poloczanska, Germany]</td>
</tr>
<tr>
<td>2108</td>
<td>7</td>
<td>54</td>
<td></td>
<td></td>
<td>The language in this draft is often ambiguous. This is just one example. When you say &quot;already detectable&quot; do you actually mean &quot;has already been detected&quot;? Or do you mean that we could expect to find the changes in extremes, if we could look for them? [Christopher Ney, Germany]</td>
</tr>
<tr>
<td>10735</td>
<td>7</td>
<td>54</td>
<td>7</td>
<td>54</td>
<td>Is it better to change &quot;record&quot; to &quot;records&quot;? [Seyed Muhammadreza Tabatabaei, Iran]</td>
</tr>
<tr>
<td>2109</td>
<td>7</td>
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<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>5245</td>
<td>7</td>
<td>55</td>
<td>7</td>
<td>55</td>
<td>&quot;observed&quot; = &quot;observable&quot; or &quot;detectable&quot;? Results from simulations cannot be observed [Var Van den Hurk, Netherlands]</td>
</tr>
<tr>
<td>13810</td>
<td>7</td>
<td>55</td>
<td>7</td>
<td>55</td>
<td>provide an explanation for transient climate projection or record [Eva Poloczanska, Germany]</td>
</tr>
<tr>
<td>14984</td>
<td>7</td>
<td>55</td>
<td>7</td>
<td>57</td>
<td>Detactable how? Within computer models or through observations? There should be more discussion about the basis of these findings, including links to the underlying literature. [Farhan Akhtar, United States of America]</td>
</tr>
<tr>
<td>13811</td>
<td>7</td>
<td>56</td>
<td>7</td>
<td>56</td>
<td>Do you mean temperature mean and temperature extremes? Or do extremes include other variables? [Eva Poloczanska, Germany]</td>
</tr>
<tr>
<td>2110</td>
<td>7</td>
<td>57</td>
<td></td>
<td></td>
<td>Do you mean &quot;large&quot; when you say &quot;detectable&quot;? Why do you keep using different words for it when I think the same meaning? [Robert Vautard, France]</td>
</tr>
<tr>
<td>10736</td>
<td>7</td>
<td>57</td>
<td>7</td>
<td>57</td>
<td>The, should change to: in breezes, so. [3.3.1, 3.3.3, 3.12] [Seyed Muhammadreza Tabatabaei, Iran]</td>
</tr>
<tr>
<td>16221</td>
<td>7</td>
<td>57</td>
<td>8</td>
<td>1</td>
<td>We are presently experiencing very damaging Atlantic hurricanes because the water temperatures in some regions are up a degree or so - it might be good to mention that one can end up with more intense storms as oceans are warmed. [Michael MacCracken, United States of America]</td>
</tr>
</tbody>
</table>

We are grateful for your suggestion, and will be including consideration of it in the next draft.
In the section in the ES on "natural and managed sections," please include a summary of terrestrial agriculture (e.g. cropland, corn, rice, etc.), which is a critical sector for humanity that appears to be left out of the ES. (Christopher Clark, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

While adaptation is touched upon here and there in this chapter, this is the sole description of adaptation. There should be at least one paragraph

We are grateful for your suggestion, and will be including consideration of it in the next draft.

In the section in the ES on "natural and managed sections," please include a summary of terrestrial agriculture (e.g. cropland, corn, rice, etc.), which is a critical sector for humanity that appears to be left out of the ES. (Christopher Clark, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

How large is a "substantially lower risk?" The magnitude of these sorts of predicted changes is crucial, if you want a fact to take decision to not take your report. (Neville Nichols, Australia)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10697
8
8
8
1
In the section in the ES on "natural and managed sections," please include a summary of terrestrial agriculture (e.g. cropland, corn, rice, etc.), which is a critical sector for humanity that appears to be left out of the ES. (Christopher Clark, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10003
8
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8
1
Add "for" before "precipitation extremes" (Sonja Seneviratne, Switzerland)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10697
8
8
8
1
In the section in the ES on "natural and managed sections," please include a summary of terrestrial agriculture (e.g. cropland, corn, rice, etc.), which is a critical sector for humanity that appears to be left out of the ES. (Christopher Clark, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

12781
8
8
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1
The Mediterranean drought should be cited as "For example," (Robert Vautart, France)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

1319
8
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1
I think "safe" options is a bit too imprecise and should be reworded. "Safe" builds on so many judgements that it cannot be used like this in the ES, I hope.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

13703
8
8
8
34
The subtitle of Floods should be added "runoff" here, if the "drought" and "flood" are discussed, respectively? (Rongshuo Cai, China)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

13729
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4
Slightly unclear sentence, could change "For mean precipitation" to "hydrological drought", "accumulated precipitation", "hydrological drought", "soil moisture deficit", and "seasonal rainfall" to "hydrological drought", "accumulated precipitation", "hydrological drought", "soil moisture deficit", and "seasonal rainfall" in the Mediterranean region at 1.5°C compared to 2°C. (3.3.4) (Bult Nattalie, Australia)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10880
8
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8
4
Is the Mediterranean region the only one highlighted here because it is the only one with literature available or after a global evaluation is the only one

We are grateful for your suggestion, and will be including consideration of it in the next draft.

11923
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8
4
ADD...compared to 2°C, "for example" (Paul Doyle, Canada)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

11939
8
8
8
4
ADD...compared to 2°C, "for example" (Paul Doyle, Canada)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

13249
8
8
8
6
Should be "1.5°C warming climate" (Wei Zhang, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

13250
8
8
8
7
"1.5°C warming climate" should be "2°C warming climate" (Wei Zhang, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

9702
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34
36
The impacts of warmer ocean on fisheries and aquaculture vary regionally, e.g., the impact on fisheries might not be completely negative in High-Latitude Spring Bloom Systems, although the text emphasises the region where corsi will disappear. In addition, as a reader, I hope to know what kind of changes in coastal area are expected to experience? What types of coastal regions and communities will undergo positive or negative changes? (Rongshuo Cai, China)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

9799
8
8
52
52
The subtitle of Floods should be added "runoff" here, if the "drought" and "flood" are discussed, respectively? (Rongshuo Cai, China)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10681
8
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8
12
This conclusion is very important, it should have a reference to a chapter section (Carolina Vera, Argentina)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10122
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12
It might also be said that impacts with 1°C are a good bit greater than at 0°C as well? Regarding the second of the sentence, good to be saying that 1.5°C cannot be considered a safe option, but to suggest that adaptation can help in avoiding impacts seems unduly optimistic unless there are some qualifiers here--avoiding impacts of sea level rise will be virtually impossible in many locations, and will be able to be adapted to only for limited periods of time. Greater qualification is needed here. (Michael MacCracken, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

13812
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12
Adaptation and adaptation limits need to be addressed, clearly these are surpassed for some systems at 1.5°C (Elvira Poloczanska, Germany)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

6688
8
8
12
12
Suggest to add "...particularly considering the significant regional differences that may exist and the range of uncertainty among model projections..." after "impacts are to be reduced or avoided" (Sai Ming Lee, China)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

1023
8
8
12
12
While adaptation is touched upon here and there in this chapter, this is the sole description of adaptation. There should be at least one paragraph discussing how adaptation is effective and at what cost. (Mitsuvu Yamaguchi, Japan)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

2474
8
8
14
14
State at the outset: and tropical zones are expanding and concomitant--for tropics, e.g., biodiversity and diseases (Marina, dengue, zika, etc.) (Lisa Luco, United States of America)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

10446
8
8
14
50
Very clear exposition (Jonathan Lynn, Switzerland)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

1311
8
8
9
8
There is no reference to sub-sections of the Chapter after each statement. Add them please. (GREGORY INSAROV, Russian Federation)

We are grateful for your suggestion, and will be including consideration of it in the next draft.

1351
8
8
9
8
There is no reference to sub-sections of the Chapter after each statement. Add them please. (GREGORY INSAROV, Russian Federation)

We are grateful for your suggestion, and will be including consideration of it in the next draft.
Point lane, we are working to improve traceability. The interlinks into the primary literature for the different coastal ecosystems is quite strong. Papers by Lovelock, Hooidonk, and others indicate the advantages of the Long Term Stabilization Goal on these ecosystems - based on their sensitivity to sea level rise.

<table>
<thead>
<tr>
<th>Comment No</th>
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</thead>
<tbody>
<tr>
<td>5488</td>
<td>8</td>
<td>14</td>
<td>9</td>
<td>8</td>
<td>Up to this point, in the 2 previous subsections of the executive summary, every statement had a cross-reference to the section of the IPCC report. More here the statement is discussed in detail (example: the current climate is substantially lower risk in the Mediterranean region at 1.5°C compared to 2°C). However, in the present 3 subsections (Natural and managed systems, Floods and Health) there are no cross references anymore. Why? Example: &quot;limiting warming to 1.5°C rather than 2°C would carry significant benefits&quot;. For this report to be policy relevant, it should be better to add information of additional cost in comparison to 2 degree target. If this is not the task of chapter 3, should refer to relevant chapters and pages for policymakers to check.</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>6306</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>16</td>
<td>This sentence can be read as if 1.5°C is not a problem (it has benefits). I think, it should be reordered to stress clearly that 1.5°C is just a smaller problem than 2°C - but still a PROBLEM [Emilie M. Muelin, Russian Federation]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>1024</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>16</td>
<td>Here it says &quot;limiting warming to 1.5°C rather than 2°C would carry significant benefits&quot;. For this report to be policy relevant, it should be better to add information of additional cost in comparison to 2 degree target. If this is not the task of chapter 3, should refer to relevant chapters and pages for policymakers to check. [Mitsutosune Yamaguchi, Japan]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>16223</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>16</td>
<td>This paragraph also needs to give a sense of how serious the changes at 1.5°C will be. Yes, 1.5°C instead of 2°C will mean less damage, but to call these &quot;benefits&quot; given the seriousness of the impacts that will be occurring is like putting make-up on a seriously ill pig. Such a hinting of the impacts of 1.5°C is inappropriate.</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>20589</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>16</td>
<td>With a warming of 1.5°C, the anticipated impacts of natural and managed systems are likely to be significant. However, with a 2°C warming, these impacts will be worst. From this perspective, instead of saying that … Would carry significant benefits……. I would say …….. would reduce significantly the negative impacts on …… [KENEL DELUSCA, Haiti]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>1849</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>16</td>
<td>According to the available literature on natural and managed systems, limiting warming to 1.5°C rather than 2°C would carry significant benefits for different ecosystems</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>12468</td>
<td>8</td>
<td>16</td>
<td>8</td>
<td>19</td>
<td>We hope to provide evidence to support this statement. Also mitigation action could have negative impact which also need to be stated. [Dr Norm UDDIN, Australia]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>376</td>
<td>8</td>
<td>16</td>
<td>9</td>
<td>8</td>
<td>References to respective sections are missing. [Jan Fuglestvedt, Norway]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13706</td>
<td>8</td>
<td>18</td>
<td>8</td>
<td>18</td>
<td>agriculture should be included in the list of benefits food production systems [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>16224</td>
<td>8</td>
<td>21</td>
<td>8</td>
<td>21</td>
<td>This desirable to halve the risk of extinction; the sentence should not numerically what the two levels are (as is done in the next sentence for income transformation) [Michael MacCracken, United States of America]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13813</td>
<td>8</td>
<td>21</td>
<td>8</td>
<td>21</td>
<td>Does this statement refer to terrestrial species or does it include marine species (where much less knowledge on species extinction risks exists) [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>10455</td>
<td>8</td>
<td>22</td>
<td>8</td>
<td>22</td>
<td>&quot;biomes&quot; may not be clear in Exec Summary [Jonathan Lynn, Switzerland]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13814</td>
<td>8</td>
<td>22</td>
<td>8</td>
<td>22</td>
<td>This misses the point by not mentioning marine species? Please be explicit that both terrestrial and marine species are included [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13815</td>
<td>8</td>
<td>24</td>
<td>8</td>
<td>25</td>
<td>Does this include ocean and land? Not clear [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>19000</td>
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<td>Instead of writing &quot;in the Mediterranean [...]&quot;, please said directly &quot;The Mediterranean [...]&quot;. [JACQUES-ANDRE NIKONE, Senegal]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13162</td>
<td>8</td>
<td>25</td>
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<td>25</td>
<td>After a sentence &quot;limiting warming to 1.5°C, compared to 2°C, is also projected to reduce climate change induced species range loss, forest fire risk, and the geographic spread of invasive species, pests and diseases.&quot;, the following sentence might be useful: &quot;For example, potential habitats of invasive biomass species (Phytophthora roots and P. bambusae) in central and northern Japan was estimated to increase from 35% under the current climate (1980-2000) to 48-46%, 51-54%, 61-67%, and 77-83% under 1.5°C, 2.0°C, 3.0°C, and 4.0°C warming levels, respectively [Takano et al. in press].&quot; [Takano et al. Ecology and Evolution, DOI: 10.1002/ece3.3471 [Takahiro Takano, Japan]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>13816</td>
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<td>25</td>
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<td>Be clear if you mean Mediterranean region, as Mediterranean biomes are found in Australia and south Africa, or Mediterranean Sea [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<tr>
<td>1296</td>
<td>8</td>
<td>26</td>
<td>8</td>
<td>26</td>
<td>Re the use of the concept &quot;tipping points&quot;. The wording regarding abrupt changes, TPs, irreversibility, timescales should be carefully coordinated across chapters, especially with chapter 1 [Jan Fuglestvedt, Norway]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13817</td>
<td>8</td>
<td>27</td>
<td>8</td>
<td>27</td>
<td>Does this include northern and southern hemisphere? [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>5430</td>
<td>8</td>
<td>30</td>
<td>8</td>
<td>30</td>
<td>It would be more appropriate to say: Large changes in ocean systems are expected to occur as the world warms to 1.5°C. It would be good to include a link/quote for this statement. [Klaus Rieckink, Australia]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13818</td>
<td>8</td>
<td>30</td>
<td>8</td>
<td>30</td>
<td>Projected to occur? or evidence suggested? Would be more suitable formulations of this sentence [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>16225</td>
<td>8</td>
<td>30</td>
<td>8</td>
<td>30</td>
<td>What is the justification for talking about a &quot;transition to 1.5°C&quot;? It is clear that at least some impacts, such as the rate of sea level rise and loss of coral, will be far above acceptable levels at 1.5°C - this should be stated as, if possible, a ceiling, and if not, a point on a path back toward a lower overall global warming. I just do not think this volume should be accepting the notion that 1.5°C is a proper (safe) new level--the basis for this level is political, not scientific--there are technological approaches to get back to lower levels on 1.5°C should just not be accepted as the new normal [Michael MacCracken, United States of America]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<tr>
<td>6227</td>
<td>8</td>
<td>31</td>
<td>8</td>
<td>31</td>
<td>changes in water temperature (not changes to water temperature). [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13819</td>
<td>8</td>
<td>31</td>
<td>8</td>
<td>31</td>
<td>This is already occurring, suggest adding &quot;to mitigate further&quot; [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13820</td>
<td>8</td>
<td>31</td>
<td>8</td>
<td>32</td>
<td>Novel ecosystems emerging due to biodiversity reshuffling and species local extinction? See work by William Cheung and by Jorge Garcia-Molinos (2016 nature climate change 6) [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<tr>
<td>6817</td>
<td>8</td>
<td>32</td>
<td>8</td>
<td>32</td>
<td>less able to move, however, and will experience high rates. [Rahs Hamed, Belgium]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>13321</td>
<td>8</td>
<td>32</td>
<td>8</td>
<td>32</td>
<td>Relocate or Redistribute may be a more suitable term than move [Elwira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
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<td>Comment No</td>
<td>From Page</td>
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<td>16229</td>
<td>8</td>
<td>32</td>
<td>8</td>
<td>33</td>
<td>Somewhere in this section there needs to be special mention made of what</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>such levels of warming will mean in high latitudes, making the point</td>
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<td>that while warming in high latitudes is typically something like a doubling</td>
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<td>of the increase in the global average temperature (and also making clear that land</td>
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<td>temperatures changes are also greater than the global average). In any</td>
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<td>case, any specific mention (e.g., a special section or paragraph) is needed of</td>
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<td>high latitude effects, explaining how species will go extinct in high latitudes</td>
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<td>as the conditions suitable for many species will no longer exist, etc.</td>
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<td>9477</td>
<td>8</td>
<td>33</td>
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<td>I think this sentence refers to the behaviour of coral reefs in tropical and sub-tropical locations.</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td></td>
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<td>Is there anything you can say from the literature about deep water corals, which support important ecosystems in locations further away from the equator?</td>
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<td>My recollection is that deepwater corals are quite vulnerable to ocean acidification - but I don’t have references to hand since I am typing these comments waiting for a plane at San Francisco Airport.</td>
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<tr>
<td>13440</td>
<td>8</td>
<td>34</td>
<td>9</td>
<td>36</td>
<td>Also, water quality issues is a major challenge in coastal cities, where aquifer pollution due to salinity intrusion and excessive usage of aquifers.</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13822</td>
<td>8</td>
<td>34</td>
<td>9</td>
<td>36</td>
<td>These are food production systems, maybe clarify with marine food production systems.</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>Further be clear when you are talking about fish stocks vs fisheries (fishers) vs fishery businesses</td>
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<tr>
<td>6208</td>
<td>8</td>
<td>35</td>
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<td>... - by relocating stocks, and the increased risk of ... is to be changed to ... by relocating stocks with the increased risk of ...</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13683</td>
<td>8</td>
<td>35</td>
<td>9</td>
<td>36</td>
<td>This should also be addressed in island, according to AR5 crop production goes into high risk beyond 1.5, okay comes further down.</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>Some reorganization of this and the next paragraph seems warranted.</td>
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<td>7230</td>
<td>8</td>
<td>36</td>
<td>9</td>
<td>36</td>
<td>Remove Nevertheless (But Nathalie, Australia)</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>11799</td>
<td>8</td>
<td>36</td>
<td>9</td>
<td>36</td>
<td>In the &quot;changes to food&quot; or &quot;changes in food&quot;? [Wilhelm Muhlemann, Oke, France]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>6207</td>
<td>8</td>
<td>36</td>
<td>9</td>
<td>36</td>
<td>changes to food&quot; sounds strange [Dmitry L. Masolin, Russian Federation]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>10740</td>
<td>8</td>
<td>38</td>
<td>9</td>
<td>38</td>
<td>food, income and livelihoods. Is better to change to &quot;food, incomes and livelihoods.&quot; or &quot;food, income and livelihood.&quot; [Seyed Muhammedreza Tabatabaei, Iran]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13624</td>
<td>8</td>
<td>38</td>
<td>9</td>
<td>38</td>
<td>Clarify – declines in commercial fish stocks, or reduction of fisheries productivity? [Elvira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>10741</td>
<td>8</td>
<td>38</td>
<td>9</td>
<td>38</td>
<td>&quot;Loss&quot; is better to change to &quot;losses&quot; [Seyed Muhammedreza Tabatabaei, Iran]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>2112</td>
<td>8</td>
<td>40</td>
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<td>&quot;try to avoid starting sentences with words such as &quot;studies reveal&quot;&quot;. I think we can accept that you are not making this stuff up, so we can assume</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>there are some studies underlying what you conclude. So don’t say it. You do this sort of a thing a lot through the report - rewrite any sentence starting</td>
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<td>in this way. [Nilvea Nicholls, Australia]</td>
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<tr>
<td>13825</td>
<td>8</td>
<td>40</td>
<td>9</td>
<td>40</td>
<td>also an economic source [Elvira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>17705</td>
<td>8</td>
<td>40</td>
<td>9</td>
<td>40</td>
<td>substantial RELATIVE benefits. I think you meant comparing 1.5°C to 2°C scenarios? [Ana Bastos, France]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>5246</td>
<td>8</td>
<td>40</td>
<td>9</td>
<td>40</td>
<td>Are the &quot;substantial benefits to marine fisheries&quot; here relative to the current situation or relative to 2 degree warming? [Bart Van den Hurk, Netherlands]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13827</td>
<td>8</td>
<td>41</td>
<td>9</td>
<td>41</td>
<td>Dependent on what? Ocean? [Elvira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>16226</td>
<td>8</td>
<td>41</td>
<td>9</td>
<td>41</td>
<td>1.5°C should not be a target, but a ceiling, or if that is not possible, a point along a path to a lower global warming [Michael MacCracken, United States of America]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>13828</td>
<td>8</td>
<td>41</td>
<td>9</td>
<td>41</td>
<td>This jumps to human systems here which are addressed in the section below [Elvira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>2113</td>
<td>8</td>
<td>41</td>
<td>9</td>
<td>44</td>
<td>Similarly, you do not insert a &quot;newsworthy&quot; announcement statement here. And again, try to include a magnitude for the &quot;much lower&quot;, as well as an IPCC calibrated language to indicate uncertainty. [Nilvea Nicholls, Australia]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>2709</td>
<td>8</td>
<td>41</td>
<td>9</td>
<td>44</td>
<td>It would be good to make the connection with poverty and equity here, in addition to livelihoods [Penny Ungarath, South Africa]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>20565</td>
<td>8</td>
<td>42</td>
<td></td>
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<td>Instead of livelihood do you mean livelihoo? This is an issue in other parts across the chapter. [Vera Barboza Aranha, Sao Seine Br-heldo, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<tr>
<td>6209</td>
<td>8</td>
<td>42</td>
<td></td>
<td></td>
<td>The word &quot;the&quot; between &quot;in&quot; and &quot;food&quot; is suggested to be deleted. [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>7231</td>
<td>8</td>
<td>42</td>
<td></td>
<td></td>
<td>Instead of &quot;livelihoods&quot; with livelihoods [But Nathalie, Australia]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>3990</td>
<td>8</td>
<td>42</td>
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<td></td>
<td>livelihoods (not &quot;livelihood&quot;) [Elefphant Herson, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>10742</td>
<td>8</td>
<td>42</td>
<td></td>
<td></td>
<td>livelihood should change to &quot;livelihoods&quot; [Seyed Muhammedreza Tabatabaei, Iran]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13628</td>
<td>8</td>
<td>43</td>
<td></td>
<td></td>
<td>Provision of what? Catch or Potential? [Elvira Poloczanska, Germany]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<tr>
<td>5221</td>
<td>8</td>
<td>46</td>
<td>9</td>
<td>50</td>
<td>Here, in the executive summary, there is an expression &quot;In freshwater systems, constraining warming to 1.5°C compared to 2°C, reduces climate change induced increases in global water resources stress relative to 1980-2009 by an estimated 50%, with particularly large benefits in the Mediterranean.&quot; I think there are similar statements through the chapter on various affected sectors. [e.g. PBL20-L22: Constraining warming to 1.5°C compared to 2°C, is projected to halve the climate change related increase in the risk of species extinction, as well as reduce the risks of decline in terrestrial and wetland ecosystem services.]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<td>There has been a global temperature increase (dT) of about 1°C from the pre-industrial period to the present period (1890-2009). With considering it, the additional temperature increase from the present to the 1.5°C world and the 2.0°C world are about 0.5°C and 1.0°C respectively. If the climate impact (here water resource stress) is assumed to change in proportion to the dT, 50% reduction of the impact by shifting from the 2.0°C world to the 1.5°C world is quite natural and no surprise.</td>
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<td>I understand that the expression cited above is objective based on several studies without any flaws in it. However, at the same time, I am afraid that readers may be confused if they mistakenly compare the 50% decrease of impact (from the present state) with the 25% decrease of dT (from pre-industrial) or 25% decrease of dT (from 2.0°C to 1.5°C). Some clarification seems warranted. [Ekiva Poloczanska, Germany]</td>
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<tr>
<td>11924</td>
<td>8</td>
<td>47</td>
<td>9</td>
<td>47</td>
<td>Switched to 1980-2009 climate normals when all sites is measured against pre-industrial base data. This needs to be emphasized in some manner. [Paul Doyle, Canada]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
</tbody>
</table>
Switched to 1980-2009 climate normals when all else is measured against pre-industrial base data. This needs to be emphasized in some manner.

What do you mean by “significantly” here? Is it “substantially” or “statistically significant”? (surely not the latter?). [Neville Nicholls, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

What about Europe and north America? [Rafiq Hamdi, Belgium] We are grateful for your suggestion, and will be including consideration of it in the next draft.

The section on floods is insufficient for the purpose of an executive summary. Please expand on this important topic further. [Jason Donev, Canada] We are grateful for your suggestion, and will be including consideration of it in the next draft.

The word “significantly” appears often in the text. If this is not intended to reflect statistical significance, perhaps it could be replaced by a word with less “ baggage”, like “substantially”, or something similar? [David Schoeman, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

It is not at all clear what point is being made. An expansion is needed here covering not just storm track changes but also the likelihood of extreme events. [Neville Nicholls, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

Is this supposed to be a separate section? Why the focus on floods? [Elvira Poloczanska, Germany] We are grateful for your suggestion, and will be including consideration of it in the next draft.

However, excessive irrigation and land-use changes might need to be considered as a major threat that are not included in the Earth System Models. [Vidivalma Veidt, Norway] We are grateful for your suggestion, and will be including consideration of it in the next draft.

The summary of the impacts of 1.5°C global warming scenario on floods is too short for such an important phenomenon. It should be expanded to at least a ten-line paragraph. [Hayr Tyung, Nigeria] We are grateful for your suggestion, and will be including consideration of it in the next draft.

Sorry but the analysis is very weak; just two (2) lines and nothing on Africa... [JACQUES-ANDRÉ NDIKONE, Senegal] We are grateful for your suggestion, and will be including consideration of it in the next draft.

This section does not do appropriate justice to the complexity of anticipated future changes to floods, which might arise from intensification of extreme precipitation at multiple timescales (e.g. less than hourly for flash floods, through to multi-month rainfall in large basins such as the Mississippi or Murray Darling basins), or from changes to snow melt timing or glacial melt, or changes to storm surge and sea levels for coastal and estuarine regions. Antecedent conditions are also critical for catchments that are capable of absorbing large volumes of rainfall prior to producing runoff. As a result, there remains very substantial uncertainty on future changes in floods, and current global models (both global climate models and global-hydrological models) are not sufficiently advanced to capture this nuance. Furthermore, papers that assess historical trends in flood hazard (i.e. papers that seek to focus on the physical changes to flooding, rather than increased urbanisation and development in flood plains and other factors that influence total flood exposure and vulnerability) are suggesting more stations show decreases than increases, and thus further emphasise the uncertainty that needs to be placed on any future model projections. [Seth Westra, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

Regarding floodings, an additional aspect compared to effects of changes in precipitation include the possible combination with sea level rise. The IPCC SREX (chapter 3) pointed to the fact that there has been a “likely increase in extreme coastal high water worldwide related to increases in mean sea level in the late 20th century” (Seneviratne et al. 2012). That chapter also stated for projections that it is “very likely that mean sea level rise will contribute to upward trends in extreme coastal high water levels” and that there is high confidence that locations currently experiencing coastal erosion and inundation will continue to do so due to increasing sea level, in the absence of changes in other contributing factors (see Table 1 of Seneviratne et al 2012). The potential relevance of this factor has for instance been illustrated with the hurricanes Harvey and Irma this summer, whereby most of the damage was induced by flooding rather than wind speed. [Sonia Seneviratne, Switzerland] We are grateful for your suggestion, and will be including consideration of it in the next draft.

On a related topic, increases in heavy precipitation associated with hurricanes may need to be explicitly mentioned in this paragraph or somewhere in the executive summary of this chapter. On this point on well, there was a clear statement in Chapter 3 of the IPCC SREX (For projections: “Likely increase in heavy rainfall associated with tropical cyclones”, see Table 1 of that chapter) [Sonia Seneviratne, Switzerland] We are grateful for your suggestion, and will be including consideration of it in the next draft.

This part is very short and insufficient [MUSTAFA TALAN TÖRP, Turkey] Accepted. Text revised.

Do not know what you are trying to say here, or why you want to include this in the ES [Neville Nicholls, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

Does this mean in comparison with 2C? Is there a sentence or phrase missing here? [Butt Nathalie, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

I do not know what you are trying to say here, or why you want to include this in the ES. [Neville Nicholls, Australia] We are grateful for your suggestion, and will be including consideration of it in the next draft.

New paragrapgh to be clear this isn’t food production from freshwater environments [Elvira Poloczanska, Germany] We are grateful for your suggestion, and will be including consideration of it in the next draft.

This sentence may help readers to understand the context and circumstance. Also a brief information on distinguishing between climate extremes and climate related hazards [Permin Permin, Indonesia] We are grateful for your suggestion, and will be including consideration of it in the next draft.
Comment No: 3651
From Page: 8
From Line: 54
To Page: 8
To Line: 55

Exceedingly brief discussion of floods here isn't adequate, even for the executive summary of a concise summary chapter. Yes, of course, increasing precipitation will tend to increase flood risk. But two other major factors - increased human populations living on floodplains leading to greater impacts and therefore risks, and LLUC change (specifically, urbanization and loss of permeable area) leading to increased flooding for a given precipitation amount and therefore greater hazards and therefore risks - are controllable and therefore offer important mechanisms for climate change adoption. We absolutely have to mention that here, because it's key information for policy makers, planners, etc. [Sean Fleming, United States of America]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 1704
From Page: 8
From Line: 54
To Page: 8
To Line: 55

In the context of discussion on floods, there is need to mention occurrence of 'hurricanes'. While changes in hurricane frequency remain uncertain, basic physical understanding and model results suggest that the strongest hurricanes (when they occur) are likely to become more intense and possibly larger in a warmer, moister atmosphere over the oceans. This is supported by available observational evidence in the North Atlantic. Some conditions favourable for strong thunderstorms that spawn tornadoes are expected to increase with warming, but uncertainty exists in other factors that affect tornado formation, such as changes in the vertical and horizontal variations of winds. [Mishra Santosh Kumar, India]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 1714
From Page: 8
From Line: 54
To Page: 8
To Line: 55

In the context of discussion on floods, there is need to mention occurrence of 'hurricanes'. While changes in hurricane frequency remain uncertain, basic physical understanding and model results suggest that the strongest hurricanes (when they occur) are likely to become more intense and possibly larger in a warmer, moister atmosphere over the oceans. This is supported by available observational evidence in the North Atlantic. Some conditions favourable for strong thunderstorms that spawn tornadoes are expected to increase with warming, but uncertainty exists in other factors that affect tornado formation, such as changes in the vertical and horizontal variations of winds. [Mishra Santosh Kumar, India]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 1719
From Page: 8
From Line: 54
To Page: 8
To Line: 55

In the context of discussion on floods, there is need to mention occurrence of 'hurricanes'. While changes in hurricane frequency remain uncertain, basic physical understanding and model results suggest that the strongest hurricanes (when they occur) are likely to become more intense and possibly larger in a warmer, moister atmosphere over the oceans. This is supported by available observational evidence in the North Atlantic. Some conditions favourable for strong thunderstorms that spawn tornadoes are expected to increase with warming, but uncertainty exists in other factors that affect tornado formation, such as changes in the vertical and horizontal variations of winds. [Mishra Santosh Kumar, India]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 1724
From Page: 8
From Line: 54
To Page: 8
To Line: 55

In the context of discussion on floods, there is need to mention occurrence of 'hurricanes'. While changes in hurricane frequency remain uncertain, basic physical understanding and model results suggest that the strongest hurricanes (when they occur) are likely to become more intense and possibly larger in a warmer, moister atmosphere over the oceans. This is supported by available observational evidence in the North Atlantic. Some conditions favourable for strong thunderstorms that spawn tornadoes are expected to increase with warming, but uncertainty exists in other factors that affect tornado formation, such as changes in the vertical and horizontal variations of winds. [Mishra Santosh Kumar, India]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 11925
From Page: 8
From Line: 55
To Page: 8
To Line: 55

Why no comparison of flood risks between 1.5°C and 2°C warming? [Paul Doyle, Canada]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 11941
From Page: 8
From Line: 55
To Page: 8
To Line: 55

Why no comparison of flood risks between 1.5°C and 2°C warming? [Paul Doyle, Canada]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 9701
From Page: 8
From Line: 55
To Page: 8
To Line: 55

We are more precise or at least consistent in next draft. Area is considerably larger than US! And all 3 have a wide variety of climate! [Eric Martin, France]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 10004
From Page: 9
From Line: 9
To Page: 9
To Line: 9

Row 1: This section should also mention the water-dorm or vector diseases that are not yet fully understood such as Zika [Nazan AN, Turkey]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 7591
From Page: 9
From Line: 1
To Page: 9
To Line: 8

I think the word 'detetctable' or something similar should be used in the health section, to make the point that we have statistically robust differences between these low emission scenarios. [Darn Mitchell, United Kingdom (of Great Britain and Northern Ireland)]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 13707
From Page: 9
From Line: 1
To Page: 9
To Line: 8

I am assuming this is not all there will be in the Exec. Summary on human systems! It's very limited. Some headings and bullet points would have been useful to include. Impacts are not just to morbidity and mortality but also to mental health, psychological resilience, impaired sense of place/identity, loss of cultures; also heat related violence, intergroup conflict over reduced or degraded resources. [Evlira Potocnikova, Germany]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 9070
From Page: 9
From Line: 10
To Page: 9
To Line: 10

It would be better if it could be highlighted the risk of another kind of diseases such as Zika, vector and water-born diseases as well. [Mustafa Tufan Turp, Turkey]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 13831
From Page: 9
From Line: 8
To Page: 9
To Line: 8

Why limited to health? Why don't include eg livelihoods, poverty, economics, urban, security? See chapter 4 and 5! [Evlira Potocnikova, Germany]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 4358
From Page: 9
From Line: 9
To Page: 9
To Line: 9

The section 'health' must be improved, including more details, information and references. [Gabriel de Oliveira, Brazil]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 2116
From Page: 9
From Line: 9
To Page: 9
To Line: 9

What does 'complex regional patterns' mean? I think this means that some areas will NOT see [greater risks] from 2°C warming, but I don't think you mean this. [Neville Nichols, Australia]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 9703
From Page: 9
From Line: 9
To Page: 9
To Line: 9

It is strange to have in the same paragraph "complex regional pattern" and "linear association". Linear means a simple impact. Be more precise in next draft and clearly separate linear and more complex type of impacts [Eric Martin, France]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 16228
From Page: 9
From Line: 9
To Page: 9
To Line: 9

There needs to be mention that with greater risks anywhere, global transportation and economic systems interconnect the world such that risks anywhere really are risks (virtually) everywhere. [Michael MacCracken, United States of America]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 4720
From Page: 9
From Line: 9
To Page: 9
To Line: 9

This short section on health is incorrect. It would be better that warming above 2°C would provide greater changes in disease risks than warming only to 1.5°C, but we really do not know. It is likely that, depending on disease, patterns will change - increasing risks on some locations, decreasing risks in others and more epidemic behavior of some diseases in some circumstances. Effects of climate change on health go much further than effects of temperature only. There is no clear expectation that relationships between disease risks and temperature will increase linearly - for some that may happen but we also expect thresholds to be crossed that cause non-linear increases in risks. So this section needs to be re-written and uncertainty included. [Nicholas Ogden, Canada]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.

Comment No: 2117
From Page: 9
From Line: 4
To Page: 9
To Line: 4

Linear associations can mean one of two things. But most people will think you mean that you can fit a straight line between temperature and impacts. But this isn't the case for heat-related mortality is it? There the association is U-shaped. [Neville Nichols, Australia]

Response:
We are grateful for your suggestion, and will be including consideration of it in the next draft.
Methods of assessment section content needs to be balanced with content of chapter 1 [Ervina Potoczanska, Germany]

Taken into account. Material has been more strongly streamlined with Chapter 1. Also, this section has been shortened (e.g. removed previous sections 3.2.2.2 and 3.2.2.3 and moved material to suppl. Information or chapter 1).

10753 10 36 10 51 All WGIII and WGIV should be WP2 and WGVI [Sayed Muhammadreza Tabatabaei, Iran]

Editorial - copyedit to be completed prior to publication

10698 10 40 10 40

Do there a missing word after “main relevant” “Information” [Christopher Clark, United States of America]

Note: that the text was revised to make it clearer

10754 10 41 10 46

Some of references are not complete in the references of the chapter, i.e. the contributors are not clearly detected. e.g. Seren ratings et al. 2012; Hardmer et al. 2012; Hartmann et al. 2013; Bindoff et al. 2013; Collins et al. 2013; Church et al. 2013; Christensen et al. 2013; Zettale et al. 2014a. [Sayed Muhammadreza Tabatabaei, Iran]

Editorial - copyedit to be completed prior to publication

13251 10 49 10 49

should be “globally” [Wei Zhang, United States of America]

Editorial. Text has been corrected (added “warming” after “global”).

8820 10 53 10 53

What is the meaning of the word weather in the sentence? [Rafiq Hamdi, Belgium]

Accepted - remove “weather”

13841 10 55 10 55

Only human settlements? What about human health (in exec summary), industry etc? [Elvira Poloczanska, Germany]

Accepted - change settlement by systems

17991 10 56 10 56

applied, should delete the comma after “applied”? [Wilfran Moufouma Okia, France]

Editorial - copyedit to be completed prior to publication

20656 11 15

section 3.2 overlaps with methods explained in chapters 1 and 2. Potential here for reducing redundancies and streamlining chapters and namelifts. [Koko Warner, Germany]

Taken into account - Some of the text has been removed, shifted to the suppl. Information or to Chapter 1. Some material is nonetheless necessary as a background for the chapter 3 assessment.

13842 11 1

To reduce chapter length and achieve balances in cover between different sections of the chapter, the supplementary material could be used for supporting technical and methodological material [Elvira Poloczanska, Germany]

Taken into account - the section has been reduced; a part of the information (climate models) will shift to chapter 1. Information needed to understand the chapter is kept.

13843 11 1

Much of this would readily complement what is insufficiently said in Chapter 1. This should be addressed in the framing, suggest to transfer text to there or to suppl material [Elvira Poloczanska, Germany]

Taken into account - the section has been reduced.

2120 11 15 56

I don’t think this detailed description of the methods of assessment need to be in the main body of the report, it would make the report flow better if this stuff was in an appendix. [Neville Nichols, Australia]

Taken into account - the section has been reduced; a part of the information (climate models) will shift to chapter 1. Information needed to understand the chapter is kept.

10700 11 3

Seems odd to imply that only climate models are used in investigating climate systems. I’d recommend the sentence to “Climate models and the empirical record are necessary...” [Christopher Clark, United States of America]

Rejected. This sentence refers to climate conditions under additional warming compared to present, hence they have to be assessed with climate models.

16322 11 4 11 4

The use of the phrase “climate predictions” here is simply not justified—all of the models are running projections based only on projections of changes in emissions and/or atmospheric loading and leaving out any possible changes due to natural influences such as solar variations, volcanic influences, etc. There is not really any useful skill in decadal predictions and quite limited skill out to seasonal time periods—and certainly no skill of any kind from now out to when 1.5 or 2°C is reached. [Michael MacCracken, United States of America]

Notes. This will be fixed in the FGD.

13252 11 5 11 5

Does the coming century mean “the end of this century”? We are not sure of what will happen at the end of this century. What about the next (22nd) century? [Wei Zhang, United States of America]

Accepted - end of this century

10755 11 6 11 11

Section should be deleted [Sayed Muhammadreza Tabatabaei, Iran]

Editorial - copyedit to be completed prior to publication

10756 11 9 11 9

IPCC 2007-2013 is better to be written as IPCC AR4, AR5 [Sayed Muhammadreza Tabatabaei, Iran]

Editorial - copyedit to be completed prior to publication

9971 11 10 11 11


Notes. This will be fixed in the FGD.

7233 11 12 11 12

remove and or after framework [Bult Nathalie, Australia]

Editorial - copyedit to be completed prior to publication

10375 11 13 11 13

Delete apostrophe after “emissions” [Malag Law, United Kingdom (of Great Britain and Northern Ireland)]

Editorial - copyedit to be completed prior to publication

13844 11 14 11 14

Be clear, do you mean projected temperatures are slightly below 1.5°... [Elvira Poloczanska, Germany]

Editorial - copyedit to be completed prior to publication

10460 11 14 11 14

It’s better or ‘somewhat’ better than ‘is it?’ [Jonathan Lynn, Switzerland]

Editorial - copyedit to be completed prior to publication

10757 11 15 11 16

Some of references are not complete in the reference of the chapter, i.e. the contributors are not clearly detected. e.g. Kirman et al. 2013; Collins et al. 2013, [Sayed Muhammadreza Tabatabaei, Iran]

Editorial - copyedit to be completed prior to publication

10758 11 16 11 16

A: ”...we have given that this report...” [Sayed Muhammadreza Tabatabaei, Iran]

Rejected. This topic is addressed in chapter 1 and also referred to in the cross-chapter box on 1.5°C climates

20590 11 17 11 18

the expected mean temperature response is with respect to a reference period pre-industrial era, for clarity there’s a need to specify the reference period (even when it’s redundant) [Koen DeLusco, Turkey]

Rejected.

3537 11 20

use of word “following” twice in one sentence, bad style! [Sylvia Sander, Monaco]

Editorial - copyedit to be completed prior to publication

3257 11 29

Much of this is redundant in the chapter 1. Merge there or move to suppl material [Ervina Potoczanska, Germany]

Taken into account. Material has been shortened; however, some background material is essential to understand the analyses reviewed and the assessments provided in the present chapter.

9072 11 29 11 29

if the heading 3.2.2.1 Definition of a ‘1.5°C or 2°C climate projection’, °C must be adjoined to °... in other words °C ‘[Mustafa Tufan Turp, Turkey]

Editorial - copyedit to be completed prior to publication

5716 11 29 11 31

The definition of 1.5°C warming projection is already given and also should be given in Chapter 1. Chapter 3 should not repeat it. Overall Chapter 3 is too long. Many repetitions and overlaps to Chapters 1 and 2 should be avoided to reduce the length of the text. Also, much text on 2°C can be dropped or shortened. [Hong Yang, Switzerland]

Taken into account. Material has been shortened. However, some background material is essential to understand the analyses reviewed and the assessments provided in the present chapter

8820 11 29 11 31

The section discussing about the challenges of assessing climate change while the heading written was definition. [Lutina Albani, Bangladesh]

Taken into account. The structure has been revised.

12265 11 29 11 31

Section 3.2.2.1 is of course very important and will probably be useful for a long time. It is important to communicate these approaches clearly to various groups of users. I wonder if some kind of illustration could help. [Koko Warner, Germany]

Taken into account. The section has been reduced; a part of the information (climate models) will shift to chapter 1. Information needed to understand the chapter is kept.

13845 11 29

IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

Page 23 of 152

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Page 24 of 152

The issues discussed in 3.2.2 highlight the main challenge for this chapter. Mostly it will have to relook at assumptions of scenarios passing through 1.5°C or 2°C warming, and calculations for comparison will largely depend on Table 3.1. The example of sea-level rise is given as one in which different approaches will give very different responses. However, I presume for some variables the approach could work quite well e.g. land-sea warming contrast, tropical precipitation changes? I think it would be useful to stress which variables are more or less susceptible to uncertainties induced by the choice of approach used to estimate their response (Mat Collins, United Kingdom of Great Britain and Northern Ireland). Taken into account. The revised chapter now includes comparisons between estimates of change in climate extremes at 1.5 and 2 based on transient simulations vs based on simulations from the HAPPM experiment. Overall, the results are quite consistent (see e.g. new Figs. 3.8, 3.9, 3.12). We also note in the text that the time scale is nonetheless important for several variables, in particular sea level rise.

10198 11 29 13 12
Comment
This section could be shortened and refer to other chapters [Pieter Franke, United Kingdom of Great Britain and Northern Ireland]. Taken into account. This section has been shortened.

10760 11 35 11 35
Comment
- should be deleted between 21st and century. [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

17443 11 38 11 36
Comment
- mean global warming to 1.5C or 2C by 2011 instead of “...mean global warming to 1.5°C or 2°C by 2011” [Xiaolin Zhang, China] Editorial - copyedit to be completed prior to publication

9073 11 38 11 36
Comment
In te sentence “scenarios stabilizing mean global warming to 1.5°C or 2°C C...” there is one extra C [MUSTAFA TUFAN TURP, Turkey] Editorial - copyedit to be completed prior to publication

16233 11 38 11 36
Comment
That the only long-term equilibrium values shown at an 1.5 and 2.5°C is presumably a result of not giving any consideration at all to Carbon Dioxide Removal (amplifying natural sinks and/or Direct Air Capture) techniques. This seems a serious and inappropriate limitation in the cases being considered. There is no question that the impacts at 1.5°C will be serious [Hansen et al. at paper], and so it should not be indicated that stabilizing at 1.5 or 2°C could be acceptable and that efforts like CDR need to be considered vital (costs may well end up being well below impact costs) [Michael MacCracken, United States of America]. Rejected. It is not clear what the reviewer is suggesting, but it if refers to an assessment of impacts for global temperature anomalies below 1.5°C, this does not fit into the scope of the report.

925 11 37 11 36
Comment
Second i.e. in the end of line should be deleted [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

10761 11 37 11 38
Comment
the assumption that the climate can come into “equilibrium” after several millennia is strongly subject to the definition of equilibrium. Even with unchanging forcings climate variability will remain manifest at all time scales [Bart Van den Hurk, Netherlands]. Rejected. Too detailed.

10576 11 38 11 38
Comment
...several millennia...[Matt Law, United Kingdom of Great Britain and Northern Ireland] Not clear what is the comment.

10762 11 43 11 43
Comment
The wind “probability of which is not necessary to be [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

16234 11 43 11 62
Comment
That CDR is an option to lower the ultimate stabilization levels needs to be mentioned, and its potential indicated. [Michael MacCracken, United States of America] Taken into account. This seems too detailed for the present section, is addressed in cross-chapter box “1.5°C warmer worlds”.

10763 11 46 11 47
Comment
Cross-chapter and ‘1.5°C warmer worlds’ should be deleted. [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

10764 11 46 11 47
Comment
Note the additional ‘%’ is better to be replaced by ‘%’; so we will have: (i.e. 33%) [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

5358 11 54 11 54
Comment
what is a "2°C emissions scenario" ? I think this must be explained clearly again at the beginning of the report as the expression itself without a definition does not make any sense. [Sylvia Sander, Monaco] Editorial - copyedit to be completed prior to publication

10765 11 55 11 57
Comment
Not sure if the upper end of the temperature range is consistent with what has been stated in chapter 2 [Oliver Geden, Germany] Noted. This is an upper bound given considered scenarios from chapter 2, but it could indeed be larger if emissions reductions are not large enough (but in this case 1.5°C warming may not be reachable within the 21st century). This question will be checked again for the FGD.

16235 11 56 11 67
Comment
The phrase ‘at most’ is simply not justified—present commitments will only limit the warming to somewhere between 3.5 and 4°C, and it will take much more commitment to limit the warming to below 3°C. But this already is one possibility for the natural carbon feedbacks (oxidation of permafrost, deaths of tropical forests, etc.) to push the ultimate temperature change upward. The phrasing here seems to me far too reassuring. [Michael MacCracken, United States of America] Noted. This is an upper bound given considered scenarios, but it could also be larger (see next comment). Will be checked for FGD.

10006 12 12
Comment
Row 6: There must be ‘C’ in 1.5°C ; Row 7: Expansion of AR is already Assessment Report, so there must not be used AR6 and report one after another [Nazan AN, Turkey] Editorial - copyedit to be completed prior to publication

10007 12 12
Comment
Row 11: A more reasonable word should be used, like no warming instead of (for 0°C warming) [Naazan AN, Turkey] Editorial - copyedit to be completed prior to publication

19081 12 12
Comment
Resolution of fig. 3.12 is so low it will not be readable picture 3-12 [Patty Elbeheiry, Egypt] Editorial - copyedit to be completed prior to publication

7235 12 4 12 44
Comment
’solar ‘leaves’ (But Nathake, Australia) Editorial - copyedit to be completed prior to publication

10765 12 6 12 6
Comment
the box with names ‘1.5°C Warmer World’ is box 3.12 which should be corrected from 3.11 to 3.12 [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

10766 12 6 12 6
Comment
The box with names ‘1.5°C Warmer World’ is box 3.12 which should be corrected from 3.11 to 3.12 [Seyed Mohammadreza Tabatabaei, Iran] Editorial - copyedit to be completed prior to publication

3846 12 6 12 6
Comment
The box is 3.12 [Elvira Poloczanska, Germany] Editorial - copyedit to be completed prior to publication

13253 12 6 12 6
Comment
1.5°C [Wei Zhang, United States of America] Editorial - copyedit to be completed prior to publication

9974 12 6 12 6
Comment
(i.e. "1.5°C warming world") It is missing. It must be “1.5°C warmer world” [MUSTAFA TUFAN TURP, Turkey] Editorial - copyedit to be completed prior to publication

13847 12 7 12 7
Comment
too prescriptive, please recommend instead and let the AR6 scoping and authors decide [Elvira Poloczanska, Germany] Editorial - copyedit to be completed prior to publication

9975 12 7 12 7
Comment
Since AR6 already means Assessment Report 6. instead of saying "...as part of the IPCC AR6 report" it would be... as part of the IPCC AR6: "MUSTAFA TUFAN TURP, Turkey" Editorial - copyedit to be completed prior to publication

5925 12 9 12 20
Comment
Could this report perhaps be cleaner on how to define the 1.5°C Breaths? Is this very value-added, but it is an interesting discussion and policymakers need help to define this. For instance, that the global temperature has to be above this limit on average for a period of 30 years? The report can also be cleaner on a suggestion of the exact reference time period. My second point is to link cleaner the text on the reference starting point to the industrial Revolution, large scale emissions, and the timing of this, that is why pre-industrial pre-industrial. [Borger Aarsma, Norway] Rejected. Since the report cannot be policy prescriptive, we need to provide assessments illustrating the impacts of different definition choices instead.

13848 12 9 12 9
Comment
Please consult the structured expert dialogue where all WGs participated and addressed the question of 1.5 vs 2. [Elvira Poloczanska, Germany] Noted. Will be checked again for FGD

9976 12 11 12 11
Comment
or 0°C warming this phrase can be changed (e.g. no warming) [MUSTAFA TUFAN TURP, Turkey] Editorial - copyedit to be completed prior to publication

4559 12 12
Comment
change the text in brackets "e.g. 20 or 30 years' by "e.g. 30 years or long" [Radim Tolasz, Czech Republic] Editorial - copyedit to be completed prior to publication

10883 12 13 12 13
Comment
The sentence talks about "1.5°C climate" instead, shouldn’t be better to talk here, and at anyhcase else where this name appears, about "1.5°C world climate" or "1.5°C global warming climate"? [Carolina Vera, Argentina] Editorial - copyedit to be completed prior to publication

13849 12 14 12 20
Comment
Such clear wording is urgently needed in chapter 1 [Elvira Poloczanska, Germany] Editorial - copyedit to be completed prior to publication

5859 12 16 12 18
Comment
Please specify in some part of the paragraph that the 1.5°C increase is derived from both land and ocean temperature. [Joan A. Lopez-Bustins, Spain] Noted. This is mentioned in the cross-chapter box on 1.5°C climate. Because of space constraints cannot be mentioned in the present section. Might be considered in FGD.

7724 12 28 12 28
Comment
Put a comma after the word "present" [Hiaryy Huyang, Nigeria] Editorial - copyedit to be completed prior to publication

IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

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Consider whether this paragraph deserves a new bullet point on its own. (P. Feels like this paragraph describes a significant challenge similar to point (4).) [Byrd Christophersen, Norway]

* would be better to say that any new relevant literature after this report needs to be addressed in AR6 to provide a comprehensive assessment. If during AR6 the lack of simulations for short and long term stabilization continues to exist, then how the shortfall will be addressed as IPCC does not produce new literature? [Elena Georgopoulou, Greece]

* Noted. This is a valid point. Was not implemented in CD6 but could be done for FG6.

* Too prescriptive, please recommend instead and let the AR6 scoping and authors decide [Elena Georgopoulou, Greece]

* Noted. Will consider to make the text less prescriptive for the FG6.

* is missing after Section 3.3 [Jorge Cameasco, Chile]

* Close bracket after Section 3.3 [David Docquier, Belgium]

* should change to nd [Elena Georgopoulou, Greece]

* Noted. Will consider to make the text less prescriptive for the FG6.

* needed at the end of the line. (Cater Moricz Sobrino, Spain)

* Noted. This section has been removed and moved to the suppl. Information.

* Language difficult to comprehend and filled with jargon. This paragraph does not convey why it is relevant for assessing impacts. It would turn policymakers away… [Elena Georgopoulou, Greece]

* Noted. Text was replaced.

* This is excellently explained. It will help readers and policy makers in reckoning with the approximations that have been incorporated to enable general assessments. (Hiary Hungy, Nigeria)

* Thank you.

* The low-warming experiments made by NCAR CESM should be mentioned. The experiments are available to the general public. [Wei Zhang, United States of America]

* Noted. Some results from the HAPPI experiment have been now added in chapter 3.

* Add ‘of’ between ‘approach’ and ‘James’. [David Docquier, Belgium]

* Editorial - copyedit to be completed prior to publication

* The low-warming experiments made by NCAR CESM should be mentioned. The experiments are available to the general public. [Wei Zhang, United States of America]

* Noted. Some results from the HAPPI experiment have been now added in chapter 3.

* Expert judgement: I am not sure an IPCC report should be based on “expert judgement”. What is an expert? Is a judgement similar to a point of view? [MacCracken, United States of America]

* Rejected. Could not highlight material from a single modeling group. But if key publications based on these simulations are available, they could be cited in the FG6.

* Noted. Should be corrected.

* expert judgement: I am not sure an IPCC report should be based on “expert judgement”. What is an expert? Is a judgement similar to a point of view? [MacCracken, United States of America]

* Rejected. Expert judgement is a common assessment approach in IPCC reports.

* Noted. This is a valid point. Was not implemented in CD6 but could be done for FG6.

* Noted. This is a valid point. Was not implemented in CD6 but could be done for FG6.

* Noted. This is a valid point. Was not implemented in CD6 but could be done for FG6.

* Noted. This is a valid point. Was not implemented in CD6 but could be done for FG6.

*Noted. This is not correct. The concept itself of “overshoot”, which is discussed in depth in this section presupposes that there are CDR methods being implemented.

* Noted. This is not correct. The concept itself of “overshoot”, which is discussed in depth in this section presupposes that there are CDR methods being implemented.

* Noted. This is not correct. The concept itself of “overshoot”, which is discussed in depth in this section presupposes that there are CDR methods being implemented.

* Noted. This is not correct. The concept itself of “overshoot”, which is discussed in depth in this section presupposes that there are CDR methods being implemented.

* Noted. This is not correct. The concept itself of “overshoot”, which is discussed in depth in this section presupposes that there are CDR methods being implemented.

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* Noted. This is not correct. The concept itself of “overshoot”, which is discussed in depth in this section presupposes that there are CDR methods being implemented.
List which biogeochemical cycles are included in the GCMs whose results are invoked in this report. Water, clearly? Is the full carbon cycle now present in all of these GCMs? If not, is it possible to detect changes in terrestrial and marine ecosystems?

This whole section has been removed and moved to the Suppl. information / chapter 1.

7237
13 21 23
22
phrase as: "In many cases, typical ESM simulations have too coarse a resolution (100km or more) to assess the impact and risk of projected climate changes on ecosystems or human systems." [Butt Nathanial, Australia]

This whole section has been removed and moved to the Suppl. information / chapter 1.

6637
13 21 23
28
inside a particular region the geography also may have an important role modifying some relevant climatic parameters (e.g. rain). Of course it may be almost impossible to include all of them in detail when running some models, but it may be important to have some of these parameters in mind when e.g. try to detect areas with the greatstes risks of floods or drought inside a larger region (>100x100 km cells). [Castor Muñoz Sobrino, Spain]

This whole section has been removed and moved to the Suppl. information / chapter 1.

408
13 21 35
35
I feel that this paragraph constitutes a link between Sections 3.2.2 (climate projections) and Section 3.2.3 (impacts). Shouldn't it be moved at the end of Section 3.2.2? At least, it could go after the following paragraph about climate model information. [David Docquier, Belgium]

This whole section has been removed and moved to the Suppl. information / chapter 1.

9978
13 21 35
35
Here, a hybrid approach (dynamical/statistical downscaling combination in some cases) can also be defined as a third approach [Mustafa Tufan Turp, Turkey]

This whole section has been removed and moved to the Suppl. information / chapter 1.

17681
13 21 35
35
Can the authors add a discussion on the strengths and weaknesses or differences in the use of downscaling approaches? Winkler et al. 2011 on climate scenario development can be a potential reference. [Perdman Perdman, Indonesia]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11928
13 22 35
35
SHIFT "a", ... ESM simulations have too coarse "a" resolution. ... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

9797
13 25 35
25
Regional Climate Models (RCM) must be "Regional Climate Models (RCMs)" [Mustafa Tufan Turp, Turkey]

This whole section has been removed and moved to the Suppl. information / chapter 1.

20778
13 28 35
28
Nox, RCM will be used in an ongoing collaboration project between France and Egypt with title "Health mapping of infectious diseases vulnerable to climate change", (2017-2019) [Armel Hussein, Egypt]

This whole section has been removed and moved to the Suppl. information / chapter 1.

10843
13 28 35
28
CORDEX defined before? Should it be included a reference here instead of the acronym? The comment applies to other mentions to CORDEX [Carolina Vera, Argentina]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11929
13 29 35
29
ADD... some cases even higher "than that" (connection... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11930
13 29 35
29
CHANGE... models, e.g. "less than 4 km... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11945
13 29 35
29
ADD... some cases even higher "than that" (connection... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11946
13 29 35
29
CHANGE... models, e.g. "less than 4 km... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

12782
13 31 31
31
Needs a citation for statistical downscaling, maybe Meran et al. 2010 Rev. Geophys. [Robert Vautard, France]

This whole section has been removed and moved to the Suppl. information / chapter 1.

10855
13 33 33
33
Add e.g. within the brackets and before the references [Carolina Vera, Argentina]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11931
13 33 34
34
CHANGE... time of "this writing, there are only"... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11947
13 33 34
34
CHANGE... time of "this writing, there are only"... [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

625
13 33 33
33
An example of recent study on statistical downscaling (or bias correction) is Izumiz et al. (2011a) which offers climate change scenario scenarios used to estimate the differences in the impacts on global crop yields between 1.5 and 2 degrees C warming described in Izumi et al. (2015b). It is just for your reference.

This whole section has been removed and moved to the Suppl. information / chapter 1.


This whole section has been removed and moved to the Suppl. information / chapter 1.

19002
13 37 37
37
The second sentence starts with "First", but nonetheless the paragraph we find "Second"... is it possible to cancel "First"? [Jacques-Andre Njione, Benin]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11948
13 41 41
41
DELETE... "we note that" at the beginning of the sentence. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11933
13 43 43
44
The acronym "Decorated regional climate model experiments (COREDEX)" should be explained earlier on lines 2728 on this page. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11949
13 43 43
44
The acronym "Decorated regional climate model experiments (COREDEX)" should be explained earlier on lines 2728 on this page. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

10866
13 44 44
44
Add e.g. before the reference to COREEX. It might be the largest but is not the only RCM intercomparison project. [Carolina Vera, Argentina]

This whole section has been removed and moved to the Suppl. information / chapter 1.

8827
13 45 45
46
What is the meaning of SOD [Lutra Alam, Bangladesh]

This whole section has been removed and moved to the Suppl. information / chapter 1.

12852
13 46
46
define SOD [Jorge Camacano, Chile]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11934
13 46 46
46
Don't remember the acronym "SOD" being explained anywhere previously. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11950
13 46 46
46
Don't remember the acronym "SOD" being explained anywhere previously. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

8894
13 46 49
49
The sentence is unclear, do you mean "other models are available to assess impacts of changes in... or do you want to say that the sea-level rise and flood models etc... to assess changes in regional and global climate systems? I think the former makes more sense and in that case you could add models dealing with biogeochemical cycling and vegetation distribution. [Christopher Rayer, Germany]

This whole section has been removed and moved to the Suppl. information / chapter 1.

8638
13 46 49
49
Again, many of them can changed inside a region depending altitude, orientation, rain-shadow effects, etc.[Castor Muñoz Sobrino, Spain]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11957
13 47 47
47
'... other models are usually called... impact models' [Carolina Vera, Argentina]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11935
13 47 47
47
ADD "v and comma... climate system" etc. in e.g. models. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.

11951
13 47 47
47
ADD "v and comma... climate system" etc. in e.g. models. [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. information / chapter 1.
What is the difference between cryosphere models and models for glaciers and ice sheets? I would suggest deleting one of them in the sentence (previously cryosphere models, which is not the right terminology). [David Docquier, Belgium]

This whole section has been removed and moved to the Suppl. Information / chapter 1.

Sea level rise in response to ice cap mass balance processes are particularly useful to include here [Bart Van den Hurk, Netherlands]

This whole section has been removed and moved to the Suppl. Information / chapter 1.

Remember to include "SOOD references." [Paul Doyle, Canada]

This whole section has been removed and moved to the Suppl. Information / chapter 1.

Please rewrite this sentence. A typographic mistake was found. [Joan A. Lopez-Bustins, Spain]

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<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>20560</td>
<td>14</td>
<td>49</td>
<td></td>
<td></td>
<td>First time the acronym BP is introduced. Any person might not understand what this is. Has this been introduced in other chapters? Would be easy to add a Glossary to the full report were BP would be represented as Before Present. [Vera Barrosa Araujo, Ioana Sminjoa, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>10380</td>
<td>14</td>
<td>49</td>
<td>49</td>
<td></td>
<td>The Eemian period was c.130 – 115 ka (or 130 000 to 115 000 BP) [Matt Law, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>32123</td>
<td>14</td>
<td>49</td>
<td>49</td>
<td></td>
<td>Change “125-120 year” to “125-120 year BP” [Fredrik Charpentier, London, Sweden]</td>
<td>Taken into account - lab or field</td>
</tr>
<tr>
<td>4560</td>
<td>14</td>
<td>49</td>
<td>49</td>
<td></td>
<td>Add explanation of “BP” [Radim Tolzak, Czech Republic]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>10461</td>
<td>14</td>
<td>49</td>
<td>51</td>
<td></td>
<td>“BP” not clear (guessing it’s a culturally neutral alternative to BC the BCE but could be spelt out at first reference) [Jonathan Lyn, Switzerland]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>2475</td>
<td>14</td>
<td>50</td>
<td>51</td>
<td></td>
<td>Ruddiman reference above-evidence for increasing GHG at advent of agriculture nearly 10,000 years ago [Lisa Lucern, United States of America]</td>
<td>Rejected - Ruddiman’s hypothesis is not proved; in any case, the variations of Neolithic CO2 is very small according to present change</td>
</tr>
<tr>
<td>20561</td>
<td>14</td>
<td>51</td>
<td></td>
<td></td>
<td>Same issue for Ms. Important to present acrylics before using them or at least have a glossary for this whole document. [Vera Barrosa Araujo, Ioana Sminjoa, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>7628</td>
<td>14</td>
<td>51</td>
<td>51</td>
<td></td>
<td>Another reason that far past paleo records are difficult to use is that in addition to sparse data is that species we have evolved and changed over this long period and we may not respond in the same way. It may be more useful for physical than biological processes [Sophie Fauquet, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>11958</td>
<td>14</td>
<td>51</td>
<td>51</td>
<td></td>
<td>STHS Ma (1 million years) the first time used [Paul Doyle, Canada]</td>
<td>Taken into account - rows 46-51 have been removed as they are redundant with Box 3.1</td>
</tr>
<tr>
<td>13256</td>
<td>14</td>
<td>51</td>
<td>51</td>
<td></td>
<td>It’s hard to have a third approach [Wei Zhang, United States of America]</td>
<td>Accepted - add e.g.</td>
</tr>
<tr>
<td>13860</td>
<td>14</td>
<td>52</td>
<td>52</td>
<td></td>
<td>If the citations are examples, if so then say so [Elvira Poloczanska, Germany]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>5257</td>
<td>14</td>
<td>52</td>
<td>52</td>
<td></td>
<td>You mean manipulation in the field? [Bart Van den Hurk, Netherlands]</td>
<td>Taken into account - lab or field</td>
</tr>
<tr>
<td>13862</td>
<td>14</td>
<td>53</td>
<td>55</td>
<td></td>
<td>This is a bit name as described. Understanding system properties and associated vulnerabilities as well as the underlying and unifying mechanisms of impact are crucial in assessing risk. Relevant literature exists which goes much beyond what is described here. [Elvira Poloczanska, Germany]</td>
<td>Accepted - Replace by ‘on the causal effect of a key factors and helps to develop impact models. Last sentence of the paragraph is removed</td>
</tr>
<tr>
<td>9245</td>
<td>14</td>
<td>54</td>
<td>54</td>
<td></td>
<td>spelling mistake: insights should be insights [Marie-Jeanne S. Royer, Canada]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13861</td>
<td>14</td>
<td>54</td>
<td>54</td>
<td></td>
<td>correct spelling of insights [Elvira Poloczanska, Germany]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>7239</td>
<td>14</td>
<td>54</td>
<td>54</td>
<td></td>
<td>correct to: Insights into [Bart Van den Hurk, Netherlands]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>9311</td>
<td>14</td>
<td>54</td>
<td>54</td>
<td></td>
<td>The last word in ‘provide key insights’ should be ‘insights’ [Bir KILIKS, Turkey]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>11692</td>
<td>14</td>
<td>54</td>
<td>54</td>
<td></td>
<td>‘Insight’ is misspelled [David Schieman, Australia]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13256</td>
<td>14</td>
<td>54</td>
<td>54</td>
<td></td>
<td>‘Insights’ to ‘insights’ [Paul Doyle, Canada]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>1386</td>
<td>14</td>
<td>55</td>
<td>55</td>
<td></td>
<td>insights to “insights” [Wei Zhang, United States of America]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>486</td>
<td>14</td>
<td>55</td>
<td>55</td>
<td></td>
<td>‘Environ’ can be found in the middle of the line. ‘Insight?’ Please correct it [Aldia Buzlaki, Hungary]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13863</td>
<td>14</td>
<td>57</td>
<td>57</td>
<td></td>
<td>Awkward wording [Elvira Poloczanska, Germany]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>10009</td>
<td>15</td>
<td>57</td>
<td>57</td>
<td></td>
<td>They are generally used for “risk assessment” or “risk estimation” [Carolina Vera, Argentina]</td>
<td>Accepted - see reply to comment 13863</td>
</tr>
<tr>
<td>20560</td>
<td>15</td>
<td>57</td>
<td>57</td>
<td></td>
<td>Rowe 2. There must be ‘C’ in 1.5 and there must be ‘C’ in 1.5 [Nan An, Turkey]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>10010</td>
<td>15</td>
<td>57</td>
<td>57</td>
<td></td>
<td>Rowe 20. There must be ‘C’ in 1.5 and 2 [Nan An, Turkey]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>3632</td>
<td>15</td>
<td>60</td>
<td>60</td>
<td></td>
<td>Box 3.1: this box needs more explanation. I stands there, unrelated to the text and the purpose of it is not clear at all. [Sylva Sander, Monaco]</td>
<td>Taken into account - the box will be fully written in SDS</td>
</tr>
<tr>
<td>13848</td>
<td>15</td>
<td>1</td>
<td>15</td>
<td></td>
<td>please clarify what the thresholds of concern are [Elvira Poloczanska, Germany]</td>
<td>Accepted - Replace by ‘Even if the four RCP scenarios used in the AR5 are not strictly to 1.5° and 2°C global warming, studies on 1.5° and 2°C impact projections have increased in recent times’</td>
</tr>
<tr>
<td>409</td>
<td>15</td>
<td>2</td>
<td>3</td>
<td></td>
<td>What comes after ‘global warming’ seems to be out of sentence [David Boscuiper, Belgium]</td>
<td>Accepted - see reply to comment 13863</td>
</tr>
<tr>
<td>11993</td>
<td>15</td>
<td>3</td>
<td>3</td>
<td></td>
<td>Reference: Schiffmeister et al. 1016, no 2016b could be located in the text but it appears in the reference list. [William Moufouma Okia, France]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>626</td>
<td>15</td>
<td>3</td>
<td>4</td>
<td></td>
<td>ice sheet at [1217] is a good example of the approach discussed in the text that uses four RCP scenarios to infer the impacts of 1.5 and 2 degree C warming [Iizumi et al. (2017)]</td>
<td>Accepted - reference added</td>
</tr>
<tr>
<td>10983</td>
<td>15</td>
<td>57</td>
<td></td>
<td></td>
<td>They are generally used for “risk assessment” or “risk estimation” [Carolina Vera, Argentina]</td>
<td>Accepted - see reply to comment 13863</td>
</tr>
<tr>
<td>410</td>
<td>15</td>
<td>8</td>
<td></td>
<td></td>
<td>Shouldn’t the reference be bracketed Section 3.2.2.1 instead of ‘Section 3.2.2.1’ [David Boscuiper, Belgium]</td>
<td>Taken into account - the text has been completely changed</td>
</tr>
<tr>
<td>11960</td>
<td>15</td>
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<td>(2016 ?) which one a, b or c?? [Paul Doyle, Canada]</td>
<td>Taken into account - the text has been completely changed</td>
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<tr>
<td>13257</td>
<td>15</td>
<td>15</td>
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<td></td>
<td>Change to “1.5° and 2°C warming” [Wei Zhang, United States of America]</td>
<td>Taken into account - the text has been completely changed</td>
</tr>
<tr>
<td>13257</td>
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<td>16</td>
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<td></td>
<td>cannot find Section 3.2.3.3 [David Boscuiper, Belgium]</td>
<td>Taken into account - the text has been completely changed</td>
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<tr>
<td>17994</td>
<td>15</td>
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<td>15</td>
<td></td>
<td>Quick &amp; Cramer 2016 ‘X’ should be replaced by “and” [William Moufouma Okia, France]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>11961</td>
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<td></td>
<td>(2016 ?) which one a, b or c?? [Paul Doyle, Canada]</td>
<td>Accepted - see comment 17994</td>
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<td></td>
<td>After “1.5° vs 2°C” need to add letter C [William Moufouma Okia, France]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>9886</td>
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<td>for clarity I would add “if 1.5°C vs 2°C global warming” [Christopher Rayer, Germany]</td>
<td>Accepted - add global warming</td>
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<tr>
<td>4132</td>
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<td>20</td>
<td></td>
<td>can maybe be missing [Hans-Jorg Scherl, Italy]</td>
<td>Accepted - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>10980</td>
<td>15</td>
<td>25</td>
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<td></td>
<td>Section 1.2 also discuss global versus regional warming [Carolina Vera, Argentina]</td>
<td>Taken into account - possible but here it is done in a specific objective</td>
</tr>
<tr>
<td>2710</td>
<td>15</td>
<td>25</td>
<td>28</td>
<td></td>
<td>it would be preferable to mention other regions as well, or provide a reference to sections where this is discussed, as the text at the moment is likely to raise questions (factual and political) on why these regions are mentioned and not others. [Penny Urquhart, South Africa]</td>
<td>Taken into account - Brazil is added</td>
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<tr>
<td>2121</td>
<td>15</td>
<td>28</td>
<td>28</td>
<td></td>
<td>I don’t know what you mean by “the local impacts are assessed on the basis of large local threshold” [Neville Nicholls, Australia]</td>
<td>Accepted - removed sentence</td>
</tr>
<tr>
<td>Comment No</td>
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<td>20</td>
<td>what does large local threshold mean?</td>
<td>Elvira Poloczanska, Germany</td>
</tr>
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<td>thresholds</td>
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<td>20</td>
<td>20</td>
<td>Does not read. Maybe “on the basis of a large local threshold”?</td>
<td>Jonathan Lynn, Switzerland</td>
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<tr>
<td>12784</td>
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<td>30</td>
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<td>30</td>
<td>Suggestion: Here I think there could be a paragraph or section on the SHI ratio at regional scale long-term variability also gets much larger. Post-ARS results are many in this direction, see papers from Deser et al. and others.</td>
<td>Robert Vautard, France</td>
</tr>
<tr>
<td>2122</td>
<td>15</td>
<td>35</td>
<td>15</td>
<td>38</td>
<td>Has anyone actually read this paragraph? There are spelling mistakes and mistakes of logic and the paragraph actually doesn’t say anything useful.</td>
<td>Paul Doyle, Canada</td>
</tr>
<tr>
<td>2779</td>
<td>15</td>
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<td>corrct to: two types of driver</td>
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<tr>
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<td>in “two types of drivers”</td>
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<tr>
<td>7000</td>
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<td>36</td>
<td>Typo “types” should be “types”</td>
<td>Efall Ming Lee, China</td>
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<td>9312</td>
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<td>36</td>
<td>The second word in “two types of drivers” should be “types”</td>
<td>Ilir KLIDIS, Turkey</td>
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<td>“two types of drivers”</td>
<td>Matti, United Kingdom (of Great Britain and Northern Ireland)</td>
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<td>Typo “types”</td>
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<td>36</td>
<td>“two types”</td>
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<td>5881</td>
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<td>36</td>
<td>15</td>
<td>36</td>
<td>Please substitute “types” with “types”</td>
<td>Joan A. Lopez-Bustins, Spain</td>
</tr>
<tr>
<td>12208</td>
<td>15</td>
<td>36</td>
<td>15</td>
<td>36</td>
<td>Suggest replacing “i.e., anthropogenic and natural forcing”</td>
<td>Bart Van den Hurk, Netherlands</td>
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<tr>
<td>9680</td>
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<td>15</td>
<td>36</td>
<td>then two-pieces of drivers. must be</td>
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</tr>
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<td>37</td>
<td>15</td>
<td>37</td>
<td>change “differentiates” to “differentiate”</td>
<td>Wei Zhang, United States of America</td>
</tr>
<tr>
<td>12808</td>
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<td>39</td>
<td>15</td>
<td>39</td>
<td>Suggestion for the whole section, to be potentially added here and results summarized elsewhere in the temperature, precip etc sections: there is a recently growing literature (several papers published, in press or submitted) on extreme event attribution using global and regional simulations, ensemble- or multi-ensemble- to detect and attribute extremes likelihood changes that occurred between either a control/experiment or a world that has less warming (end of 20th century (Stott et al 2016, WRIES CC). This can be used for showing detectable changes in extremes for a 0.5°C global change. For instance, comparing return periods in 1990s, 2010s can find many recent (2001-2003) could be used here. One example using CMIP5 and CORDEX simulations can be found in Hauser et al, 2017, Earth’s Future, in press (for summer 2015 precipitation): another (Phillip et al., 2017) for spring floods is submitted. Other could be found in BAMS supplement reports on attribution 2015, 2016 and 2017. See also Eden et al. 2016, ERL, on Boulder event, detection studies from observations for mediterranean extreme rain events (Vautard et al., BAMS supplement 2015, Ribes et al., 2017, submitted...)</td>
<td>Robert Vautard, France</td>
</tr>
<tr>
<td>2478</td>
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<td>15</td>
<td>40</td>
<td>If the purpose of this box is not clear the caption must give more details on what this box is about to show</td>
<td>Bart Van den Hurk, Netherlands</td>
</tr>
<tr>
<td>11964</td>
<td>15</td>
<td>40</td>
<td>15</td>
<td>40</td>
<td>Why does Box 3.1 not immediately follow para 40-57 on p.14?</td>
<td>Paul Doyle, United States</td>
</tr>
<tr>
<td>6165</td>
<td>15</td>
<td>40</td>
<td>15</td>
<td>41</td>
<td>Would it be useful to add a note to the box, that there may have been other (or secondary) influencing factors for (past) climate impacts than just temperature? E.g., land use changes, that may impact how much warming or change in temperature.</td>
<td>Bart Van den Hurk, Netherlands</td>
</tr>
<tr>
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<td>41</td>
<td>The purpose of this box is not clear.</td>
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</tr>
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<td>15</td>
<td>41</td>
<td>If it really necessary to have Box 3.1? Since the text has not been written yet, i cannot see the added value of this box. Maybe adding some supplementary references in the text (page 40, line 46) is sufficient.</td>
<td>David Docquier, Belgium</td>
</tr>
<tr>
<td>19004</td>
<td>15</td>
<td>40</td>
<td>15</td>
<td>41</td>
<td>Please add “*” after the word “climate”</td>
<td>JACQUES-ANDRE NDIONE, Senegal</td>
</tr>
<tr>
<td>17257</td>
<td>15</td>
<td>52</td>
<td>15</td>
<td>53</td>
<td>Terrestrial vegetation and ecosystems (I)</td>
<td>Bart Van den Hurk, Netherlands</td>
</tr>
<tr>
<td>17708</td>
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<td>55</td>
<td>15</td>
<td>55</td>
<td>Suggestion: add extreme events to point 2 (Ana Baskos, France)</td>
<td>Taken into account - the box will be fully written in SOD</td>
</tr>
</tbody>
</table>
*IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3*

<table>
<thead>
<tr>
<th>Comment No</th>
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<th>From Line</th>
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<th>Comment</th>
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<tr>
<td>10511</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>Roe 34. (RCP 2.6) must be written adjacent [Hazar AN, Turkey]</td>
<td>Noted. This figure is no longer in the main text (now in suppl. information - while cells are described twice)</td>
</tr>
<tr>
<td>15005</td>
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<td>16</td>
<td>16</td>
<td>16</td>
<td>Please add <strong>&quot;after the word&quot;</strong> events [JACQUES-ANDRE NIoned, Senegal]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
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<tr>
<td>5882</td>
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<td>16</td>
<td>16</td>
<td>16</td>
<td>Please consider including other teleconnection patterns as Pacific North American pattern (PNA index) or Madden-Julian oscillation (MJO) [Joan A. Lopez-Boiutia, Spain]</td>
<td>Taken into account - the box will be fully written in SOD 9099 16 16 16 PDO, PDV, and AMO can also be listed as well [Mustafal Tufan Turp, Turkey]</td>
</tr>
<tr>
<td>3653</td>
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<td>16</td>
<td>Add PDO to the list. For example, see PDO teleconnection changes inferred from paleoclimatic data by Fleming and Sauchyn (2013, Water Resources Research, 49: 64-74.) [Sean Fleming, United States of America]</td>
<td>Taken into account - the box will be fully written in SOD 6639 16 16 16 Extreme droughts should be also specified here? [Castror Muñoz Sobrino, Spain]</td>
</tr>
<tr>
<td>19006</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>Please add <strong>&quot;all the end of each sentence; and &quot;</strong> after &quot;NAO, line 4 [JACQUES-ANDRE NIoned, Senegal]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>17445</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>See &quot;ENSO&quot; and &quot;NAO&quot; anywhere in this report? If this is the first time these two words are used, need to give the full expressions [Kacielu Zhang, China]</td>
<td>Taken into account - the box will be fully written in SOD 2031 16 4 Can be added: &quot;Morison Actives phase as 2010 Pakistan's Flood and Sun Spots. [Mohammad Ahram, Iran]</td>
</tr>
<tr>
<td>1709</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>Instead of ENSO and NAV only; a comprehensive Insight on changes in atmospheric circulation and climate variability patterns could be given in point 3. (e.g. Coumou et al. 2014 PMAs; Francis &amp; Varrux 2015 ERL; Woolings &amp; Blackmon 2011 Jclimact; Mann et al., 2014 Se Rep) [Ana Bastos, France]</td>
<td>Taken into account - the box will be fully written in SOD 19007 16 16 6 6 Please add <strong>&quot;after the word&quot;</strong> points [JACQUES-ANDRE NIoned, Senegal]</td>
</tr>
<tr>
<td>19008</td>
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<td>16</td>
<td>16</td>
<td>Please add <strong>&quot;all the end of each sentence; and &quot;</strong> after &quot;ecosystems, line 9 [JACQUES-ANDRE NIoned, Senegal] Editorial - copyedit to be completed prior to publication</td>
<td></td>
</tr>
<tr>
<td>13867</td>
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<td>16</td>
<td>In this chapter focusing on climate related hazards may provide a better focus. Discussing the wider climate context may not be needed and irrelevant for this chapter. In some ways it buries the relevant aspects. If risk analysis is introduced earlier. e.g. by turning ember diagram the differences between 1.5 and 2 could be elaborated. See structured expert dialogue 2016 [Elvira Poloczanska, Germany]</td>
<td>Rejected. Overall changes in climate (means and extremes) are essential to understand the associated changes in risks and potential impacts.</td>
</tr>
<tr>
<td>3841</td>
<td>16</td>
<td>14</td>
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<td>15</td>
<td>As suggested using semantics in the section heading [Elvira Poloczanska, United States of America]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13866</td>
<td>16</td>
<td>14</td>
<td>16</td>
<td>15</td>
<td>If this section is focused on climate and hazards should be the title be projected hazards and avoided hazards? Please check WGI risk terminology [Elvira Poloczanska, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
</tr>
<tr>
<td>6185</td>
<td>16</td>
<td>14</td>
<td>46</td>
<td>3</td>
<td>In general there seems to be a heavy reliance on AR5 on throughout section 3.3. This is, of course, fine where there is no new information but I think there is no need to repeat the AR5 findings in detail. It is enough to briefer state the findings and then note if there is anything new to add. [Mat Collins, United Kingdom (of Great British and Northern Ireland)]</td>
<td>Taken into account - the text based on AR5 has been shortened and new references have been added.</td>
</tr>
<tr>
<td>505</td>
<td>16</td>
<td>14</td>
<td>51</td>
<td>16</td>
<td>Section 3.3. While this section provides very interesting results, it think it could be substantially reduced and simplified by keeping only the essential information, i.e. highly relevant to impacts at 1.5°C. At the moment, I have the feeling that a state-of-the-art for each sub-section rather than a synthesis of impacts at 1.5°C. [David Docquier, Belgium]</td>
<td>Taken into account. The section has been shortened.</td>
</tr>
<tr>
<td>6184</td>
<td>16</td>
<td>14</td>
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<td>3</td>
<td>I realize there is very little literature to draw from in section 3.3. Nevertheless, approaches to displaying information from multi-model ensembles are well established e.g. AR5 with hatching indicating responses which are small in comparison to natural variability and stippling indicating model agreement (WG1, CH2, line 12.1). While these approaches are very useful way of displaying the gross characteristics of projections, their uncertainties and the differences between 1.5 and 2C projections. Thus, not every variable will need a dedicated set of papers on changes at 1.5°C. [Mat Collins, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Noted. The level of model agreement (~2/3 of models) is shown for the differences plots on Figs. 3.4, 3.5, 3.6, and 3.10. The authors will consider including more details (e.g. small vs large changes) for the FDD.</td>
</tr>
<tr>
<td>506</td>
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<td>51</td>
<td>16</td>
<td>Section 3.3 It is hard to find out what are the key results of each sub-section (topic). There could be an introductory paragraph for each sub-section summarizing the key findings, and there could be much more reference to Table 3.1. [David Docquier, Belgium]</td>
<td>Taken into account - the text has been substantially revised. The authors will consider including a summary paragraph at the end of section 3.3.1</td>
</tr>
<tr>
<td>10702</td>
<td>16</td>
<td>21</td>
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<td>23</td>
<td>Reference the summary table. [Christopher Clark, United States of America]</td>
<td>Taken into account - the box will be fully written in SOD 414 16 22 23 As mentioned in Comment 12 above, it strange to have a supplementary section (Section 3.3.13) after the global synthesis (Section 3.3.12). The global synthesis should go on the end of Section 3.3. [David Docquier, Belgium]</td>
</tr>
<tr>
<td>415</td>
<td>16</td>
<td>26</td>
<td>27</td>
<td>27</td>
<td>I think references to Vaughan et al. (2013, Chapter 4 of IPCC AR5 WG1 report) on the Cryosphere and Church et al. (2013, Chapter 13 of IPCC AR5 WG1 report on Sea Level Changes) are two chapters are present in Section 3.10 (Sea level). [David Docquier, Belgium]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft of section 3.10.</td>
</tr>
<tr>
<td>11965</td>
<td>16</td>
<td>27</td>
<td>58</td>
<td>27</td>
<td>CHANGE... as well as four more recent... as well as &quot;four&quot; more recent... [Paul Doyle, Canada]</td>
<td>Taken into account - the box will be fully written in SOD 11968 16 28 28 Walkerburger et al. (?????) Cited numerous times in different ways. Reference in REFERENCES section shown in 2 different ways. Needs consistency [Paul Doyle, Canada]</td>
</tr>
<tr>
<td>13868</td>
<td>16</td>
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<td>11</td>
<td>Suggest focusing on climate related hazards that can cause impacts. A more general description of climate is not needed in this chapter. It could be deleted, find its place in the framing or supplementary material. [Elvira Poloczanska, Germany]</td>
<td>Taken into account - the box will be fully written in SOD 20657 16 40 71 11 For sections 3.3 and 3.4. Authors could align findings about impacts with the four pathways introduced in chapter 1 (that would generally be helpful for the reader to understand impacts associated with the different choices) to show what is at stake for key values to decision makers. It would be helpful if those subsections in 3.3 and 3.4 that COMPARE 1.5 with 2 degrees with coordinates of authors with chapter 4 and 5-5- either each chapter should contrast and compare and 2 degrees impacts and options, or &quot;save&quot; the comparison of 1.5 and 2 degrees for chapter 5. That would mean that chapters 1-4 present the pathways, general characteristics, impacts, and options for 1.5 (which will give the reader very clear idea about each of the four pathways presented in chapter 1), and section 5 to close out the special report by showing the consequences for humanity of 1.5 vs. 2 C for the aspirations of sustainable development [Koko Warner, Germany]</td>
</tr>
<tr>
<td>10204</td>
<td>16</td>
<td>42</td>
<td>19</td>
<td>14</td>
<td>am not convinced that this section (3.1.1.1) is needed. When is now covered in chapter 1 in a less confusing way. The next sections very seem to compare 1.5C to 2C, so I was left confused about how they compare to present-day. I think the present day, 1.5C and 2C climates are all useful to assess, i.e. just not that close in the present draft [Pears Forster, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - the box will be fully written in SOD 6822 16 43 16 43 Global Mean Surface Air Temperature [Kathy Hamil, Belgium]</td>
</tr>
<tr>
<td>4313</td>
<td>16</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>warming of the global mean surface temperature (I do not like a temperature warm, but increasing [teodoro georgiadis, Italy]</td>
<td>Noted. We use both terms &quot;temperature warming&quot; and &quot;temperature increasing&quot; For a general public, &quot;warming&quot; is easier to understand.</td>
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<tr>
<td>Comment No</td>
<td>From Page</td>
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<td>Comment</td>
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<td>5863</td>
<td>16</td>
<td>43</td>
<td>16</td>
<td>43</td>
<td>Please specify that GMT is derived from both land and ocean temperature [Joana A. Lopez-Budini, Spain]</td>
<td>Noted. The revised text mentions that the GMT is computed from both land and ocean data. This could be also further clarified for the FGD.</td>
</tr>
<tr>
<td>6516</td>
<td>16</td>
<td>45</td>
<td>16</td>
<td>48</td>
<td>Are there any newer studies that extend the trend beyond 2012 [Heike Heddinghaus, Germany]</td>
<td>Noted. This text is no longer in the chapter (following shortening).</td>
</tr>
<tr>
<td>6167</td>
<td>16</td>
<td>47</td>
<td>16</td>
<td>48</td>
<td>Minor comment: ‘when multiple independently produced datasets existed’ refers to the period 1850-2012 but it would be more suitable for the period 1951-2012, which is mentioned in the same sentence. I suggest moving that segment of the text since so as to refer to the more relevant period. [Vanessa Pártaln, Argentina]</td>
<td>Noted. The revised text mentions that the GMT is computed from both land and ocean data. This could be also further clarified for the FGD.</td>
</tr>
<tr>
<td>6640</td>
<td>16</td>
<td>49</td>
<td>16</td>
<td>60</td>
<td>This seems to be a common fact during other warming stages recorded everywhere in the past. For example, similar conclusions were reached by Bint et al. (2014) after reconstructing temperatures by using a number of comparable multiproxy data, taken for the Lateglacial period, in all Western Europe. Heiri, O. et al. (2014) Nature Communications 5: 4914 <a href="http://dx.doi.org/10.1038/ncomms9594">http://dx.doi.org/10.1038/ncomms9594</a> [Castor Muñoz Sobrino, Spain]</td>
<td>Noted. Because there were suggestions to shorten this section, further aspects on paleoclimate were not added. But we will possibly still consider this for the FGD.</td>
</tr>
<tr>
<td>587</td>
<td>16</td>
<td>49</td>
<td>16</td>
<td>53</td>
<td>According to the report, some regions facing stronger trends in the global mean average. In my opinion, a short description of the background of above mentioned anomalies shall be added to the chapter. [Attila Buzaí, Hungary]</td>
<td>Noted. More background on this topic is available in the chapter.</td>
</tr>
<tr>
<td>10466</td>
<td>16</td>
<td>50</td>
<td>16</td>
<td>51</td>
<td>“With a few exceptions, most land regions display stronger trends in the global mean average,” seems illogical: how can most be above the average? [Jonathan Lynn, Switzerland]</td>
<td>Rejected. This is because the global average is for both land and oceans and the oceans warm less.</td>
</tr>
<tr>
<td>12786</td>
<td>16</td>
<td>53</td>
<td>16</td>
<td>53</td>
<td>It would be nice to have a global number for land vs. ocean with error bars, to support “much larger warming” [Robert Vautard, France]</td>
<td>Noted. Figs. 3.8 and 3.9 include numbers for land vs ocean.</td>
</tr>
<tr>
<td>3533</td>
<td>17</td>
<td>1</td>
<td></td>
<td></td>
<td>Figure 3.1. very bad quality/resolution, in fact most figures are substandard quality/resolution and most of them almost unreadable. [Sylvia Sandor, Monaco]</td>
<td>Editorial</td>
</tr>
<tr>
<td>7594</td>
<td>17</td>
<td>1</td>
<td></td>
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<td>Taken into account. This figure is no longer in the main text (now in suppl. Information)</td>
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</tr>
<tr>
<td>13329</td>
<td>17</td>
<td>1</td>
<td>17</td>
<td>6</td>
<td>Figure 3.1. Include what white areas mean in figure legend (as text in caption may not be easily noticed) [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account. Changed text to “incorrectly labelled.”</td>
</tr>
<tr>
<td>13330</td>
<td>17</td>
<td>1</td>
<td>17</td>
<td>6</td>
<td>Figure 3.1. Temperature scale/legend may be more quickly understood if the legend is rotated to the vertical instead of horizontal. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account. Changed text to “incorrectly labelled.”</td>
</tr>
<tr>
<td>17446</td>
<td>17</td>
<td>3</td>
<td>17</td>
<td>3</td>
<td>Figure 3.1. This is why Chapter 1 developed the human induced warming – which hiatus like events to not affect. Reference needs to be made back to this and “overall, the issue of internal climate variability is the reason why a 1.5 C warming level needs to be determined in terms of ‘human-induced warming’” (see Chapter 1 for additional background on this issue).</td>
<td>Taken into account. Text was revised and shortened.</td>
</tr>
<tr>
<td>2513</td>
<td>17</td>
<td>8</td>
<td>17</td>
<td>31</td>
<td>It’s too strong to describe the hiatus as erroneously labelled – it depends how the word is used and the trend defined – I would trust the word ‘alleged’ [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account. This figure is no longer in the main text (now in suppl. Information)</td>
</tr>
<tr>
<td>10200</td>
<td>17</td>
<td>8</td>
<td>17</td>
<td>18</td>
<td>This discussion of the hiatus is poorly written and needs a better overall structure. [Robert Kopp, United States of America]</td>
<td>Taken into account. This figure is no longer in the main text (now in suppl. Information)</td>
</tr>
<tr>
<td>10003</td>
<td>17</td>
<td>8</td>
<td>17</td>
<td>31</td>
<td>It’s very long section on the hiatus, which is a bit standalone in the storyline of the chapter and report. It should be shortened and a suggestion would be to add a sub-section on what would it include. Otherwise it should be focused better on what the hiatus means to the 1.5° issue, and summarized. [Robert Vautard, France]</td>
<td>Taken into account. Added the following sentence at the end of this paragraph: “Overall, the issue of internal climate variability is the reason why a 1.5°C warming level needs to be determined in terms of ‘human-induced warming’.”</td>
</tr>
<tr>
<td>12876</td>
<td>17</td>
<td>8</td>
<td>17</td>
<td>31</td>
<td>This is a very long section on the hiatus, which is a bit standalone in the storyline of the chapter and report. It should be shortened and a suggestion would be to add a sub-section on what would it include. Otherwise it should be focused better on what the hiatus means to the 1.5°C issue, and summarized. [Robert Vautard, France]</td>
<td>Taken into account. This figure is no longer in the main text (now in suppl. Information)</td>
</tr>
<tr>
<td>5261</td>
<td>17</td>
<td>9</td>
<td>17</td>
<td>9</td>
<td>Refer to this period as &quot;known as the warming hiatus&quot; [Bart Van den Hurk, Netherlands]</td>
<td>Noted. Written now as “which has been referred to by some as the ‘growing hiatus’”. Will consider proposed alternative wording for the FGD.</td>
</tr>
<tr>
<td>6539</td>
<td>17</td>
<td>11</td>
<td>17</td>
<td>11</td>
<td>Instead of just mentioning the 2015 and 2016 were the two warmest years, I’d suggest that it is framed as the most recent years; 2015 and 2016, were the two warmest years. This is to stress of how temperature has increased in the recent past. [Victor Ongoma, Kenya]</td>
<td>Noted. This text is no longer in the chapter (following shortening).</td>
</tr>
<tr>
<td>11968</td>
<td>17</td>
<td>11</td>
<td>17</td>
<td>11</td>
<td>Minor comment: ‘when multiple independently produced datasets existed’ refers to the period 1880-2012 but it would be more suitable for the period 1951-2012, which is mentioned in the same sentence. I suggest moving that segment of the text since so as to refer to the more relevant period. [Vanessa Pártaln, Argentina]</td>
<td>Noted. This text is no longer in the chapter (following shortening).</td>
</tr>
<tr>
<td>3513</td>
<td>17</td>
<td>12</td>
<td>17</td>
<td>12</td>
<td>The phrase “we note as discussed in Medhaug et al. (2017)” refers to that 2015 to 2017 note that Paul Doyle - 2017 note that Paul Doyle [Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Accepted.</td>
</tr>
<tr>
<td>17998</td>
<td>17</td>
<td>13</td>
<td>17</td>
<td>15</td>
<td>It's really the temperature response from radiative forcing on shorter time scale, not the effect of natural variability? It might be worth substantiate the statement with references from literature [William Moufouma Okia, France]</td>
<td>Noted. Will consider revising for FGD.</td>
</tr>
<tr>
<td>5262</td>
<td>17</td>
<td>14</td>
<td>17</td>
<td>14</td>
<td>event &quot;x&quot; passed&quot; [Bart Van den Hurk, Netherlands]</td>
<td>Noted. Will be edited in the FGD.</td>
</tr>
<tr>
<td>6517</td>
<td>17</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td>Using the term “cooler temperature” here is misleading. The mentioned period did not actually show a cooling, and even less a cooling below pre-industrial levels, so there were no cooler temperatures. Instead, by choosing an exceptionally hot year as starting point, the temperatures looked cooler, but only compared to that record high year. Maybe better phrase along the line of “year to year change are not linear and a year with record-high temperatures can be followed by several less hot years, as during the recent…” [Heike Heddinghaus, Germany]</td>
<td>Noted. This text is no longer in the chapter (following shortening).</td>
</tr>
<tr>
<td>5263</td>
<td>17</td>
<td>16</td>
<td>17</td>
<td>16</td>
<td>Why “erroneously called”? [Bart Van den Hurk, Netherlands]</td>
<td>Noted. Changed text to “incorrectly labelled”. Based on most recent literature, there is no evidence of a “hiatus” in climate forcing or even climate response. But will consider editing this text for FGD.</td>
</tr>
<tr>
<td>17997</td>
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<td>16</td>
<td>17</td>
<td>18</td>
<td>The issue of global warming hiatus seems a topic still under debate, so the expression “erroneously labelled” may be too prescriptive. It would be appropriate to add references about “warming hiatus”. In addition, the speculation in Line 17-18 need to be backed up with evidence from relevant literature [William Moufouma Okia, France]</td>
<td>Noted. Changed text to “incorrectly labelled”. Based on most recent literature, there is no evidence of a “hiatus” in climate forcing or even climate response. But will consider editing this text for FGD.</td>
</tr>
<tr>
<td>10466</td>
<td>17</td>
<td>20</td>
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<td>22</td>
<td>The apparent slowdown… was overestimated…” OK this is clear but for many people at first reading “overestimated” will mean the whole thing was bigger, not the slowing trend. Can it be expressed be more clearly? (Maybe this only a consideration for SPM/TS/ES not chapters, for non-specialists) [Jonathan Lynn, Switzerland]</td>
<td>Noted. Keep text but will consider clearer wording for the FGD.</td>
</tr>
</tbody>
</table>
Following the reference of Schlesser et al. (2017) the report says that "robust increases in observed precipitation extremes can also be identified for..."  Relocated. No analyses available from literature to our knowledge.

Comment: I would not use TXn and TNn abbreviations in the text since it is rather complex for the non-expert reader. I would keep the original names instead.

Response: Noted. Will possibly consider for the FGD.

Comment: The resolution of Figure 3.2 could be improved. The same holds for Figures 3.8, 3.9 and 3.12. [Kai Fang, China]

Response: Noted. Will be improved for FGD.

Comment: I see two different "light colored envelopes". What's the difference between them? [Bart Van den Hurk, Netherlands]

Response: Noted. Will clarify this point in the caption for the FGD.

Comment: Further clarification is needed on the following sentences "For observational datasets..." [Wilfran Moufouma Okia, France]


Comment: Mann et al. 2016 assessed the anthropogenic fingerprint in record breaking global temperature records in the recent years [Ana Bastos, France]

Response: Noted. Will possibly consider for the FGD.

Comment: What do "20CR" and "ERA" stand for? [Paul Doyle, Canada]

Response: Noted. Will be clarified for the FGD.

Comment: Fig. 3.2: Is it really necessary to include results from internal variability (light-coloured envelopes)? This complexifies the figure and the message (and..."

Response: Rejected. The analyses in Fig. 3.2 are for the global land.

Comment: Fig. 3.2: The quality of this figure is not good. The text in the axes and legend is too small. [David Docquier, Belgium]

Response: Noted. Will be improved for FGD.

Comment: Fig. 3.2: According to the text above, there was a 'reduction of the intensity of cold extremes by at least 2.5°C' (page 18, lines 13-14). What we see in..."

Response: Rejected. The analyses in Fig. 3.2 are for the global land.

Comment: This is the relevant information needed. However, progressive shifts in temperature, ocean acidification, shifted precipitation patterns also have relevant impact. Focus on hazards that relate to impacts in a 1.5°C world. [Elvira Pöltölä, Germany]

Response: Noted. Cannot provide that level of detail.

Comment: NOAA and the EPA back up claims of precipitation changes since 1901. In fact, according to data published by NOAA in 2016, most of the continental United States has experienced substantial decreases in the frequencies and intensities of cold extremes by at least 2.5°C (page 18, lines 13-14). What we see in the middle panel (Thn) is an increase of 2.5°C. Or something is unclear in the figure. [David Docquier, Belgium]

Response: Noted. Cannot provide that level of detail.

Comment: Noted. Cannot provide that level of detail.

Comment: Noted. Cannot provide that level of detail.

Comment: Fig. 3.2: Is it really necessary to include results from internal variability (light-coloured envelopes)? This complexifies the figure and the message (and..."

Response: Rejected. The analyses in Fig. 3.2 are for the global land.

Comment: Fig. 3.2: Is it really necessary to include results from internal variability (light-coloured envelopes)? This complexifies the figure and the message (and..."

Response: Rejected. The analyses in Fig. 3.2 are for the global land.

Comment: Additional clarification is needed on the following sentences "For observational datasets..." [Castor Muñoz Sobrino, Spain]

Response: Noted. Will be added for the FGD.

Comment: Noted. Kept text but will consider clearer wording for the FGD.

Comment: Comment: How do I access the full description of the analysed variables? [Joan A. Lopez-Bustins, Spain]

Response: Rejected. Using full description of the analysed variables would be too complex as well.
Figure 3.3: explanation of shading (and colours) of the thick bands needs to be explained more prominently in figure legend (as the text in caption may not be read when initially trying to interpret the information). [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

Comment: The color bars for the left two plots in Figure 3.4 lead to an impression, with a quick glance, that warming is not occurring everywhere, whereas this is occurring, as is more evident in the third plot. I'd suggest changing the color bar for the left two figures that perhaps has purple instead of blue for the lower warming level–save blue for areas that are actually cooling. The same comment applies to Figure 3.5 on page 20. As a further comment, might it be helpful to the reader to also have plots for the changes normalized by the natural variability (so variability about some human-induced trend curve) over some period of time like the mid- or late 20th century, it would be helpful to pick a sense of the significance of the changes. While the changes over the ocean are less in absolute amount over land and in low latitudes, the normalized changes are likely not so much different than the changes over land. [Michael MacCracken, United States of America]

Response: Noted. We believe the text is clear as is.

6960 19 28 20 20 The units of figures are wrong °C, they must changed with °C [Mustafa Tunel Turp, Turkey]

Comment: Article is now published.

Response: Noted. Will consider this for FGD.

16237 19 28 19 34 The color bars for the left two plots in Figure 3.4 lead to an impression, with a quick glance, that warming is not occurring everywhere, whereas this is occurring, as is more evident in the third plot. I'd suggest changing the color bar for the left two figures that perhaps has purple instead of blue for the lower warming level–save blue for areas that are actually cooling. The same comment applies to Figure 3.5 on page 20. As a further comment, might it be helpful to the reader to also have plots for the changes normalized by the natural variability (so variability about some human-induced trend curve) over some period of time like the mid- or late 20th century, it would be helpful to pick a sense of the significance of the changes. While the changes over the ocean are less in absolute amount over land and in low latitudes, the normalized changes are likely not so much different than the changes over land. [Michael MacCracken, United States of America]

Response: Noted. We believe the text is clear as is.

6963 20 12 20 13 The units of figures are wrong °C, they must changed with °C [Mustafa Tunel Turp, Turkey]

Comment: Article is now published.

Response: Noted. Will consider this for FGD.
Figure 3.5: Temperature scale/legend may be more quickly understood if the legend is rotated to the vertical instead of horizontal. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

Daytime and "nighttime" may not make sense with surface temperature in the plots. A larger description of the caption of figure 3.5 is required to clarify it. [Joan A. Lopez-Bustins, Spain]

Compared to changes in temperature, changes in precipitation are not globally uniform and projections are more uncertain. Suggests that temperatures ARE globally uniform, which they obviously are not... [David Schoeman, Australia]

Regarding Figure 3.6: These figures need to be provided, as Figure SPM.8b in IPCC AR5 Summary for Policymakers, with hatching indicating regions where the multi-model mean is small compared to natural internal variability (i.e., less than one standard deviation of natural internal variability in 20-year means) and with stippling indicating regions where the multi-model mean is large compared to natural internal variability (i.e., greater than two standard deviations of natural internal variability in 20-year means) and where at least 90% of the models agree on the sign of change. Otherwise, the figures will give a false impression of a larger certainty in the direction and amplitude of precipitation change than actually exists. [Heidh Charpentier-Luqrist, Sweden]

Figure 3.6: Figure headings are written in 2.0 °C and degrees are written in the form of C° in some maps in Figure 3.6 [Nazan AN, Turkey]

Fig. 3.7: Add unit to y axis (probably %). [David Docquier, Belgium]

Figure 3.7: Avoid unnecessary acronym in y-axis, can instead simply state ‘Probability ratio’. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

The title of this section is not clear. [Hong Yang, Switzerland]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

Why does Figure 3.5 not immediately follow Fig. 3.4 in text? [Paul Doyle, Canada]

Figure 3.6; figure headings are written in 2.0 °C and degrees are written in the form of C° in some maps in Figure 3.6 [Nazan AN, Turkey]

The units of figures are wrong “C°”; they must changed with “°C” [Mustafa Tufan Turp, Turkey]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

Can be better conceptually this Sentence: “However, some regions display substantial changes in mean precipitation -Under- between 1.5°C vs. 2°C global warming...” [Mohammad Ahmadi, Iran]

Please substitute “5-day maximum precipitation” with “annual maximum 5-day precipitation”. [Joan A. Lopez-Bustins, Spain]

Please write “heavy precipitation” instead of “extreme precipitation” in order to be coherent with L22P20. [Joan A. Lopez-Bustins, Spain]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

Figure 3.6: Explain ‘pmean’ (projected mean?) in upper row of figure. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

Figure 3.7: Avoid unnecessary acronym in y-axis, can instead simply state ‘Probability ratio’. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

Again, the focus should be on climate related hazards in relation to observed or projected impacts, in order not to bury that core information. [Elvira Ljungqvist, Sweden]

Figure 3.7: Add unit to y axis (probably %). [David Docquier, Belgium]

There is something backwards with the caption/description. Seems backwards that at any degree warming, you’d have a lower probability of crossing the 99th percentile (e.g. 5% at 2 deg C), than the 99.9 percentile (30%), is this backwards? [Christopher Clark, United States of America]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]


Suggestion is to provide more studies and references, such as Guo Xiaojun, Jianbin Huang, Yong Luo, Zongci Zhao and Ying Xu, 2016, Projection of heat waves over China for eight different global warming targets using 12 CMIP5 models, Theor. Appl. Climatol., doi: 10.1007/s00704-015-1718-1 [Zong-Ci Zhao, China]

Crossing the 99th percentile (e.g. 5% at 2 deg C), than the 99.9 percentile (30%)…is this backwards? [Christopher Clark, United States of America]

As for the 99.99th percentile, it is not clear to me what the values represent. [David Schoeman, Australia]

The probability ratio as different (but linked) concepts, I suggest mentioning as "probability of exceeding…" instead of "risk of exceeding…". [Vanesa Pántano, Argentina]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

Why does Figure 3.5 not immediately follow Fig. 3.4 in text?? [Paul Doyle, Canada]

The “probability ratio” requires a little explanation. It isn’t currently clear to me what this refers to. Perhaps a brief elaboration is in order? [David Docquier, Belgium]

It is not clear what threshold means here. Is it the 95th? If so then you should exchange words to make the sentence clearer. [Sylvia Sander, Monaco]

It is not clear what threshold means here. Is it the 95th? If so then you should exchange words to make the sentence clearer. [Sylvia Sander, Monaco]


Figure 3.5: remove longitude and latitude tick marks and labels in the maps (as unnecessary visual clutter) [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]
### IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>988</td>
<td>22</td>
<td>8</td>
<td>22</td>
<td>14</td>
<td>How do the undersampling of mentioned regions affect the confidence? If undersampling can be reduced, relevant improvement of confidence can be realized, or the effect is marginal? [Alfita Ruska, Hungary]</td>
<td>Done</td>
</tr>
<tr>
<td>13436</td>
<td>22</td>
<td>8</td>
<td>22</td>
<td>38</td>
<td>References cited are AR5 and SREX only. More recent studies need to be included in this review, particularly those on attribution of the long-term observed extreme temperatures. [Sung-Ki Min, Republic of Korea]</td>
<td>Recent literature added [Sylla et al., 2016; Abatzoglou and Williams 2016; Guo et al., 2017]</td>
</tr>
<tr>
<td>6172</td>
<td>22</td>
<td>16</td>
<td>22</td>
<td>16</td>
<td>The availability of data is sufficient to very controversial phrase since coverage, quality, completeness, length of period, etc are needed to be improved in so many meteorological stations (specially in southern hemisphere) and meteorologists make great efforts to convince policy makers to invest with that aim. I suggest removing this assertiveness. [Vanessa Pantano, Argentina]</td>
<td>Done.</td>
</tr>
<tr>
<td>16238</td>
<td>22</td>
<td>17</td>
<td>22</td>
<td>17</td>
<td>The phrase “except Antarctica”, as placed in the sentence, could give the impression that no warming has occurred on Antarctica, which is just not the case (not to mention what is happening in terms of mass loss). I would suggest restating the sentence indicating that data make clear human induced warming is occurring on all continents and that for Antarctica, while changes are occurring, statistical assessment (presumably to 95% confidence) has not been achieved due primarily to the large natural variability in the weather that occurs there and the comparatively short observational record. [Michael MacCracken, United States of America]</td>
<td>Done. The paragraph has been reformedulated</td>
</tr>
<tr>
<td>16239</td>
<td>22</td>
<td>19</td>
<td>22</td>
<td>20</td>
<td>Really, only “likely” for the Arctic? Is there any other possible explanation? This is another example of really not conveying findings in a way that is generally useful to decision makers, allowing statistical rigor to hide a clear finding as a result of limitations in data and the range in temperature that can occur in the thin atmospheric inversion layer making it mathematically challenging to get to two standard deviations. I would urge making a clearer statement here, or at least indicating that the key issue here is not doubt about a human influence but the limit of the statistical techniques due to the complications involved in considering the complex atmosphere-ocean-sea ice system, etc. [Michael MacCracken, United States of America]</td>
<td>Done. The paragraph has been reformedulated</td>
</tr>
<tr>
<td>16240</td>
<td>22</td>
<td>20</td>
<td>22</td>
<td>21</td>
<td>This is also a misleading statement. Global warming has affected everywhere—all sub-continental regions. Whether one can detect this from analyzing temperatures from just within that region may be a question—basically with a much smaller data set and using in region statistical analyses, it can be hard to get statistical significance, but there is no question that human-influences are affecting everywhere. This sentence thus needs some reworking to indicate this, and then fine to add that only in some regions has this change become very clearly larger than the baseline conditions. In saying this, it does raise the point that it is essential to indicate what periods he was comparing—is it the most recent few decades to the 19th century baseline or, as seems possible given the preceding sentence, the change since the mid-20th century. If the latter, then one is really not doing an analysis of if there is a human influence, but if the human influence has grown by some amount over some period of time. The Hansen et al. PNAS paper on perceptions of change showed that summer land temperatures for the NH have changed substantially since mid-century—and in particular the fraction of time above what was two standard deviation warmth in the mid-20th century has gone up by a factor of something like 100. So, the statements made here really do not convey how much change has occurred due to how the analysis is done and a much more nuanced explanation is needed. [Michael MacCracken, United States of America]</td>
<td>Done. The paragraph has been reformedulated</td>
</tr>
<tr>
<td>16241</td>
<td>22</td>
<td>23</td>
<td>22</td>
<td>38</td>
<td>As context for the statements regarding only likely and just medium confidence, it really needs to be said that the analysis framework is based on regional-scale statistical tests where one is seeking to evaluate standard deviations of confidence, etc. Given warming due to human activities is occurring virtually all over the world, warming to be evident in the various regional and temporal records—after all, the global values are averages of local and high resolution data from weather observations and were such warming not occurring, we would not have a global signal. Somehow, this all needs to be explained—and rephrased—to make clear there is no question that the world is warming and this means warming is occurring virtually everywhere. [Michael MacCracken, United States of America]</td>
<td>Done. The paragraph has been reformedulated</td>
</tr>
<tr>
<td>7244</td>
<td>22</td>
<td>26</td>
<td>22</td>
<td>38</td>
<td>remove “or” [But Nathalie, Australia]</td>
<td>Done</td>
</tr>
<tr>
<td>433</td>
<td>22</td>
<td>30</td>
<td>22</td>
<td>31</td>
<td>Why do you use “or” between “length,” “number of warm spells” and “heat waves”? [David Docquier, Belgium]</td>
<td>Done</td>
</tr>
<tr>
<td>434</td>
<td>22</td>
<td>38</td>
<td></td>
<td></td>
<td>Re-write “supplementary material of Schlesser et al. 2017.” [David Docquier, Belgium]</td>
<td>Done</td>
</tr>
<tr>
<td>18502</td>
<td>22</td>
<td>35</td>
<td>22</td>
<td>38</td>
<td>the format of reference, delete the full break in (Schlesser et al. 2014) [William MacIvor Oku, France]</td>
<td>Done</td>
</tr>
<tr>
<td>13711</td>
<td>22</td>
<td>38</td>
<td>22</td>
<td>38</td>
<td>Position of parenthesis needs revision [Elvira Poloczanska, Germany]</td>
<td>Done</td>
</tr>
<tr>
<td>5140</td>
<td>22</td>
<td>40</td>
<td>22</td>
<td>40</td>
<td>extreme heat events in cities. The term “cities” is perhaps too general for this case as it is not perceived the same by people of different cultural background. Therefore, it should be further defined or described as metropolitan areas. For instance, Shanghai in China cannot be compared to a much smaller city of the same country. Both are cities indeed, yet, the structure and population distribution differ, same as the perception of the term “city” in similar examples. [Spyros Schismenos, China]</td>
<td>Done. &quot;Metropolitan areas&quot; added</td>
</tr>
</tbody>
</table>
| 5465       | 22        | 40        | 22      | 47      | Good attempt was made here. However, it is important consider global urban land teleconnections and global urban land use change in relation to climate change and emissions. May be a box is needed constring the amount of data and literature on this. [Aliu Barau, Nigeria] | There is a box on urban issues where change in land cover and land use have been handled
Among the reasons of the urban heat island, the rate of air conditioning equipment plays a role too in a negative feedback loop. (APUR, 2012)

The two are quite good but it would be better to give more examples. In addition, what about Africa? [JACQUES-ANDRE NDIONE, Senegal] Noted. An example could not be added at this stage, but this will be considered for the FGD.

UHI can be stronger in winter because of heating, not summer. Also, references should be included here. [Jinkyu Hong, Republic of Korea] Yes. Paragraph updated.

Punctuation needs revision [Elvira Poloczanska, Germany] Done.

per capita energy use must be included in factors controlling UHI. [Jinkyu Hong, Republic of Korea] Agree. List updated.

low cloud cover - does this mean "relatively clear skies" or "clouds that are low in the sky"? [Erica Head, Canada] We meant low altitude in the sky

Rephrase: 'there is low wind speed, low cloud cover, large populations or city sizes (Arnfield 2003)'. [David Docquier, Belgium] The paragraph has been reformulated.

Clarify differences between surface and air temperature [Cynthia Rosenzweig, United States of America] Noted. Could not be addressed due to time constraints. Will be considered for the FGD.

cities are not warmer only in summer [Rafiq Hamdi, Belgium] The paragraph has been reformulated.

Influencing factors of magnitude of UHI shall be completed by the followings: built-up areas, energy consumption, vegetation index, transportational issues, etc. [Attila Boldy, Hungary]

Generally, cities are warmer in summer. … Potentially an over-generalisation when stating "in summer". Cooler season examples include Couls (2007), Justin Oogjes, Australia

Influencing factors of magnitude of UHI shall be completed by the followings: built-up areas, energy consumption, vegetation index, transportational issues, etc. [Attila Boldy, Hungary]

A key factor for UHI causation is missing from the review: UHI warming also depends on waste (Anthropogenic) heat from building HVAC and vehicle emissions. The waste heat input can be considerable in flux e.g. see examples from Singapore (Quah and Roth 2012, Dermal and weekly variation of anthropogenic heat emissions in a tropical city, Singapore. Atmospheric Environment 49, 85–103) and from Phoenix, AZ (Chow et al. 2014, “A multi-scale approach for estimating city-wide anthropogenic heat fluxes” Atmospheric Environment. 99: 64-76. DOI:10.1016/j.atmosenv.2014.09.053.) [Winston Chow, Singapore]

A key factor for UHI causation is missing from the review: UHI warming also depends on waste (Anthropogenic) heat from building HVAC and vehicle emissions. The waste heat input can be considerable in flux e.g. see examples from Singapore (Quah and Roth 2012, Dermal and weekly variation of anthropogenic heat emissions in a tropical city, Singapore. Atmospheric Environment 49, 85–103) and from Phoenix, AZ (Chow et al. 2014, “A multi-scale approach for estimating city-wide anthropogenic heat fluxes” Atmospheric Environment. 99: 64-76. DOI:10.1016/j.atmosenv.2014.09.053.) [Winston Chow, Singapore]

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A key factor for UHI causation is missing from the review: UHI warming also depends on waste (Anthropogenic) heat from building HVAC and vehicle emissions. The waste heat input can be considerable in flux e.g. see examples from Singapore (Quah and Roth 2012, Dermal and weekly variation of anthropogenic heat emissions in a tropical city, Singapore. Atmospheric Environment 49, 85–103) and from Phoenix, AZ (Chow et al. 2014, “A multi-scale approach for estimating city-wide anthropogenic heat fluxes” Atmospheric Environment. 99: 64-76. DOI:10.1016/j.atmosenv.2014.09.053.) [Winston Chow, Singapore]

A key factor for UHI causation is missing from the review: UHI warming also depends on waste (Anthropogenic) heat from building HVAC and vehicle emissions. The waste heat input can be considerable in flux e.g. see examples from Singapore (Quah and Roth 2012, Dermal and weekly variation of anthropogenic heat emissions in a tropical city, Singapore. Atmospheric Environment 49, 85–103) and from Phoenix, AZ (Chow et al. 2014, “A multi-scale approach for estimating city-wide anthropogenic heat fluxes” Atmospheric Environment. 99: 64-76. DOI:10.1016/j.atmosenv.2014.09.053.) [Winston Chow, Singapore]
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>11699</td>
<td>22</td>
<td>46</td>
<td>22</td>
<td>46</td>
<td>&quot;Low cloud! Low in what sense? Low altitude? Small tycoons. Avoid ambiguous adjectives! [David Schiehn, Austria]&quot;</td>
<td>Low altitude</td>
</tr>
<tr>
<td>2300</td>
<td>22</td>
<td>46</td>
<td>22</td>
<td>46</td>
<td>The Urban Heat Island is related to pollution among other multiple mechanisms ([references in the text]), but also urban air pollution can be affected by this effect. There are clear feedbacks in this issue. [Begoña ARTIÑANO, Spain]</td>
<td>Yes agree</td>
</tr>
<tr>
<td>13713</td>
<td>22</td>
<td>46</td>
<td>22</td>
<td>47</td>
<td>[Reference added to Hamdi and Schayes 2008 could be added in the list: Hamdi Raif, S. Schayes. Sensitivity study of the urban heat island intensity to urban characteristics. International Journal of Climatology, 26, 973-982, 2006. [Rafiq Hamdi, Republic of Korea]</td>
<td>Done. The paragraph has been updated</td>
</tr>
<tr>
<td>6825</td>
<td>22</td>
<td>47</td>
<td>22</td>
<td>47</td>
<td>&quot;Reference added&quot;</td>
<td>Agree. Reference added</td>
</tr>
<tr>
<td>12476</td>
<td>22</td>
<td>47</td>
<td>22</td>
<td>47</td>
<td>[Reference added to Hamdi and Schayes 2008 could be added in the list: Hamdi Raif, S. Schayes. Sensitivity study of the urban heat island intensity to urban characteristics. International Journal of Climatology, 26, 973-982, 2006. [Rafiq Hamdi, Republic of Korea]</td>
<td>Done. The paragraph has been updated</td>
</tr>
<tr>
<td>6641</td>
<td>22</td>
<td>49</td>
<td>22</td>
<td>49</td>
<td>I suggest that at the end of the sentence, different studies can be given with the respective cities of where they were undertaken. [Victor Ongoma, Kenya]</td>
<td>There is a box on urban areas where these examples will be showed</td>
</tr>
<tr>
<td>18003</td>
<td>22</td>
<td>49</td>
<td>22</td>
<td>57</td>
<td>These statements don't seem to connect urban climate to 1.5 °C warming. Further clarification is needed? [William Mouchouma Oka, France]</td>
<td>Noted. This is related to a lack of publications specific to urban climate and 1.5. However, because the topic is relevant for impacts, and was not addressed in the AR5, it is considered relevant for the SR15. If additional literature can be found for specifically on this topic, this will be added for the FGD.</td>
</tr>
<tr>
<td>13874</td>
<td>22</td>
<td>49</td>
<td>23</td>
<td>2</td>
<td>22</td>
<td>Agree. Reference added</td>
</tr>
<tr>
<td>7557</td>
<td>22</td>
<td>49</td>
<td>23</td>
<td>2</td>
<td>Studies have been conducted to estimate the UHI intensity in many cities (Stewart 2011, Taiwai et al. 2015; Mccae and Higghait 2010); Stewart, I.D. (2011) A Systematic Review and Scientific Critique of Methodology in Modern Urban Heat Island Literature. International Journal of Climatology, 31, 200-217.</td>
<td>Done. The paragraph has been updated and new references added</td>
</tr>
<tr>
<td>12478</td>
<td>22</td>
<td>50</td>
<td>22</td>
<td>50</td>
<td>The most conclusive study that evidence estimation of urban temperature is theoretically difficult. [Rafiq Hamdi, Republic of Korea]</td>
<td>Yes</td>
</tr>
<tr>
<td>12477</td>
<td>22</td>
<td>50</td>
<td>22</td>
<td>61</td>
<td>Hong and Hong (2016) showed that doubled population due to urban redevelopment made about 0.6°C daily minimum temperature in one of Asian cities. [Rafiq Hamdi, Republic of Korea]</td>
<td>Reference added</td>
</tr>
<tr>
<td>5143</td>
<td>22</td>
<td>57</td>
<td>23</td>
<td>1</td>
<td>The statement needs to be qualified as large tropical cities have UHI intensities similar to temperate cities of similar size e.g. Singapore has a max UHI of 7 K (e.g. Roth &amp; Chow 2012, &quot;A historical review and assessment of urban heat island in Singapore&quot;. H45. 33(3): 381-397. doi:10.1111/j.1365-2806.2012.02203.x).</td>
<td>The paragraph has been updated</td>
</tr>
<tr>
<td>5144</td>
<td>22</td>
<td>57</td>
<td>23</td>
<td>1</td>
<td>&quot;I suggest the following amendment: Tropical cities generally have UHI intensities lower than comparable temperate cities (Roth 2007), but large tropical cities can have UHI intensities similar to cities of similar size and population in mid-latitudes e.g. Singapore’s maximum UHI is 7°C (Roth and Chow 2012).&quot;</td>
<td>Agree. The paragraph has been updated</td>
</tr>
<tr>
<td>437</td>
<td>23</td>
<td>1</td>
<td>23</td>
<td>1</td>
<td>Replace “urban heat island” by “UHI” [David Docquier, Belgium]</td>
<td>Done</td>
</tr>
<tr>
<td>11977</td>
<td>23</td>
<td>1</td>
<td>23</td>
<td>1</td>
<td>REPLACE “urban heat island” with “UHI” [Paul Doyle, Canada]</td>
<td>Done</td>
</tr>
<tr>
<td>5069</td>
<td>23</td>
<td>1</td>
<td>23</td>
<td>1</td>
<td>I suggest the following amendment: Tropical cities generally have UHI intensities lower than comparable temperate cities (Roth 2007), but large tropical cities can have UHI intensities similar to cities of similar size and population in mid-latitudes e.g. Singapore’s maximum UHI is 7°C (Roth and Chow 2012).</td>
<td>Done</td>
</tr>
<tr>
<td>6827</td>
<td>23</td>
<td>2</td>
<td>23</td>
<td>2</td>
<td>A paragraph is missing on the estimation of the UHI on the warming rate, because for some cities the effect could be large if the meteorological station referenced historical urbanization like in China for example. [Rafiq Hamdi, Belgium]</td>
<td>Agree. The paragraph has been updated</td>
</tr>
<tr>
<td>6230</td>
<td>23</td>
<td>9</td>
<td>23</td>
<td>9</td>
<td>[Reference added]</td>
<td>Done</td>
</tr>
<tr>
<td>10426</td>
<td>23</td>
<td>9</td>
<td>23</td>
<td>9</td>
<td>[Reference added]</td>
<td>Done</td>
</tr>
<tr>
<td>7245</td>
<td>23</td>
<td>10</td>
<td>23</td>
<td>10</td>
<td>[Reference added]</td>
<td>Done</td>
</tr>
<tr>
<td>2516</td>
<td>23</td>
<td>13</td>
<td>23</td>
<td>15</td>
<td>[Reference added]</td>
<td>Done</td>
</tr>
<tr>
<td>16243</td>
<td>23</td>
<td>15</td>
<td>23</td>
<td>15</td>
<td>[Reference added]</td>
<td>Done</td>
</tr>
<tr>
<td>11978</td>
<td>23</td>
<td>15</td>
<td>23</td>
<td>15</td>
<td>[Reference added]</td>
<td>Done</td>
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<td>Comment No</td>
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<td>Comment</td>
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<td>13436</td>
<td>23</td>
<td>17</td>
<td>23</td>
<td>27</td>
<td>Figure 3.8 shows results on the intensity of extreme temperature only (same for Fig. 3-9). Responses of frequency and duration of temperature extremes as well as soil moisture deficit would be as important as those of intensity. 1.5 and 2.0 degree warming, which might show non-linear response to the global mean temperature, differently from the intensity. Addressing this point would be helpful for related impact assessments. [Seung-Ki Min, Republic of Korea]</td>
<td>Noted. Results on frequency are provided in Fig. 3-7.</td>
</tr>
<tr>
<td>438</td>
<td>23</td>
<td>19</td>
<td></td>
<td></td>
<td>I do not think Section 3.2 provides an overview of IPCC SREX regions as mentioned in the text. You probably refer to another section of this report. [David Docquier, Belgium]</td>
<td>Agree. Was corrected.</td>
</tr>
<tr>
<td>439</td>
<td>23</td>
<td>19</td>
<td></td>
<td></td>
<td>I invert: displays changes in temperature hot extremes for the IPCC SREX regions. [David Docquier, Belgium]</td>
<td>Agree. Will be corrected in FGD.</td>
</tr>
<tr>
<td>13714</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>This information should also be provided in the legend to Fig. 3.8 [Eveline Poloczanska, Germany]</td>
<td>Agree. Will be edited in the FGD.</td>
</tr>
<tr>
<td>11979</td>
<td>23</td>
<td>23</td>
<td>24</td>
<td>24</td>
<td>Wartenburger et al. ?? Maybe this paper will be published by the time this report is printed and ref can be updated?? [Paul Doyle, Canada]</td>
<td>Yes, reference will be updated</td>
</tr>
<tr>
<td>445</td>
<td>24</td>
<td>24</td>
<td></td>
<td></td>
<td>Fig. 3.8: This figure has a very poor quality. It is difficult to read without zooming. And even after zooming, you realize that the image resolution is low. Finally, the landscape format makes the readability even more difficult. My suggestion is to plot only some key regions. [David Docquier, Belgium]</td>
<td>Figure improved</td>
</tr>
<tr>
<td>3541</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>4</td>
<td>some lines and legends too small to read. [Sylvia Sander, Monaco]</td>
<td>Done. Figure and legend improved.</td>
</tr>
<tr>
<td>666</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>4</td>
<td>Suggestion is to add &quot;multi CMIP5 at RCP8.5 and RCP2.6&quot; [Zong-Ci Zhao, China]</td>
<td>Legend updated</td>
</tr>
<tr>
<td>696</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>4</td>
<td>Suggestion is to add &quot;multi CMIP5 at RCP8.5 and RCP2.6&quot; [Zong-Ci Zhao, China]</td>
<td>Legend updated</td>
</tr>
<tr>
<td>13347</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>5</td>
<td>Figure 3.8: This is a very complex figure, packing in a lot of information, making it difficult to work out what the associated message is. It could benefit from separating out the global data from the regional data. Presenting global data in a plot alongside an explanation of the structure of the data and what it shows, would enable the reader to first grasp how to read the plot and its meaning. Regional data could then be presented as a separate figure. [Bart Van den Hurk, Netherlands]</td>
<td>Figure improved</td>
</tr>
<tr>
<td>13348</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>5</td>
<td>Figure 3.8: figure resolution is currently very poor. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Figure improved</td>
</tr>
<tr>
<td>5720</td>
<td>24</td>
<td>1</td>
<td>30</td>
<td>4</td>
<td>The quality of Figures 3.8, 3.9 and 3.11 is very poor. In general, the quality of Figures in this Chapter needs to be improved. [Hong Yang, Switzerland]</td>
<td>Agree. Figure improved</td>
</tr>
<tr>
<td>1421</td>
<td>24</td>
<td>2</td>
<td></td>
<td></td>
<td>This figure is really not easy to read [Philippe Routier, France]</td>
<td>The figure was substantially revised and improved.</td>
</tr>
<tr>
<td>440</td>
<td>24</td>
<td>2</td>
<td></td>
<td></td>
<td>Add bracket: 'TX' [David Docquier, Belgium]</td>
<td>Editorial</td>
</tr>
<tr>
<td>4562</td>
<td>24</td>
<td>2</td>
<td></td>
<td></td>
<td>Add ?? [Radim Tolasz, Czech Republic]</td>
<td>Editorial</td>
</tr>
<tr>
<td>11980</td>
<td>24</td>
<td>2</td>
<td>24</td>
<td>2</td>
<td>Fig. 3.8 Good but very small font. [Paul Doyle, Canada]</td>
<td>The figure was substantially revised and improved.</td>
</tr>
<tr>
<td>339</td>
<td>24</td>
<td>2</td>
<td>24</td>
<td>4</td>
<td>font must give more information on the meaning of the different lines and shadings [Bart Van den Hurk, Netherlands]</td>
<td>The figure was substantially revised and improved, caption was updated.</td>
</tr>
<tr>
<td>441</td>
<td>24</td>
<td>2</td>
<td>24</td>
<td>4</td>
<td>More bracket: land Wartenburger et al. (in review) [David Docquier, Belgium]</td>
<td>Noted. Results on frequency are provided in Fig. 3-7.</td>
</tr>
<tr>
<td>11072</td>
<td>25</td>
<td>1</td>
<td>25</td>
<td>18</td>
<td>When assessing droughts and heat waves simulated by climate models, please note the recent studies by Talaksen and Stahl (2014), De Kauwe et al. (2015) and Ukkola et al. (2016) that indicate that LSMs overestimate the frequency / severity of drought events. This could also have implications for surface temperature extremes through the coupling between latent and sensible heat fluxes: an underestimation of ET for periods of precipitation deficit would imply an overestimation of temperature. This should be considered both in studies on heat extremes and in studies on climate change since temperature increases in regions with drier future conditions could be overestimated by some models. Some mechanisms that can explain the underestimation of ET by LSMs during periods with dry precipitation anomalies are discussed by Ukkola et al. (2016). [Seung-Ki Min, Republic of Korea]</td>
<td>Yes, this is correct. But too detailed to add text on this point.</td>
</tr>
<tr>
<td>13437</td>
<td>25</td>
<td>1</td>
<td>25</td>
<td>18</td>
<td>Nothing is mentioned here about benefit from weaker warming of extreme temperature, assessed from differences between 1.5 and 2 degree warming?? [Seung-Ki Min, Republic of Korea]</td>
<td>Not sure to understand question. Benefits are addressed later in the chapter (in section 3.5), not in section 3.3.</td>
</tr>
<tr>
<td>444</td>
<td>25</td>
<td>1</td>
<td>25</td>
<td>2</td>
<td>I do not understand this sentence [David Docquier, Belgium]</td>
<td>This means that the anomalies in changes in hot extremes are stronger than for the global mean temperature.</td>
</tr>
<tr>
<td>6642</td>
<td>25</td>
<td>1</td>
<td>25</td>
<td>7</td>
<td>Of course there is an inevitable problem of scale here (real vs working scale), which may produce some undesirable ambiguities. For example, currently SW Europe/Mediterranean or W North America include areas with hyperoceanic, humid, sub-humid, submediterranean, mediterranean and arid/moist continental climates. Under the same global scenario, people living and ecosystems developing on each one may have their own risks/threats. [Castor Múñoz Sobrino, Spain]</td>
<td>Yes, this is correct. But too detailed to add text on this point.</td>
</tr>
<tr>
<td>6173</td>
<td>25</td>
<td>1</td>
<td>25</td>
<td>26</td>
<td>Regarding the regions of strong soil-atmosphere coupling, Bennett et al (2015) identifies the regions with transitional climate zones, as mentioned in lines 6 and 30 (page 3-25). However, specifically for soil moisture-temperature coupling, the authors identify the regions with higher coupling a those with moisture limited evapotranspiration regime (which include both dry climate regimes and transitional ones). I suggest specifying this because it would better introduce the findings of Huang et al. (2017) mentioned in line 24 (page 3-25), who identify &quot;that warming is much larger in drylands&quot; [Kawasaki Palacios, Argentina]</td>
<td>The definition of ‘drylands’ in Huang et al. (2017) is not standard, hence difficult to include here (and it is mentioned further down). But will consider this comment in the preparation of the FGD.</td>
</tr>
<tr>
<td>Comment No</td>
<td>From Page</td>
<td>From Line</td>
<td>To Page</td>
<td>To Line</td>
<td>Comment</td>
<td>Response</td>
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<tr>
<td>4316</td>
<td>25</td>
<td>2</td>
<td>25</td>
<td>2</td>
<td>temperature warming... change in &quot;temperature increase...&quot; [Besoldo, Georgiadis, Italy]</td>
<td>both wording is used in the text &quot;temperature warming&quot; and &quot;temperature increase.&quot;</td>
</tr>
<tr>
<td>443</td>
<td>25</td>
<td>2</td>
<td>25</td>
<td>4</td>
<td>Stronger contrast in what? Something is missing. [David Docquier, Belgium]</td>
<td>Stronger than &quot;the mean global temperature warming in most land regions.&quot;</td>
</tr>
<tr>
<td>12075</td>
<td>25</td>
<td>4</td>
<td>25</td>
<td>14</td>
<td>soil moisture temperature coupling and associated response in soil respiration is not included in recent climate models, which should be considered in next generation models. Best explanation on how soil moisture module temperature sensitivity of soil respiration can be found in Davidson et al. 1998-Global Change Biology-4:217-227; Davidson et al 2006-Global Change Biology-12:154-164; Moyano et al 2013-Soil Biology and Biochemistry-59:72-85. [Delgarno, Sih, United States of America]</td>
<td>Too detailed for the present text.</td>
</tr>
<tr>
<td>14359</td>
<td>25</td>
<td>6</td>
<td>25</td>
<td>6</td>
<td>soil moisture regime as well as a transitional soil temperature regime as described by Grillakis et al., 2016.</td>
<td>Probably too detailed for the present text. But will consider for the FGD.</td>
</tr>
<tr>
<td>9479</td>
<td>25</td>
<td>7</td>
<td></td>
<td></td>
<td>Replace &quot;enhance&quot; by &quot;enhanced&quot; [David Watt, New Zealand]</td>
<td>Editorial</td>
</tr>
<tr>
<td>7226</td>
<td>25</td>
<td>7</td>
<td>25</td>
<td>7</td>
<td>Due to &quot;enhanced&quot; rather than &quot;enhance&quot;. [Hilarie Inyang, Nigeria]</td>
<td>Editorial</td>
</tr>
<tr>
<td>7246</td>
<td>25</td>
<td>7</td>
<td>25</td>
<td>7</td>
<td>enhance [Butt Nathalie, Australia]</td>
<td>Editorial</td>
</tr>
<tr>
<td>18006</td>
<td>25</td>
<td>7</td>
<td>25</td>
<td>7</td>
<td>enhance drying - enhanced drying [Withan, Moofisoa, Ofake, France]</td>
<td>Editorial</td>
</tr>
<tr>
<td>10594</td>
<td>25</td>
<td>7</td>
<td>25</td>
<td>7</td>
<td>&quot;... due to enhanced drying.&quot; [Wallace, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Editorial</td>
</tr>
<tr>
<td>10470</td>
<td>25</td>
<td>7</td>
<td>25</td>
<td>7</td>
<td>enhanced [Jonathan Lynn, Switzerland]</td>
<td>Editorial</td>
</tr>
<tr>
<td>7247</td>
<td>25</td>
<td>13</td>
<td>25</td>
<td>13</td>
<td>alter to &quot;these feedbacks with clouds and surface radiation are also&quot; [Butt Nathalie, Australia]</td>
<td>Editorial</td>
</tr>
<tr>
<td>7248</td>
<td>25</td>
<td>14</td>
<td>25</td>
<td>14</td>
<td>change to &quot;regions internal climate variability can also&quot; [Butt Nathalie, Australia]</td>
<td>Editorial</td>
</tr>
<tr>
<td>10864</td>
<td>25</td>
<td>14</td>
<td>25</td>
<td>15</td>
<td>Instead of Deeser et al. 2012, it should be included a reference to a chapter of the AR5 or to an article published after it. [Carolina Vera, Argentina]</td>
<td>Note. FIES et al. 2012 is a suitable reference, important to also list original material.</td>
</tr>
<tr>
<td>5870</td>
<td>25</td>
<td>18</td>
<td>25</td>
<td>18</td>
<td>IPCC may be more suitable than &quot;no warming&quot;. [Lazar, A Lopez-Bustins, Spain]</td>
<td>Rejected. Consider &quot;no warming&quot; easier to read.</td>
</tr>
<tr>
<td>12788</td>
<td>25</td>
<td>18</td>
<td>25</td>
<td>18</td>
<td>One thing that should be mentioned is the overall tendency of models to have a too strong temperature extreme responses (Böberg and Christensen 2012: 2013) and in general a large spread in latent and sensible fluxes (Stegehuis et al., 2012; Clim. Dyn.). Thus the spread may to a certain extent be underestimated. [Robert Vautard, South Africa]</td>
<td>Will be considered for the FGD.</td>
</tr>
<tr>
<td>2712</td>
<td>25</td>
<td>20</td>
<td>25</td>
<td>26</td>
<td>This is a key point - about drylands - and may highlight the need for advocacy on the part of the Chapter 3 team to ensure that drylands are adequately covered in chapters 4 and 5 as such - it would be useful for example, to have a case study of climate resilient development pathways focussing on drylands? [Penny Unsworth, South Africa]</td>
<td>Note. Will clarify coordination with Chapters 4 and 5 on this point in preparation of FGD.</td>
</tr>
<tr>
<td>5270</td>
<td>25</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>What do you mean with &quot;largely responsible&quot;? Isn't this the anthropogenic greenhouse gas emissions? [Bart Van den Hurk, Netherlands]</td>
<td>Will remove this sentence in the FGD.</td>
</tr>
<tr>
<td>16244</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>26</td>
<td>The last phrase beginning a &quot;Although...&quot; needs to be dropped even if someone points up that this is an inference about developed vs. developing countries responsibility, it is not the case - witness most countries in the tropics being developed and their being too humidities in large parts of many developed nations. Just drop the phrase and let's keep inferences about responsibility to places where it can be more clearly laid out. [Michael MacCracken, United States of America]</td>
<td>Agreed. Will be removed in the FGD.</td>
</tr>
<tr>
<td>7249</td>
<td>25</td>
<td>28</td>
<td>25</td>
<td>28</td>
<td>change to &quot;for annual&quot; [Butt Nathalie, Australia]</td>
<td>Editorial</td>
</tr>
<tr>
<td>6828</td>
<td>25</td>
<td>28</td>
<td>25</td>
<td>28</td>
<td>as in Figure 3.8 [Rafiq Hamdi, Belgium]</td>
<td>Editorial</td>
</tr>
<tr>
<td>6823</td>
<td>25</td>
<td>28</td>
<td>25</td>
<td>34</td>
<td>Fig 2.3.8 displays similar analyses as Figure 3.7: It should be Figure 3.9 and Figure 3.8 [Lubna Ahmar, Bangladesh]</td>
<td>Editorial</td>
</tr>
<tr>
<td>13715</td>
<td>25</td>
<td>28</td>
<td>25</td>
<td>34</td>
<td>shouldn't say Figure 3.8 instead of 3.7? [Enrica Poldeman, Germany]</td>
<td>Editorial</td>
</tr>
<tr>
<td>16245</td>
<td>25</td>
<td>31</td>
<td>25</td>
<td>32</td>
<td>It is also the case because when there is no sea ice insulating the air from the ocean beneath that the temperature change can be very large. This is possible because there is a thin inversion in the atmosphere and the air in the ice and loss or even thinning of the ice can greatly weaken the inversion--so it is the insulating feedback that Robock discussed several decades ago and might merit mention. [Michael MacCracken, United States of America]</td>
<td>Noted. Was not included in SOD but will be considered for FGD. Would be useful to have 1-2 references for this.</td>
</tr>
<tr>
<td>6820</td>
<td>25</td>
<td>34</td>
<td>25</td>
<td>34</td>
<td>Northern Europe, Figure 3.9 [Rafiq Hamdi, Belgium]</td>
<td>Editorial</td>
</tr>
<tr>
<td>446</td>
<td>25</td>
<td>26</td>
<td>25</td>
<td>5</td>
<td>Fig 3.9: Same remarks as for Fig. 3.8. Furthermore, the discussion related to this figure is very limited. Is it worth producing a figure? I suggest either to remove this figure and only keep the associated text, or to highlight some key regions. A third option is to move this figure (and the previous one) to the annex. [David Docquier, Belgium]</td>
<td>The figure was substantially revised and improved.</td>
</tr>
<tr>
<td>13349</td>
<td>26</td>
<td>18</td>
<td>26</td>
<td>5</td>
<td>Figure 3.9: figure resolution is currently very poor. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>The figure was substantially revised and improved.</td>
</tr>
<tr>
<td>13350</td>
<td>26</td>
<td>18</td>
<td>26</td>
<td>5</td>
<td>Figure 3.9: Cluttering information could help make this complex figure more easy to understand (see related comment for figure 3.8) [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>The figure was substantially revised and improved.</td>
</tr>
<tr>
<td>11981</td>
<td>26</td>
<td>24</td>
<td>26</td>
<td>2</td>
<td>Fig. 3.9 Good but very small font. [Paul Doyle, Canada]</td>
<td>The figure was substantially revised and improved.</td>
</tr>
<tr>
<td>6563</td>
<td>27</td>
<td>2</td>
<td>27</td>
<td>11</td>
<td>Fig 3.10: One picture and four different legends for days. It is confusing. [Radwan, Gaza, Gaza, Republic of Palestine]</td>
<td>Note. Will improve clarity for FGD.</td>
</tr>
<tr>
<td>447</td>
<td>27</td>
<td>2</td>
<td>27</td>
<td>11</td>
<td>Nothing is said about frost days (lower panels of Fig. 3.10). You can see the largest differences between 1.5 and 2°C warmings occur in the polar regions. [David Docquier, Belgium]</td>
<td>Note. Will add text on the frost days in the FGD.</td>
</tr>
<tr>
<td>448</td>
<td>27</td>
<td>2</td>
<td>27</td>
<td>11</td>
<td>Nothing is said about the main results of Fig. 3.10, i.e. the number of frost days increases (highest increase along the equator) and the number of frost days decreases (largest decrease in the Arctic). [David Docquier, Belgium]</td>
<td>Note. Will add text on this figure in the FGD.</td>
</tr>
<tr>
<td>567</td>
<td>27</td>
<td>2</td>
<td>27</td>
<td>18</td>
<td>It Figure 3.10 calculated with multi CMIP5 with RCP8.5 [Zong-Ci Zhao, China]</td>
<td>Yes. Will provide this information for the FGD.</td>
</tr>
<tr>
<td>569</td>
<td>27</td>
<td>2</td>
<td>27</td>
<td>18</td>
<td>It Figure 3.10 calculated with multi CMIP5 with RCP8.5 [Yang et al., China]</td>
<td>Yes. Will provide this information for the FGD.</td>
</tr>
<tr>
<td>13351</td>
<td>27</td>
<td>2</td>
<td>27</td>
<td>2</td>
<td>Remove acronym NHD, as I could not see further use of this acronym in the chapter text. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Noted. Will be updated in the FGD.</td>
</tr>
</tbody>
</table>
There needs to be an explanation of how NHD is defined—not with respect to what? Going to the figure showing the very large increase in NHD in the tropics, some would say that every day there is presently hot, so what does that mean? If it means a shift that is large in normalized temperature (i.e., with respect to standard deviation), the standard deviation in the tropics is so small that one can get a large change in exceedance of, say, number of days above two standard deviations with only a small change in temperature. That mid-latitude and high latitudes have lower numbers of hot days perhaps that should be shown—basically the changes in mid- and high-latitudes are taking temperatures (as opposed to normalized temperatures) to much more unusual conditions. There just has to be some explanation of what NHD means and how it is calculated right here where it is being used and not off in some reference. [Michael MacCracken, United States of America]

Noted. Will add information on this in the supp. Information of the FGDC.

Hot days are not defined before this sentence (or did I miss it?) [David Schoeman, Australia]

This sentence was removed.

If this study contains many errors, why include it in this report? [Bart Van den Hurk, Netherlands]

Agreed. We have removed the mentioned reference.

As the global average contains delayed ocean warming the message sent by this statement is weakened. [Elvira Poloczanska, Germany]

Yes, this is the point.

"Hot days" are not defined before this sentence (or did I miss it)? [David Schoeman, Australia]

Noted. Will add information on this in the suppl. Information of the FGD.

If it means a shift that is large in normalized temperature (i.e., with respect to standard deviation), the standard deviation in the tropics is so small that one can get a large change in exceedance of, say, number of days above two standard deviations with only a small change in temperature. That mid-latitude and high latitudes have lower numbers of hot days perhaps that should be shown—basically the changes in mid- and high-latitudes are taking temperatures (as opposed to normalized temperatures) to much more unusual conditions. There just has to be some explanation of what NHD means and how it is calculated right here where it is being used and not off in some reference. [Michael MacCracken, United States of America]

Noted. Will add information on this in the supp. Information of the FGDC.

Figure 3.10: Separate out the difference panel, e.g., by giving more white space or a vertical line between it and the other two panels. Will then be easier for people to compare the 1.5 and 2.0 panels. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

Noted. Will be updated in the FGD.

The cited paper has too many limitations to be involved into the report. In my opinion it shall be ignored. [Attila Buzási, Hungary]

Agreed. We have removed the mentioned reference.

Remove acronym NFD, as I could not see further use of this acronym in the chapter text. (also remove acronym in Figure 3.10) [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

Noted. Will consider whether to keep acronyms for the FGD.

This is unclear: UHI intensity decreases by 6% but could increase by 30%. Please clarify. [David Docquier, Belgium]

This sentence was removed.

Karmalkar and Bradley 2017 is now cited on page 31. Does not seem necessary to cite again here.

This sentence was removed.

This sentence was removed.

This sentence was removed.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>10896</td>
<td>28</td>
<td>1</td>
<td>28</td>
<td>3</td>
<td>Include the definition of deadly heatwaves (Carolina Vera, Argentina)</td>
<td>Noted. Will be updated in the FGD.</td>
</tr>
<tr>
<td>16248</td>
<td>28</td>
<td>3</td>
<td>28</td>
<td>6</td>
<td>First, I suggest changing ‘identify’ to ‘find’—out second I want to praise the way the results are presented, making clear that there are serious impacts at 1.5°C and comparing to the present. The type of comparison should be done more consistently. Also on line 8, change ‘assess’ to ‘find’ or perhaps be in past tense, so ‘found’ [Michael MacCracken, United States of America]</td>
<td>Editorial. Thank you for positive comment.</td>
</tr>
<tr>
<td>13269</td>
<td>28</td>
<td>5</td>
<td>28</td>
<td>6</td>
<td>This report is very robust because line 6 and very difference The high sensitivity to global temperature rise translates into a further doubling of global heat-stress moving from 1.5°C to 2°C above PI (5.7 and 12 times greater than 1979–2005, respectively), which from a human health perspective, provides a strong incentive for limiting global warming to the lower of these targets [Bill Hare, Germany]</td>
<td>This depends on which measure is considered. Will clarify this further for the FGD.</td>
</tr>
<tr>
<td>692</td>
<td>28</td>
<td>9</td>
<td>28</td>
<td>10</td>
<td>Is there any data about the number of fatalities regarding heatwaves in Karachi and Kolkata? The magnitude of heatwaves can be better explained by using this information [Attila Buzale, Hungary]</td>
<td>This information is not available to our knowledge.</td>
</tr>
<tr>
<td>10897</td>
<td>28</td>
<td>14</td>
<td>28</td>
<td>15</td>
<td>It does not seems the right place to include adaptation options as it is the matter of other chapters (Carolina Vera, Argentina)</td>
<td>Noted. We consider it useful to have this information in the present section, because it is related to physical feedback processes.</td>
</tr>
<tr>
<td>6830</td>
<td>28</td>
<td>15</td>
<td>28</td>
<td>15</td>
<td>A reference could be added to a recent study by Hamdi et al. 2015 on the future climate of Paris and Brussels for the 2050 horizon, Rafiq_Hamdi, O. Dist, R. Da Tochi, A. Dedynka, P. Tormenta: Future climate of Brussels and Paris for the 2050s under the A1B scenario. Urban Climate 04/2015; 12. DOI:10.1016/j.uclim.2015.03.003. [Rafiq_Hamdi, Belgium]</td>
<td>Noted. Will consider for FGD.</td>
</tr>
<tr>
<td>13792</td>
<td>28</td>
<td>16</td>
<td>28</td>
<td>18</td>
<td>The above section and the ones after on precip, drought etc. would benefit from a short concluding and summarising paragraph relating clearly what is happening in a region. Also, the only variable being considered seems to be total seasonal precipitation and there could well be changes in places/small regions can be of any sign. This should not be taken to imply (and one should not leave the implication that) no changes means nothing [Robet Vautard, France]</td>
<td>Agreed. We have included a new subsection with a summary paragraph, both in section 3.3.2 and in section 3.3.3.</td>
</tr>
<tr>
<td>13877</td>
<td>28</td>
<td>18</td>
<td></td>
<td></td>
<td>Integrate with impact sections and reduced general climate discussions [Evina Poloczanska, Germany]</td>
<td>Rejcted. General background on changes in precipitation is relevant for the understanding of changes in impacts.</td>
</tr>
<tr>
<td>13878</td>
<td>28</td>
<td>18</td>
<td></td>
<td></td>
<td>There is a lot of repetition of text from AR5 in these sections. could these be summarized? [Evina Poloczanska, Germany]</td>
<td>Noted. Material is relevant and was already summarized. If more SR15-specific material is available for the FGD, this will be considered.</td>
</tr>
<tr>
<td>5719</td>
<td>28</td>
<td>18</td>
<td>28</td>
<td>18</td>
<td>Monsoon is a climate type, not precipitation [Hong Yang, Switzerland]</td>
<td>precipitation deleted. &quot;monsoon precipitation&quot; replaced by &quot;monsoon features&quot;.</td>
</tr>
</tbody>
</table>
| 654        | 28        | 18        | 28      | 36      | Suggestion is to provide more studies and references, such as Guo X., Huang J.B., Luo A., Zhao Z.C. and Xu Y., 2016. Projection of precipitation extremes for eight global warming targets by 17 CMIP5 models, Nat Hazards, doi:10.1007/s11069-016-2553-0 (Zong-Ci Zhao, China) | Rejected. "There are enough references. This reference is not added because it is not specific to 1.5C and 2C."

| 694        | 28        | 18        | 28      | 36      | Suggestion is to provide more studies and references, such as Guo X., Huang J.B., Luo A., Zhao Z.C. and Xu Y., 2016. Projection of precipitation extremes for eight global warming targets by 17 CMIP5 models, Nat Hazards, doi:10.1007/s11069-016-2553-0 (Zong-Ci Zhao, China) | Rejected. "There are enough references. This reference is not added because it is not specific to 1.5C and 2C."

| 13438      | 28        | 25        | 28      | 49      | As for temperatures, update this subsection with recent publications after AR5 and SREX would be needed for the observed trends in region precipitation and their attribution. [Seung-Ki Min, Republic of Korea] | Done, later in the text |
| 16249      | 28        | 27        | 28      | 27      | Does ‘largest signal of differences’ refer to absolute amounts or percentage changes—this needs to be stated explicitly. [Michael MacCracken, United States of America] | VanMiert added. Sentence improved |
| 5274       | 28        | 20        | 28      | 29      | add “forced with elevated greenhouse gas levels” [Bart Van den Hurk, Netherlands] | Done, further in the text |
| 6192       | 28        | 32        | 28      | 42      | Men take one: i) shift of the regional seasonal precipitation and temperature maximum; ii) increasing a repeatability of local extreme precipitation sum. For East Europe (including UK) recent decades (after 1990) were characterized by the instability of atmospheric processes, which was lead to increasing the number of days with extreme rains in warm season (Tymofleyev et al., 2013). But the total amount of precipitation was close to the climatic norm or had weak negative trend in most regions. The main decrease in seasonal (JJA) precipitation was due to a fall in norm of precipitation in August (Martza+nova et al., 2016). Tymofleyev V.E.; Schaglova A.; Skorokhova Yu. (2013) On the extreme summer precipitation in Ukraine over the last decades. 7th European Conference on Extreme Storms (ECOSS2013) - 3 - 7 June 2013, Helsinki, Finland. Martza+ova V., vanova E., Shchetov O. (2016) The trend of the modern temperature and humidity regime of Ukraine to abnormality due to atmospheric processes in the summer season. Proceedings of UkrHMI. V. 268. P. 15-26 (in Russian). [Irina Semenova, Ukraine] | Agree but these references are not focus 1.5C and 2C |
| 16250      | 28        | 34        | 28      | 35      | Regarding saying “likely” when one has 95% statistical confidence, is that not a bit cautious? After all, 95% implies the equivalent of being provided a 2 to 1 chance for betting on that one in a horse race—there being very little chance of any other outcome. This seems to me hardly the way to convey the significance of information for the public and decision makers. [Michael MacCracken, United States of America] | Agree. Paragraph improved |
| 5275       | 28        | 34        | 28      | 35      | the nr of events exceeding the 95 percentile is always 5%. This sentence is wrong [Bart Van den Hurk, Netherlands] | Rejcted. The 95th percentile events are defined in a different period. This method of assessment is well established (see previous IPCC reports). |
| 17202      | 28        | 34        | 28      | 35      | I would suggest to replace the sentence “The SREX assessed...” by “The IPCC SREX (Seneviratne et al. 2012) assessed...” (line 34) and, on the contrary, to replace “...by The SREX...” (line 39) [Maria-Carmen Lisawat, Spain] | Done |
| 16251      | 28        | 37        | 28      | 39      | I think a bit of explanation is perhaps needed here. The results, show shifting precipitation trends, for example, so the outcomes for particular places/small regions can be of any sign. This should not be taken to mean (and one should not leave the implication that) no changes means nothing in a 1.5°C effect in a region. Also, the only variable being considered seems to be total seasonal precipitation and there could well be changes in numbers of rain days, interannual rainfall, interannual variability, etc. The rather dismissive statement here really goes no sense that the locations of no change or even negative change could well be indicative of very significant overall change occurring. I read one climate denier saying something like that ENSO had no effect on US precipitation, ignoring that El Nino and La Nina conditions caused quite contrasting geographic patterns of precipitation. [Michael MacCracken, United States of America] | Noted. Not enough time to address this comment and may be too detail for the present report. Will consider in the FGD. |
| 15011      | 28        | 44        | 28      | 49      | Please, in order to improve the analysis, include some considerations on West Africa, one region dealing with monsoon also [Jacques-Andre Ndiome, Senegal] | Done. Sylvia et al., 2015, and Jacob et al, 2017 added |
disagreement with the argument as "low confidence in trends because of insufficient evidence". In 2017, we saw an intensified monsoon in entire South Asia, including Bangladesh, which suffered from historically devastating floods. The nature of rainfall was clearly identified as strong localized convective cell with "cloudburst", i.e., concentrated high-intensity rainfall at one particular place. The observations are recorded by Bangladesh meteorological Department. I think by this time there are some literature available as well. In recent past the same trend has been observed in the region too. [M. Mir, Sirajul Islam, Bangladesh]

7251 28 46 28 49 precipitation' not 'precipitations' [Butt Nathalie, Australia]

The paragraph has been updated

453 28 53 Rephrase this sentence by briefly summarizing the results of Section 3.3.1.2 and Fig. 3.6 and putting these references in brackets. [David Docquier, Belgium]

sentence updated

5466 28 53 43 31 Considering the role of urban age, it will be important to identify how cities would be affected under 2°C and 1.5°C scenarios. Out of the issues raised in these subsections fall under planetary boundaries. Johan Rockström's work will be useful. [Aliyu Barau, Nigeria]

There is a box on cities and urban areas

2033 29 In summer seasons, Pernambuco, Brazilian tropic that now generally is a thermal pattern, gradually will dynamic and Asian's SW Monsoon can extend northwestward or novel Persian Monsoon create and eventually Michael is especially The Zagros Mountain regions will be wetter. [Muhammad Ahmed, Iran]

Agree. Thank you for this information.

2919 29 3 29 5 Why time span? Second half of 20th-century? In addition this discussion based on a single study is somewhat alarming. [Sabine Wurzler, Germany]

Noted. Sentence has been revised and another study (Jacoby et al.) has been cited.

6231 29 4 The phrase 'while precipitation decrease in --' is suggested to be rewritten as 'while a decrease in precipitation in --' [Muhammad Mohsin IQBAL, Pakistan]

Done

17200 29 4 29 18 Figure 3.11 shows a differential behaviour for Mediterranean Europe, with no trend in 5-day maximum precipitation. Altering that the summer contribution to total precipitation is very little in this region, and that summer is characterized by short convective events that last less than 5 days, I would propose: a) to include a sentence in the paragraph about this anomalous general behaviour in the Mediterranean; b) to substitute "except Southern Europe in summer" by "except Southern Europe" or, better, to eliminate the text and reference to Vaubel et al. (2014) in lines 17-18 because it is already cited in the lines 4-5 of the same paper [Man-Carmen Lissat, Spain]

The paragraph has been updated

7253 29 5 29 5 Have been reported? [Butt Nathalie, Australia]

Done

13259 29 7 29 18 The Zhang, Gabriela (Vlaam). Heavy precipitation is highly sensitive to the magnitude of future warming. Climatic Change Letters. In press. This reference carefully examined the responses of heavy precipitation to 1.5 and 2°C warming using NCAR low-warming experiments. It indicates remarkable differences in the frequency of global heavy precipitation at the end of 21st century. [Wei Zhang, United States of America]

Noted. Could not find this study and could thus not be implemented.

5071 29 7 29 8 Is not sure if Ridicly's is strictly 'heavy precipitation'. I'd rather say that Ridicly's is a heavy precipitation episode or heavy rain spell. [Wei Zhang, Gabriele Villarini, Heavy precipitation is highly sensitive to the magnitude of future warming, Climatic Change Letters, in press. While a decrease in precipitation in the region is very little in this region, and the summer is characterized by short convective events that last less than 5 days, I would propose: a) to include a sentence in the paragraph about this anomalous general behaviour in the Mediterranean; b) to substitute "except Southern Europe in summer" by "except Southern Europe" or, better, to eliminate the text and reference to Vaubel et al. (2014) in lines 17-18 because it is already cited in the lines 4-5 of the same paper [Man-Carmen Lissat, Spain]

Agree

1808 29 8 29 10 (i) as "function" or as "function of"? [William Moomooha Oka, France]

as function

4317 29 7 29 8 Global temperature increase, change in "global temperature increase..." [Rodrigo Brenes, Italy]

Done

16252 29 10 29 11 Need to state what the "mean response" is. [Michael MacCracken, United States of America]

average

5770 29 14 29 14 You can add a reference to Lenderink and van Meijgaard, 2008 (doi:10.1038/ngeo262) [Bart Van den Hurk, Netherlands]

Noted. Will be considered for the FGD.

11983 20 17 29 17 CHANGE: "found" a mistal (Paul Jolly, Canada)

Done

11075 29 17 29 18 Please say "Vautard et al. (2014) found a robust increase in heavy precipitation everywhere in all seasons, and..." instead of "everywhere" it should probably be "everywhere in Europe" [Anna Sörenson, Sweden]

Done

17258 29 17 29 18 Unit size [Maria Jesus Iglesias Briones, Spain]

Done

1422 29 17 29 18 Which target: + 2°C + 1.5°C ? Is it worth quoting this kind of increase in heavy precipitation everywhere in all seasons, and...? [Philippe Roulcker, France]

Noted. Will be considered for the FGD.

12790 29 18 29 18 Can be mentioned that this result is completely consistent with the analysis of Jacoby et al. 2014, REC, which used more recent scenarios (EUROCORES) and a higher resolution (12km) [Robert Vautard, France]

Done

19012 29 20 29 41 Please, in order to improve the analysis regarding this paragraph, include some considerations on West Africa, one region dealing with monsoon also [JACQUES-ANDRE N'DIONE, Senegal]

Done

7001 29 20 29 41 While papers on projected changes in the strength of monsoon are limited, there are some papers discussing the changes in monsoon rainfall:

2. Li et al. (2017): Projections of South Asian Summer Monsoon Precipitation Based on 12 CMIP5 Models. Int. J. Clim., 37, 94-108 (Sai Ming Lee, China)

There are enough references. This reference is not added because it is not specific to 1.5C and 2C.

2920 29 20 29 41 What you write here can be further supported by mentioning again the low confidence problems regarding the trend in the measurements. [Sabine Wurzler, Germany]

Noted. Low confidence is indicated in the text, this seems sufficient.

454 29 20 29 41 Is it necessary to have such a long paragraph for monsoons here? I ask this question in large part due to the first sentence of this paragraph. [David Docquier, Belgium]

Sentence improved

11702 29 26 29 26 Little is confusing here, pick another adjective that is less ambiguous. [David Schoeman, Australia]

changed by "weak"

5872 29 27 29 30 This sentence is too long and unclear. Please split it into two or three sentences. Please rewrite it. [Joan A. Lopez-Bustins, Spain]

Done

6232 29 35 29 36 SAMIS also stands for South Asian Monsoon System. Please check if this abbreviation is used both for South American Monsoon System and South Asian Monsoon System? [Muhammad Mohsin IQBAL, Pakistan]

Agree. But SAMIS was clearly defined the first time it used

9480 29 35 29 36 Rather than use the words "decrease" and "increase" to describe changes in timing I suggest it would be clearer (and unambiguous) to use the words "earlier" and "later", i.e. "... They also found that an ensemble mean onset date of the SAMS which was 17 days earlier, and a demise date 17 days later, by 2045-50" [David Wratt, New Zealand]

Done

10898 29 37 29 38 The rainfall over that particular region of southeastern South America is not considered as "monsoon-like". For example lack of wet/dry season, [Carolina Vera, Argentina]

Done. Sentence updated
Recent studies have been added in different part of the subsections.
Comment Response

9246 31 41 Figure 3.12 from Greve et al. (2017), derives... an old sentence construction. [Marie-Josée S. Royer, Canada] Editorial

495 31 41 Rephrase: From Greve et al. (2017) [David Docquier, Belgium] Editorial

457 31 41 the caption of Fig. 3.12 refers to Greve (submitted) and not Greve et al. (2017). [David Docquier, Belgium] Editorial

13718 31 41 31 41 should say “Figure 3.12 from Greve et al. (2017)...” [Elvira Poloczanska, Germany] Editorial

10473 31 41 31 41 from Greve et al. or not “from Greve et al.” from should be inside brackets right? [Jonathan Lynn, Switzerland] Editorial

5873 31 41 31 41 Please substitute Greve et al. 2017 with Greve et al. submitted [Joan A. Lopez-Bustins, Spain] Editorial

7254 31 50 31 50 shows not show [Bult Nathalie, Australia] Editorial

10474 31 50 31 50 are the roman (I) and (ii) necessary? [Jonathan Lynn, Switzerland] Editorial

13719 31 54 31 54 should say “from Wartenburger et al. (in review)” [Elvira Poloczanska, Germany] Editorial

1874 31 54 31 57 This is such a long sentence. It is difficult to follow the content. Please rephrase it. [Joan A. Lopez-Bustins, Spain] Editorial

11986 31 57 31 57 SHORTEN “The section... these two further...” [Paul Doyle, Canada] Editorial

6715 32 Minor comment: The Caption of Figure 3.12 should specify what is the difference between light grey and dark grey [Vanessa Pantoano, Argentina] Editorial

3542 32 31 32 21 Figure 3.12. The definition of this figure needs to be increased, at this moment it is hard to read. Also remember that all figures and tables should be able to be understood without having to read the accompanying text, they should be self-evident. To add: this occurs across all frames and I assume it will be corrected in a further draft of this document [Vera Barbosa Araujo Soares Srehehet, United Kingdom (of Great Britain and Northern Ireland)] Noted. Will be improved for FGD.

20563 32 Not sure what this is showing me [Jonathan Lynn, Switzerland] Size will be increased and caption improved for the FGD.

10475 32 32 32 32 not sure what this is showing me [Jonathan Lynn, Switzerland] Size will be increased and caption improved for the FGD.

9985 32 32 32 32 It would be better to say “the Mediterranean basin” instead of “the Mediterranean” while we are talking about this domain [Mustafa Tufan Turun, Turkey] Editorial

7255 32 32 32 32 Not not “Mediterrane” [Bult Nathalie, Australia] Editorial


13720 32 32 32 32 Highly uncertain should be in italics [Elvira Poloczanska, Germany] Rejected. This is not a calibrated assessment.


17350 32 32 32 32 strong increases in dryness and decreases in water availability in the middle East when shifting from a 1.5°C to a 2°C global warming is proposed to be mentioned. [Saviz Sehatkashani, Iran] Noted. Will be considered for FGD.

499 32 32 32 32 Make a link to Fig. 3.6 related to drying in the Mediterranean region. [David Docquier, Belgium] Noted. Will be added for the FGD.

5875 32 32 32 32 The following paper also projected for the end of the century a major dryness in the Mediterranean catchments with major GHG emissions (A2) than B1 scenario: Lopez-Bustins et al. (2013) Future variability of droughts in three Mediterranean catchments. Natural Hazards 69: 1405-1421 [Joan A. Lopez-Bustins, Spain] Noted. Will be considered for the FGD.

11987 32 32 32 32 Same problem with Greve et al. (2017) or 2014???? as for Wartenburger. [Paul Doyle, Canada] Editorial


625 32 32 32 32 There is no section 3.3.13 (A1a) nor (A1b). [Dmitry L. Musolin, Russian Federation] Editorial

11372 32 32 32 32 Section 3.3.12 instead of Section 3.3.13 [Elvira Poloczanska, Germany] Editorial

8309 32 32 32 32 (i)→ (ii) [Dimitry L. Musolin, Russian Federation] Editorial

6646 32 32 32 32 The sections were changed, not relevant anymore. [Dmitry L. Musolin, Russian Federation] Noted. May provide more background on this point in the FGD.

7453 32 32 32 32 Please consider restructuring Figure 3.12 to improve readability and font size. [Svend Christophersen, Norway] Noted. Will consider using a landscape format for FGD.

458 32 32 32 32 Please consider restructuring Figure 3.12 to improve readability and font size. [Svend Christophersen, Norway] Noted. Will consider using a landscape format for FGD.

17682 32 32 32 32 Figure 3.12 is not clear, higher resolution image should be supplied [Perdian Perindan, Indonesia] Noted. Will consider using a landscape format for FGD.

12885 32 32 32 32 In Figure 3.12 I don’t see a graph pointing to west coast region of South America [Jose Cerracín, Chile] Noted. This indeed needs to be fed. Will be done for the FGD.

5278 32 32 32 32 map points are very hard to read. Consider entering the text. Otherwise, there is no point to show the panels. [David Docquier, Belgium] Noted. Will consider using a landscape format for FGD.

658 32 32 32 32 all climate models and all scenarios should give how many models and SHRE or RCP scenarios or pathways. [Zong-Ci Zhao, China] Noted. Will be improved for FGD.

10969 32 32 32 32 Green shading description should be included in the figure caption as well as in the definitions of the likelihood categories. White areas are defined as “no change”, but how are they distinguished from “uncertain change” regions? [Carolina Vera, Argentina] Noted. Will be considered for FGD.

5698 32 32 32 32 The section on runoff and flooding addresses exclusively continental runoff and river flooding. Because flooding on coastal areas is major hazard, it would be appropriate here to clearly identify the type of flooding addressed, i.e. river flooding. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)] Noted. Will be considered for FGD.

6800 32 32 32 32 Even though South Asia is considered as one of the most vulnerable parts in the world due to flooding, not enough literature seems reviewed or less attention is paid on trends, observation and projection of flooding nature for the region. Request to go through more detail, especially for flooding issue in the region. [Md. Sirajul Islam, Bangladesh] Noted. Will be considered for the FGD.
<table>
<thead>
<tr>
<th>Comment</th>
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<th>Comment</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>1423</td>
<td>32</td>
<td>26</td>
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<td>whole section: what is the difference with section 3.4.4.1.27 (Philippe Roudier, France)</td>
<td>Taken into account - Some paragraphs of Section 3.4.4.1.1 and 3.4.4.1.2 were moved to Section 3.3.5</td>
</tr>
<tr>
<td>20564</td>
<td>32</td>
<td>26</td>
<td></td>
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<td>There is a repetition of the word low (Vera Barbara Araujo Soares Serafica, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>Editorial – copyedit to be completed prior publication</td>
</tr>
<tr>
<td>460</td>
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<td>26</td>
<td></td>
<td></td>
<td>Rephrase: low confidence for (David Douquer, Belgium)</td>
<td>Editorial – copyedit to be completed prior publication</td>
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<td>13358</td>
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<td>26</td>
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<td>repeated “low confidence for” (Butt Nathalie, Australia)</td>
<td>Editorial – copyedit to be completed prior publication</td>
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<tr>
<td>13345</td>
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<td>26</td>
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<td>repeated “low confidence for” please change. (Vidyanatana Vatelote, Norway)</td>
<td>Editorial – copyedit to be completed prior publication</td>
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<td>10385</td>
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<td>26</td>
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<td></td>
<td>Initial second low (Matt Law, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>Editorial – copyedit to be completed prior publication</td>
</tr>
<tr>
<td>13727</td>
<td>32</td>
<td>26</td>
<td></td>
<td></td>
<td>low confidence for (Elvira Poloczanska, Germany)</td>
<td>Editorial – copyedit to be completed prior publication</td>
</tr>
<tr>
<td>933</td>
<td>32</td>
<td>26</td>
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<td></td>
<td>An editum can be found - “low” has been mentioned twice in the sentence. (Attila Buguss, Hungary)</td>
<td>Editorial – copyedit to be completed prior publication</td>
</tr>
<tr>
<td>5877</td>
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<td>26</td>
<td></td>
<td></td>
<td>Please delete one “low” (Joan A. Lopez-Bustins, Spain)</td>
<td>Editorial – copyedit to be completed prior publication</td>
</tr>
<tr>
<td>6178</td>
<td>32</td>
<td>26</td>
<td>32</td>
<td>30</td>
<td>This paragraph indicates low confidence concerning global behavior of precipitation and floods. Since both variables are characterized by great spatial variability, I consider there is no need to try to give global results. For example, the previous section (3.3.4.1) describes the findings regarding droughts at a regional scale without giving global syntheses. Then, I suggest removing this paragraph (lines 26-30; page 3-32). The rest of the section specifies regional findings, which is more appropriate for this type of variables. (Vanessa Pantano, Argentina)</td>
<td>Accepted – text revised</td>
</tr>
<tr>
<td>6645</td>
<td>32</td>
<td>26</td>
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<td>30</td>
<td>Obviously, river discharge has been regulated and modified by dams everywhere during the 20th century. Might be flooding of coastal areas managed by storms, hurricanes, etc also included in this paragraph (Ernst Harald Schimo, Spain)</td>
<td>Rejected – outside the scope of the section</td>
</tr>
<tr>
<td>11988</td>
<td>32</td>
<td>27</td>
<td>32</td>
<td>32</td>
<td>DELETE second “low” (Paul Doyle, Canada)</td>
<td>Editorial – copyedit to be completed prior publication</td>
</tr>
<tr>
<td>3654</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>13</td>
<td>Section 3.3.3 (“Runoff and flooding”) contains some huge (and potentially embarrassing) errors that must be corrected. In particular, river flow has NOT decreased in the northeastern US and western Canada, nor is it expected to in the future. In fact, a large number of studies, by many authors, using both statistical analysis of observational datasets and model-based projections of future streamflows under climate change, have clearly found that mean annual flow (and total annual flow volume) for most rivers in this region have either been stationary or have increased slightly, and will be expected to continue that behavior into the future. Flow regimes and timing have been changing, due mainly to a higher proportion of winter precipitation falling as rain instead of snow. So much flow has been declining, but winter flows have been increasing. Possible exceptions are the headwaters of large rivers in the northern US and Canada, which have never been studied for their flows under climate change. Flow regimes and timing have been changing, due mainly to a higher proportion of winter precipitation falling as rain instead of snow. So much flow has been declining, but winter flows have been increasing. Possible exceptions are the headwaters of large rivers in the northern US and Canada, which have never been studied for their flows under climate change.</td>
<td>Accepted – text revised. The Pascual et al (2015) reference was not included instead other references were omitted</td>
</tr>
<tr>
<td>10900</td>
<td>32</td>
<td>36</td>
<td>33</td>
<td>7</td>
<td>The assessment made here of both precipitation and runoff observed changes should be coherent with the observation precipitation changes assessed in 3.3.3.1 (Carolina Vera, Argentina)</td>
<td>Taken into account - The subsection was rewritten</td>
</tr>
<tr>
<td>13880</td>
<td>33</td>
<td>1</td>
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<td>I cannot discern what the focus of box 3.2 is from this placeholder. Most of these variables have been discussed in detail above so do not need duplicated focus (Elvira Poloczanska, Germany)</td>
<td>Taken into account - Box 3.2 has been removed</td>
</tr>
<tr>
<td>16254</td>
<td>33</td>
<td>3</td>
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<td>5</td>
<td>The author is not aware of any studies that are directly relevant to the issue of low confidence regarding regional changes. It is possible that there are other studies that are relevant, but they have not been included in the review. (Hilary Inyang, Nigeria)</td>
<td>Taken into account – text revised. “probably resulted from” was changed to “could has resulted from”</td>
</tr>
<tr>
<td>1426</td>
<td>33</td>
<td>7</td>
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<td>This is a bit confusing. (Philippe Roudier, France)</td>
<td>Taken into account – text revised</td>
</tr>
<tr>
<td>1427</td>
<td>33</td>
<td>7</td>
<td>33</td>
<td>13</td>
<td>Is it not more relevant to discuss impacts in terms of temperature change, for example: “under a 2°C warming, they found” instead of RCP6? (Philippe Roudier, France)</td>
<td>Taken into account – text revised</td>
</tr>
<tr>
<td>1428</td>
<td>33</td>
<td>7</td>
<td>33</td>
<td>13</td>
<td>Please have a look at: Roudier et al (2015), Projections of future floods and hydrological droughts in Europe under a 2°C global warming, Climatic Change (Philippe Roudier, France)</td>
<td>Taken into account – Reference added</td>
</tr>
<tr>
<td>1429</td>
<td>33</td>
<td>7</td>
<td>33</td>
<td>13</td>
<td>Please have a look at: Roudier et al (2014), Climatic change impacts on runoff in West Africa: a review, HESS (Philippe Roudier, France)</td>
<td>Taken into account – Reference added</td>
</tr>
<tr>
<td>10389</td>
<td>33</td>
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<td>Studies presenting results for different emission scenarios (e.g., RCP4.5 and RCP8.5) provide no information with respect to a 1.5 and 2 degree global warming because different emission scenarios exhibit a wide range of model-dependent temperature increases. These studies (i.e., Alkama et al. 2013 and Koirala et al. 2014) should not be presented in this detail: Instead, the text on studies investigating the difference between 1.5 and 2 degrees should be expanded. (Stephan Thober, Germany)</td>
<td>Accepted – text revised. As new literature was available for the SOD, the text was revised and these references were omitted</td>
</tr>
<tr>
<td>5878</td>
<td>33</td>
<td>8</td>
<td>33</td>
<td>8</td>
<td>I’d recommend to have a look at the following paper where a significant decrease in runoff is projected for the end of the century over the western Mediterranean basin: Pasqual et al. (2015) Impacts of climate change on water resources in the Mediterranean Basin. A case study in Catalonia, Spain. Hydrological Sciences Journal, doi:10.1080/02626667.2014.947339 (Joan A. Lopez-Bustins, Spain)</td>
<td>Accepted text-revised. The Pascual et al (2015) reference was not included instead other references relevant to the 1.5C world were added</td>
</tr>
<tr>
<td>7277</td>
<td>33</td>
<td>9</td>
<td>33</td>
<td>10</td>
<td>It is herein stated “additionally over South America and Africa, there is no consensus on the sign of change” that statement is referring to runoff and flooding. This statement is not entirely correct. Most rivers in West Africa are now brown from sifting. Cultural factors (deforestation and poor management of scraped terrain) have combined with increased rainfall intensity to erode and move more debris to streams, rivers and lakes. This is very well documented in literature. (Mary Iyanyang, Nigeria)</td>
<td>Taken into account – text revised</td>
</tr>
<tr>
<td>7257</td>
<td>33</td>
<td>15</td>
<td>33</td>
<td>15</td>
<td>land-use/land-cover change ‘not’ changes (Butt Nathalie, Australia)</td>
<td>Editorial – copyedit to be completed prior publication</td>
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Do Not Quote, Cite, or Distribute Page 46 of 152
<table>
<thead>
<tr>
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<td>33 35</td>
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<td>I would recommend to read the paper from Hall et al. (2014) that offers a complete state of the art to better understand flood regime changes and their drivers as well as the trends found in Europe. It will be useful to complete the paragraph about human influences as well as the following one about trends. Particularly, the text 'in Europe, flood peaks with return periods above 100 years are projected to double in frequency during the next three 30 decades (Affifi et al. 2015) can drive to a wrong idea about the present and future situation in Europe, where no common trend is found. The complete reference (open access) is: Hall, J., B. Ahmern, M. Borga, R. Brázda, P. Claps, A. Kiss, T. R. Kjellman, J. Kráal, Z., W. Kundzewicz, M. Lang, M. C. Llasat, N. MacEwannd, N. McNichfl, L. Mediero, B. Miez, P. Molnar, A. Montenare, C. Neuholz, J. Parajka, R. A. P. Perdigão, L. Piecovat, M. Röger, J. L. Salinas, E. Sausse, C. Schäf, J. Soliga, A. Viglione and G. Biltschi. 2014: Understanding Flood Regime Changes in Europe: A state of the art assessment. Hydrol. Earth Syst. Sci., 18, 2735-2772, 2013, <a href="http://www.hydrol-earth-syst-sci.net/18/2735/2014/">www.hydrol-earth-syst-sci.net/18/2735/2014/</a> doi:10.5194/hess-18-2735-2014'.</td>
<td>Taken into account - text revised. A new sentence and references were added accordingly.</td>
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<td>A study on European high flows and floods has been conducted: Thober S, Karrer R, Wanders N, Marx A, Pan M., Rakovec O, Samaniego L, Sheffield J, Wood EF, Zink M. Multi-model ensemble projections of European river floods and high flows at 1.5, 2, and 3 degree global warming**, submitted to Env. Research Letters (July 2017). This study evaluated a multi-modal ensemble of 5 Global Climate Models (GCMs) and 3 Hydrologic Models (HMs) at a 5 km resolution over entire Europe. Overall, changes in high flows (Q10) and floods (median of 30-year annual maximum daily streamflow) are increasing with the magnitude of global warming. The Mediterranean is identified as a hot spot of decreases in high flows and floods from &gt;10% at 1.5, &gt;12% at 2, to &gt;30% at 3 degree global warming. Small changes (&lt;10%) are observed for river basins in Central Europe and the British Isles under different levels of warming. Projected higher annual precipitation increases high flows in Scandinavia, but reduced snow water equivalent decreases flood events in this region. In general, changes between present-day conditions and a 1.5 degree global warming are larger and statistically more robust than changes between 1.5 and 2 degree global warming. The contribution by the GCMs to the overall uncertainties of the ensemble is in general larger than that by the HMs. The latter, however, exceed GCM uncertainty in the Mediterranean and Scandinavia, where the results are sensitive to the representation of hydrologic processes such as soil water redistribution and snow melt. (Stephan Thober, Germany)</td>
<td>Taken into account - Reference added</td>
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<td>Please have a look at: Rodier et al. (2015). Projections of future floods and hydrological droughts in Europe under a 2°C global warming, Climatic Change [Philippe Rouxier, France].</td>
<td>Taken into account - Reference added</td>
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<td>Just a clarification related to the comment # above, the references by Affifi et al. (2015a) and (2015b) are: Affifi, L., Benk, P., Feyen, L. and Forzieri, G. Global warming increases the frequency of river floods in Europe, Hydrol Earth Syst Sci Discuss, 12(1), 1199-1132, doi:10.5194/hessd-12-1199-2015. Affifi, L., Feyen, L., Dottor, F. and Bianchi, A: Ensemble flood risk assessment in Europe under high-end climate scenarios, Global Environmental Change, 35, 199–212, doi:10.1016/j.gloenvcha.2016.09.004. In details, Affifi et al. (2015a) is an assessment focused on flood hazard (i.e., discharge) while Affifi et al. (2015b) includes an impact assessment by combining the hazard with a high resolution inundation model, and with information on exposure and vulnerability to assess the flood risk. (Lorenzo Affifi, Italy)</td>
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<td>Adding some information from Affifi et al. (2015b), the text here should read: &quot;...decades under RCP 8.5 (Affifi et al., 2015a). Consequent estimates of population affected and direct flood damages indicate that by the end of the century the socio-economic impact of river floods in Europe is projected to increase by an average 220% due to climate change only (Affifi et al., 2015b). &quot; (Lorenzo Affifi, Italy)</td>
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### Comment
Following from the previous comment 3, here a suggested addition relevant to impact assessments at 1.5°C in Europe: Projected flood risk were then analyzed to assess the socio-economic impacts of river floods in Europe at different levels of global warming (Alfieri et al., 2017b). In the reference scenario (1976-2005) about 220,000 people are affected annually by river floods in Europe, which rises to 480,000 at 1.5°C global warming. With 2°C warming this amount is slightly higher to equal 510,000, whereas under 3°C warming more than 600,000 people will be annually under risk of flooding. Direct economic losses from flooding show a similar trend, with expected annual damages projected to rise from €5.3 billion/year in the reference scenario to €11 billion/year, €12 billion/year and €41.5 billion/year respectively under 1.5, 2, and 3°C warming compared to pre-industrial levels. The reference for Alfieri et al. (2017b) is Alfieri L, Dottor P, and Feyen L. Flood impact assessment for Europe in view of climate change. Deliverable 7 of the project PESETA3. Final report for DG CLIMA, JRC Technical Reports, 2017 (in review). [Lorenzo Alfieri, Italy]

### Response
Taken into account - text revised. The paragraph was rewritten

### Comment
There is inconsistency in the statements tied to findings about flood patterns observed/expected in Africa here. There is reference to expected high frequency of floods in eastern Africa (Hirabayashi et al., 2011) but at the same time there is an attribution of a contracting finding in the same paper authored by the same researchers as stated in lines 34-35. This needs to be corrected or put in a clearer context. [Hilary Inyang, Nigeria]

### Response
Taken into account - text revised. The paragraph was rewritten

### Comment
The section on 1.5 has to be expanded by studies conducted within the IMPACT2C, 9IMP, and HAPPI-MP projects, but also other projects such as HOKUM (http://www.udf.de/hokum/) [Stephan Thober, Germany]

### Response
Taken into account - text revised. The paragraph was rewritten

### Comment
There is repetition of text here; resolve [David Schreman, Austria]

### Response
Taken into account - text revised. The paragraph was rewritten
The idea of Box 3.2 is not yet clear yet, but I would like to suggest a few points to bring up concerning groundwater. Groundwater is the lower boundary of drainage, a boundary that we know is very different among regions since its depth can differ from less than a meter to several tens of meters (Fan et al. 2013). However, groundwater is not yet taken into account in most Earth System Models and this is a source of uncertainty in the land surface – atmosphere interaction and its influence on climate / climate extremes on regional scales.

Groundwater can be an important water source for plants during rainless periods (Fan 2015). Therefore, groundwater might be important for mitigating temperature extremes on regional scales. Also, consequently, since groundwater is not included in ESMs, this could imply overestimation of temperature extremes.

In particular, including groundwater in climate models has been shown to increase the evapotranspiration and decrease temperature in regions with high groundwater levels such as the La Plata Basin in Southeastern South America (Martínez et al. 2016).

Fan et al. 2013: http://science.sciencemag.org/content/339/6229/940

11076 34 7 34 7

The idea of Box 3.2 is not yet clear yet, but I would like to suggest a few points to bring up concerning groundwater. Groundwater is the lower boundary of drainage, a boundary that we know is very different among regions since its depth can differ from less than a meter to several tens of meters (Fan et al. 2013). However, groundwater is not yet taken into account in most Earth System Models and this is a source of uncertainty in the land surface – atmosphere interaction and its influence on climate / climate extremes on regional scales.

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Fan et al. 2013: http://science.sciencemag.org/content/339/6229/940

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Groundwater can be an important water source for plants during rainless periods (Fan 2015). Therefore, groundwater might be important for mitigating temperature extremes on regional scales. Also, consequently, since groundwater is not included in ESMs, this could imply overestimation of temperature extremes.

In particular, including groundwater in climate models has been shown to increase the evapotranspiration and decrease temperature in regions with high groundwater levels such as the La Plata Basin in Southeastern South America (Martínez et al. 2016).

Fan et al. 2013: http://science.sciencemag.org/content/339/6229/940
3.3.7 Storms, tropical cyclones and wind. Hurricanes are not mentioned in this section and it would be useful for the general reader to state that these
tropical cyclones also added here? [Maria Jesus Iglesias Briones, Spain] We are grateful for your suggestion, and will be including consideration of it in the next draft.

These points about permafrost and its contribution to CO2 store are really critical and should be taken further - e.g. how does this link with potential
tipping points? [Penny Ungerhaut, South Africa] We are grateful for your suggestion, and will be including consideration of it in the next draft.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Spacial resolution fully-coupled climate model. [Wei Zhang, United States of America]

What is a ‘very intense tropical cyclone’? I would add the category in bracket to be a bit more precise. According to Christensen et al. (2013), climate
	projections (scenario A1B) indicate an increase in the frequency of category 4 and 5 storms by 0.25% between 2081-2100 and 2000-2009, with
	large inter-basin variations. [David Docquier, Belgium]

This paragraph should also mention the observed global-average migration of tropical cyclone activity (Kossin et al., 2014) and the observed changes

developing trends in wave climate. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

In general, the relationship between TCs and climate can be subtle, whereas differences in the spatial and temporal scales are large (Elsner and

Jagger 2013). The analysis by Weinkle et al. (2012) does not indicate significant long period global or individual basin trends in the frequency or

intensity of landfalling TCs. Significant increase in TC landfall frequency in recent decades was also not confirmed in the most cyclone prone country,

Philippines, between 1945 and 2013, except for the latitude zone between 10N and 12N, which shows a linear increase at 0.02 times per year (Tagaki


Hazards, Vol. 80, Issue 1, pp. 211-222, DOI: 10.1007/s11069-015-1965-6 [Hiroshi Tagaki, Japan]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

This is not what AR5 concludes. AR5 is extremely prudent on such a sensitive issue. In particular over the N Atlantic, it is clearly stated that one
cannot conclude a climate change effect. If new studies may tend to strengthen such a statement, then AR5 statements should be recalled and
progresses since then mentioned separately. [Robert Vautard, France]

This is not what AR5 concludes. AR5 is extremely prudent on such a sensitive issue. In particular over the N Atlantic, it is clearly stated that one
cannot conclude a climate change effect. If new studies may tend to strengthen such a statement, then AR5 statements should be recalled and
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This is not what AR5 concludes. AR5 is extremely prudent on such a sensitive issue. In particular over the N Atlantic, it is clearly stated that one
cannot conclude a climate change effect. If new studies may tend to strengthen such a statement, then AR5 statements should be recalled and
progresses since then mentioned separately. [Robert Vautard, France]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

% by number - has not the number - have [Jonathan pyr, Switzerland]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

This section begins with a general theory "There is increasing evidence that the number of very intense tropical cyclones have increased in recent
decades across most ocean basins, with associated decreases in the overall number of tropical cyclones." This
general theory may be valid in the context of a relatively long-term climatic change. However, randomness of TC formation should also be
explained particularly from the statistical point of view. e.g.:

In general, the relationship between TCs and climate can be subtle, whereas differences in the spatial and temporal scales are large (Elsner and

Jagger 2013). The analysis by Weinkle et al. (2012) does not indicate significant long period global or individual basin trends in the frequency or

intensity of landfalling TCs. Significant increase in TC landfall frequency in recent decades was also not confirmed in the most cyclone prone country,

Philippines, between 1945 and 2013, except for the latitude zone between 10N and 12N, which shows a linear increase at 0.02 times per year (Tagaki


Hazards, Vol. 80, Issue 1, pp. 211-222, DOI: 10.1007/s11069-015-1965-6 [Hiroshi Tagaki, Japan]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

3.3.7 Storms, tropical cyclones and wind

Kossin et al., 2016; Li et al., 2016; Zhan and Wang, 2017). Relevant references:


Climate, 29, 5735-5739

Li, C.Y., W. Zhou, C.M. Shun and T.C. Lee, 2017 : Change in Destructiveness of Landfalling Tropical Cyclones over China in Recent Decades,

Journal of Climate, published online, http://dx.doi.org/10.1175/JCLI-D-16-0258.1.


1542

This paragraph should also mention the observed global-average migration of tropical cyclone activity (Kossin et al., 2014) and the observed changes

developing trends in wave climate. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]

We are grateful for your suggestion, and will be including consideration of it in the next draft.


Climate, 29, 5735-5739

Li, C.Y., W. Zhou, C.M. Shun and T.C. Lee, 2017 : Change in Destructiveness of Landfalling Tropical Cyclones over China in Recent Decades,

Journal of Climate, published online, http://dx.doi.org/10.1175/JCLI-D-16-0258.1.


Research Letter, 9, 014008.


1542.

7. Zhan R.F. and Y.Q. Wang, 2017 : Weak tropical cyclones dominate the poleward migration of the annual mean location of lifetime maximum


We are grateful for your suggestion, and will be including consideration of it in the next draft.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

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Besides changes in storms, tropical cyclones and wind, it would be worth mentioning the expected impact that climate change may have on the resulting storm surge levels. Recent research shows that depending on the location, this impact is non-negligible and may exceed 30% of the relative sea level rise (see e.g. “Vouvidakis et al., 2016. Projections of extreme storm surge levels along Europe. Journal of Climate Dynamics.” [Alessio Giardino, Netherlands])

We are grateful for your suggestion, and will be including consideration of it in the next draft.

The references that are given to support the statement. "There is increasing evidence that the number of very intense tropical cyclones have increased in recent decades across most ocean basins, with associated decreases in the overall number of tropical cyclones (Elsher et al. 2008; Holland and Bruyere 2014)" and "A general theory explaining these findings, and thereby strengthening confidence in the projections, has recently been proposed" may include earlier references among the previous. [Elvira Poloczanska, Germany]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Typos: ‘decrease’ instead of ‘deceases’. [David Docquier, Belgium]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Suggest also including more recent publications on tropical cyclone projections (e.g. Tony et al., 2013; Kunston et al., 2015; Wang and Wu, 2015; Sugi et al., 2016). Besides projected increase in the intense tropical cyclones, most model projections also predict an increase in tropical cyclones related rainfall in a warmer climate. Related references:

3. Tony et al., 2013 : Projected Changes in Late-Twenty-First-Century Tropical Cyclone Frequency in 13 Coupled Climate Models from Phase 5 of the Coupled Model Intercomparison Project. J of Climate, 26, 9496-9509.

We are grateful for your suggestion, and will be including consideration of it in the next draft.

The combined effect of future sea level rise and more intense tropical cyclones will likely contribute toward increased storm surge risk to coastal cities in the future. This issue should be mentioned and discussed in this section and other relevant sections of this document, including 3.4.2. Some relevant references:


We are grateful for your suggestion, and will be including consideration of it in the next draft.

Typos: ‘decrease’ instead of ‘deceases’. [David Docquier, Belgium]

We are grateful for your suggestion, and will be including consideration of it in the next draft.
Increase in cyclone damage potential for Gulf of Mexico storms has been highlighted in the recent work by Brey et al. 2017: Impact of Climate Change on Gulf of Mexico Hurricanes. NCAR Technical Note NCAR/TN535+STR, 165 pp, doi:10.5065/D6R85343. [Vidar Bjornstol, Norway]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Recent findings by NOAA have indicated that due to warmer SST, future tropical cyclones that do develop will have the ability to maintain their intensity as they move further north in previously cooler ocean waters. Findings have also indicated that due to warmer air temps and the ability of warmer air to hold more moisture, that storms that do develop could be subject to higher rainfall rates. [Michelle Leslie, Canada]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Hence shouldn't some of the climate assessment in this chapter be distributed with assessments for natural and human systems? [Elvira Pozo-Corrado, Germany]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Funding credits revisited [Elvira Pozo-Corrado, Germany]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

I would suggest to add also McCar et al. 2012, which is a broad assessment of wind trends [Robert Vautard, France]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

An analysis of wind is exclusively dedicated to wind over the oceans and not considered to great extent over land. Also, the links to ocean waves are not consistently presented in terms of a global picture. Hember et al. 2013 provide relevant details for wave climate changes on a global scale and recent research by Meneghini et al. 2017. Geophys. Res. Lett. 44(5), explores the CMIP5 forced wave energy fluxes along the world’s coastlines, providing a suitable indication of potential impacts/hazards related to extreme wave changes. [Carlos Loureiro, United Kingdom of Great Britain and Northern Ireland]

We are grateful for your suggestion, and will be including consideration of it in the next draft.


We are grateful for your suggestion, and will be including consideration of it in the next draft.

Wind speed? strength? [Elvira Poloczanska, Germany]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Punctuation needs revision [Elvira Poloczanska, Germany]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Better use DO NOT instead of don't [Lubna Alam, Bangladesh]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

The unit cm.s^{-1} is not usual for wind speed. [Radim Tolasz, Czech Republic]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

The unit cm.s^{-1} is not usual for wind speed. [Radim Tolasz, Czech Republic]

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The unit cm.s^{-1} is not usual for wind speed. [Radim Tolasz, Czech Republic]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

...quantitative detail needed, please state the 0-700 m ocean warming trend and the overall rate of 3.35 cm s^{-1} yr^{-1}'. Need to state the uncertainity of this trend. [Simon Josey, United Kingdom (of Great Britain and Northern Ireland)]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

Please consider stating clearly what is new since AR5 regarding ocean circulation and temperature. [Øyvind Christophersen, Norway]

We are grateful for your suggestion, and will be including consideration of it in the next draft.

The Southern Oceans are an obvious omission from the discussion in this section. So, an extra couple of sentences are needed on S Ocean wind waves are not consistently presented in terms of a global picture.
This section needs to have references added. Too many assertions without supporting literature cited. In particular, lines p36, 48-50 and p37, lines 20-

37

References needed to support these three sentences. [Simon Josey, United Kingdom (of Great Britain and Northern Ireland)] We are grateful for your suggestion, and will be including consideration of it in the next draft

2714 37 13 37 16 Should this not be discussed further under tipping points? [Peter Uqurhart, South Africa] We are grateful for your suggestion, and will be including consideration of it in the next draft

6649 37 13 37 16 This may be a quite similar scenario to that during the Holocene 8.2 ka event (a cold relapse promoted by a feedback mechanism that modified the Gulf Stream) Then, most of the western Europe facade might be affected, specially many eels (paets, lakes, ponds) in SW Europe, which during almost three centuries experienced the most intense effects (usually becoming colder and dryer) e.g. Muñoz Sobrino et al. (2005); Iriarte-Chiapusso et al. (2016)

We are grateful for your suggestion, and will be including consideration of it in the next draft

2714 37 13 37 16 Should this not be discussed further under tipping points? [Peter Uqurhart, South Africa] We are grateful for your suggestion, and will be including consideration of it in the next draft

6649 37 13 37 16 This may be a quite similar scenario to that during the Holocene 8.2 ka event (a cold relapse promoted by a feedback mechanism that modified the Gulf Stream). Then, most of the western Europe facade might be affected, specially many eels (paets, lakes, ponds) in SW Europe, which during almost three centuries experienced the most intense effects (usually becoming colder and dryer) e.g. Muñoz Sobrino et al. (2005); Iriarte-Chiapusso et al. (2016)

We are grateful for your suggestion, and will be including consideration of it in the next draft
<table>
<thead>
<tr>
<th>Comment No</th>
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</thead>
<tbody>
<tr>
<td>16255</td>
<td>37</td>
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<td>It would seem important here to also give the observed changes here (that was done for snow cover, etc.). My understanding is that the observed changes is a good bit larger than a 0.5°C increase and this point is a good trend to go one after this. To make clear in this at least this way the models are not overpredicting change, as deränse like to charge with respect to temperature change. [Michael MacCracken, United States of America]</td>
<td>Accepted text revised</td>
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<td>465</td>
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<td>before talking about climate projections in Arctic sea ice loss. I think it would be necessary to have a small paragraph about recent observations in both the Arctic and Antarctic regions, as in the previous subsections. A summary of observed sea ice changes can be found in Vaughan et al. (2013, IPCC AR5 WG1 Chapter 4) and an excellent summary of the Arctic sea ice can also be found in Dööscher et al. (2014, see complete reference below). [David Docquier, Belgium]</td>
<td>Taken into account although Semaze &amp; Stroewe more relevant</td>
</tr>
<tr>
<td>468</td>
<td>37</td>
<td>26</td>
<td>37</td>
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<td>Dööscher R., T. Vihma, and E. Maksymovich (2014). Recent advances in understanding the Arctic climate system and change from a sea ice perspective: a review. Atmos. Chem. Phys., 14, 13571–13800, doi: 10.5194/acp-14-13571-2014. [David Docquier, Belgium]</td>
<td>Taken into account although Semaze &amp; Stroewe more relevant</td>
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<td>5493</td>
<td>37</td>
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<td>37</td>
<td>28</td>
<td>Again, I would suggest to change &quot;for context&quot; by &quot;for comparison&quot; [Israel Nunez-Riboni, Germany]</td>
<td>Accepted text revised</td>
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<tr>
<td>7456</td>
<td>37</td>
<td>32</td>
<td>37</td>
<td>33</td>
<td>Please consider describing the strong positive relationship in what if it implies. [Byrd Christophersen, Norway]</td>
<td>Taken into account this section of text substantially revised and sentence no longer exists</td>
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<td>807</td>
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<td>32</td>
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<td>468</td>
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<td>34</td>
<td>37</td>
<td>34</td>
<td>Rephrase: Given these biases instead of these biases. [David Docquier, Belgium]</td>
<td>Taken into account this section of text substantially revised and sentence no longer exists</td>
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<td>7457</td>
<td>37</td>
<td>34</td>
<td>37</td>
<td>34</td>
<td>Please consider to explain what biases it refers to in the CMIP5 ensemble. [Byrd Christophersen, Norway]</td>
<td>Taken into account this section of text substantially revised and sentence no longer exists</td>
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<tr>
<td>10697</td>
<td>37</td>
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<td>37</td>
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<td>What &quot;biases&quot; are being referred to-they do not seem to be mentioned here. [Michael MacCracken, United States of America]</td>
<td>Taken into account this section of text substantially revised and sentence no longer exists</td>
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<td>469</td>
<td>37</td>
<td>36</td>
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<td>36</td>
<td>Provide reference for faster ice loss with recalibration compared to the full CMIP5 ensemble. [David Docquier, Belgium]</td>
<td>Taken into account this section of text substantially revised and sentence no longer exists</td>
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<td>470</td>
<td>37</td>
<td>36</td>
<td>37</td>
<td>36</td>
<td>Which CMIP5 subset are you talking about? [David Docquier, Belgium]</td>
<td>Taken into account this section of text substantially revised and sentence no longer exists</td>
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<td>10479</td>
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<td>37</td>
<td>37</td>
<td>proceeding [Jonathan Lynn, Switzerland]</td>
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<tr>
<td>10506</td>
<td>37</td>
<td>42</td>
<td>37</td>
<td>42</td>
<td>The word preindustrial should be pre-industrial to be similar in all chapters [Heba Elbasiouny, Egypt]</td>
<td>Editorial copyedit to be completed</td>
</tr>
<tr>
<td>18008</td>
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<td>43</td>
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<td>45</td>
<td>Contrasting results about ice-free September could be found in an essay paper by Sanderson et al. 2017 “Community Climate Simulations to assess avoided impacts in 1.5 C and 2 C futures” better to be mentioned [William Mountsoua Oka, France]</td>
<td>Accepted text revised</td>
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<td>16257</td>
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<td>46</td>
<td>Given that the models are biased, not showing enough ice meltback, here is if that a study based on model result showing a vanishingly small chance of September sea ice going to zero is credible and given so much attention without criticism here? On what basis should anyone be betting on this—did sure take a bet against their result given how the sea ice has been thinning so much. Perhaps the issue is what the definition of ice free in September? More explanation is needed. [Michael MacCracken, United States of America]</td>
<td>Accepted text revised</td>
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<td>21144</td>
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<td>52</td>
<td>Overland and Wang 2013 (When will the summer Arctic be nearly sea ice free?, Geophysical Research Letters, doi:10.1002/2014GL059794) interpreted that while the CO2-based calculations in the Nipol and Stroewe study are useful, aerosols and other factors effect this relationship and could contribute to the timing of when the Arctic is ice-free. [Nathan Borgford-Paull, Switzerland]</td>
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<td>21145</td>
<td>37</td>
<td>50</td>
<td>37</td>
<td>52</td>
<td>Overland and Wang 2013 (When will the summer Arctic be nearly sea ice free?, Geophysical Research Letters, doi:10.1002/2014GL059794) interpreted that while the CO2-based calculations in the Nipol and Stroewe study are useful for quantifying CO2 and its impact on Arctic sea ice, aerosols and other factors effect this relationship and could contribute to the timing of when the Arctic is ice free. [Nathan Borgford-Paull, Switzerland]</td>
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<td>10688</td>
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<td>52</td>
<td>Overland and Wang 2013 (When will the summer Arctic be nearly sea ice free?, Geophysical Research Letters, doi:10.1002/2016GL071841) interpreted that while the CO2-based calculations in the Nipol and Stroewe study are useful for quantifying CO2 and its impact on Arctic sea ice, aerosols and other factors effect this relationship and could contribute to the timing of when the Arctic is ice free. [Nathan Borgford-Paull, Switzerland]</td>
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<td>Natural variability may also play a part in when the Arctic is ice-free, altering the timing of an ice-free summer by as much as two decades (Jahn et al. 2016, How predictable is the timing of a summer ice-free Arctic?, Geophysical Research Letters, doi:10.1002/2016GL070007). [Nathan Borgford-Paull, Switzerland]</td>
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<td>16258</td>
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<td>[indeed!] This sentence needs a lot more attention and emphasis. [Michael MacCracken, United States of America]</td>
<td>Taken into account the revise text expands on this discussion</td>
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<td>471</td>
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<td>13</td>
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<td>13</td>
<td>Add: “as between ‘such’ and ‘the’. [David Docquier, Belgium]</td>
<td>Accepted text revised</td>
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<td>10718</td>
<td>38</td>
<td>13</td>
<td>38</td>
<td>13</td>
<td>The phrase &quot;unusual seasonal cycle&quot; is missing &quot;as&quot; between the words &quot;such&quot; and &quot;the.&quot; [Siir KILKIS, Turkey]</td>
<td>Accepted text revised</td>
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<td>11994</td>
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<td>13</td>
<td>ADD: &quot;as&quot; the seasonal. [Paul Doyle, Canada]</td>
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<td>472</td>
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<td>38</td>
<td>14</td>
<td>ADD: “sea ice” between “extents” and “of”. [David Docquier, Belgium]</td>
<td>Accepted text revised</td>
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<td>11956</td>
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<td>14</td>
<td>ADD: - extent of “sea” over recent decades. Something does not make sense here. Ice increasing in recent decades?? [Paul Doyle, Canada]</td>
<td>Accepted text revised</td>
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<td>13887</td>
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<td>16</td>
<td>I hope this will be developed into an integrated view with an emphasis on impacts on natural and managed ecosystems and human systems [Elvira Poloczanska, Germany]</td>
<td>Taken into account Box no longer exists</td>
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<tr>
<td>12887</td>
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<td>16</td>
<td>Box 3.3: Cold Regions: Is Antarctica not included in the discussion in this Box? [Jorge Carrasco, Chile]</td>
<td>Taken into account Box no longer exists</td>
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<td>13888</td>
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<td>I suggest using the term cryosphere to establish a direct link to the SR on ocean and cryosphere to a changing climate [Elvira Poloczanska, Germany]</td>
<td>Taken into account Box no longer exists</td>
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<td>11966</td>
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<td>16</td>
<td>Box 3.3 A work in progress as stated. [Paul Doyle, Canada]</td>
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<td>7664</td>
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<td>Should look at recent paper by Matthias Huss and Regine Hock on predicting glacial mass balance and contributions to sea level rise under various climate scenarios. It was published 30 September 2015 in the Frontiers in Earth Science, title “A new model for global glacier change and sea level rise” [William Koczyk, United States of America]</td>
<td>Taken into account Box no longer exists</td>
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<td>473</td>
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<td>16</td>
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<td>17</td>
<td>It is not clear at this stage what is the aim of Box 3.3. Is it really necessary? [David Docquier, Belgium]</td>
<td>Taken into account Box no longer exists</td>
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<td>8031</td>
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<td>17</td>
<td>Arctic text should be Arctic [Robert Shapiro, United States of America]</td>
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<td>14342</td>
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<td>... that has undergone major “CHANGES.” [Alessio Gaitorno, Netherlands]</td>
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<td>cautions should be changed (Robert Shapiro, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<td>7961</td>
<td>38</td>
<td>25</td>
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<td>25</td>
<td>cautions is a typographic error, should read “changes” (William Kochtitzky, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>6391</td>
<td>38</td>
<td>25</td>
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<td>25</td>
<td>cautions vs changes (Nathanael Matla, New Zealand)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>1952</td>
<td>38</td>
<td>25</td>
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<td>25</td>
<td>Cautions should read changes (Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>taken into account Box no longer exists</td>
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<td>1709</td>
<td>38</td>
<td>25</td>
<td>38</td>
<td>25</td>
<td>Changes misstated (David Eshleman, Australia)</td>
<td>taken into account Box no longer exists</td>
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<td>16259</td>
<td>38</td>
<td>25</td>
<td>38</td>
<td>28</td>
<td>This seems to have changed from an ice free Arctic in September to one presumably for the whole summer. While this may be what the statement plausible, there needs to be more discussion that considers what the summer minimum will be, which is increasingly likely seeming, from observational trends, to be an ice free state (&gt; 1M km²) in September in the not too distant future (of course, given the pace of global warming 1.5°C may occur soon too). This notion, however, of making such a statement based on model simulations when the melting of sea ice in models lags observations would seem to make for a rather tenuous conclusion, yet this statement says “virtually certain” – it is quite hard to understand the basis for this given the volume and area losses of the past couple of decades. (Michael MacCracken, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>6804</td>
<td>38</td>
<td>29</td>
<td>29</td>
<td>43</td>
<td>The information given here is rather useless unless more context is given about seasonal ranges, etc. And what does “coldest night-time temperature” mean – one night over whole Arctic in winter or what, and why is this the most relevant number for understanding potential impacts? It is not warming the coldest conditions that would seem likely to cause the largest impacts; it would be thinning of ice, duration of ice, summertime temperatures affecting permafrost, etc. – the section needs to provide useful information. (William Kochtitzky, United States of America)</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft</td>
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<tr>
<td>16260</td>
<td>38</td>
<td>30</td>
<td>38</td>
<td>34</td>
<td>The information given here is rather useless unless more context is given about seasonal ranges, etc. And what does “coldest night-time temperature” mean – one night over whole Arctic in winter or what, and why is this the most relevant number for understanding potential impacts? It is not warming the coldest conditions that would seem likely to cause the largest impacts; it would be thinning of ice, duration of ice, summertime temperatures affecting permafrost, etc. – the section needs to provide useful information. (Michael MacCracken, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>2324</td>
<td>38</td>
<td>36</td>
<td>38</td>
<td>40</td>
<td>Box 3.3 “permafrost covered land” is incorrect terminology as permafrost does not cover the land but is a condition of the ground itself, i.e. below the ground surface. We refer to areas underlain by permafrost (perhaps you are referring to the area covered by the permafrost regions which is a completely different thing). It is important to elevate that Chaburn et al. (2017) model is an equilibrium model and the actual change in permafrost distribution they predict will occur beyond 2100 which is 1.5°C or 2°C increase in air temperature. They also do not take into account that the distribution on the current (1997) permafrost map (Brown et al.) is a result of past climates and not air temperature in 1961-1990. Also they only consider the relationship between air temperatures and the boundaries of permafrost zones on the Brown et al. map and then project into future based on air temperature change. However, it is a little more complicated than that and other factors that influence permafrost conditions are not really considered in this approach. (Sharon Smith, Canada)</td>
<td>taken into account Box no longer exists</td>
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<td>16281</td>
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<td>Given how area shrinks moving north, I would think that there would be a larger percentage variation, but I guess also as one goes further to the south, the area that is permafrost goes down. Is it really linear in temperature change? (Michael MacCracken, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>11997</td>
<td>38</td>
<td>38</td>
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<td>39</td>
<td>Why put 2°C before 1.5°C? Reverse to maintain normal order? (Paul Doyle, Canada)</td>
<td>taken into account Box no longer exists</td>
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<td>7562</td>
<td>38</td>
<td>46</td>
<td>38</td>
<td>46</td>
<td>Should change attitude to elevation; attitude would imply all of these things are above the land surface (William Kochtitzky, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>17713</td>
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<td>48</td>
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<td>48</td>
<td>North adds mid-latitude effects of Arctic warming, e.g. in crop yield (Kim et al., 2017 Nature Geoscience) (Ana Bastos, France)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>7563</td>
<td>38</td>
<td>52</td>
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<td>53</td>
<td>There are no ice sheets in high elevation environments, talking about glacier melt and run off alone should suffice (William Kochtitzky, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<td>2325</td>
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<td>54</td>
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<td>54</td>
<td>Box 3.3 “permafrost melt” is incorrect. Use “permafrost thaw” (only the ice in the ground changes phase and therefore melts, while the soil or rock stays solid). (Sharon Smith, Canada)</td>
<td>taken into account Box no longer exists</td>
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<td>8009</td>
<td>38</td>
<td>56</td>
<td>38</td>
<td>56</td>
<td>Montains should be mountains (Robert Shapiro, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>5852</td>
<td>38</td>
<td>56</td>
<td>38</td>
<td>56</td>
<td>Please substitute “mountain” with “mountains” (Joan A. Lopez-Bastins, Spain)</td>
<td>taken into account Box no longer exists</td>
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<td>499</td>
<td>39</td>
<td>41</td>
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<td>The contribution from water storage to sea level rise is mentioned in the first sentence of Section 3.3.10 but not discussed in the text. (David Docquier, Belgium)</td>
<td>taken into account could not find any relevant material</td>
</tr>
<tr>
<td>5883</td>
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<td>9</td>
<td>Is it rather say &quot;sims snow depth, area and duration&quot; (Joan A. Lopez-Bastins, Spain)</td>
<td>taken into account Box no longer exists</td>
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<tr>
<td>8010</td>
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<td>what is sfc ?? (Robert Shapiro, United States of America)</td>
<td>taken into account Box no longer exists</td>
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<td>[1/3] This section needs to be improved considerably. It misses key references and falls short both from providing an analysis of future SLR under 1.5°C and 2°C by 2100 or beyond. Our understanding of the risk of ice sheet instability has improved considerably and needs to be captured here.</td>
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<td>Consider citing a recent study by Hua and Hock on global glacier mass balance and contribution to sea level rise. They estimate future contributions under various emissions scenarios. It was published 30 September, 2015 in the Frontiers in Earth Science, title &quot;A new model for global glacier change and sea-level rise&quot; [William Kochtitzky, United States of America]</td>
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<tr>
<td>482</td>
<td>39</td>
<td>20</td>
<td>41</td>
<td>19</td>
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<td></td>
<td>Section 3.3.10: I am wondering if it is really necessary to talk about projections beyond 2100 since the topic of this chapter is 'Impacts of 1.5°C global warming...'. While this information is interesting for IPCC AR reports, it is not really relevant for this special report. I suggest removing information related to Beyond 2100 as it is probably beyond the scope of this report. [David Docquier, Belgium]</td>
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<td>2021</td>
<td>39</td>
<td>20</td>
<td>41</td>
<td>19</td>
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<td></td>
<td>Once again inadequate literature on South Asia. Request to review a literature as &quot;R. Shaw et al. (eds.), Disaster Risk Reduction Approaches in Bangladesh, 217 Disaster Risk Reduction, DOI 10.1007/978-4-431-54252-0_10, © Springer Japan 2013, pp 217-231 [Md. Sirajul Islam, Bangladesh]</td>
<td></td>
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<tr>
<td>12372</td>
<td>39</td>
<td>20</td>
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<tr>
<td></td>
<td># Improved semi-empirical models. There has been considerable improvement for probabilistic SLR models (e.g. Kopp et al. 2014) and model validated semi-empirical approaches (Mengel et al. 2016). These provide component-based estimates and introduce new concepts like 'deep uncertainty' related to WAIS contributions that should be introduced.</td>
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<td>392</td>
<td>39</td>
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<tr>
<td></td>
<td>Noted section has been considerably revised. The suggested references are not incorporated because they are not particularly relevant to 1.5°C</td>
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</tbody>
</table>

Do Not Quote, Cite, or Distribute
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

Comment No | From Page | From Line | To Page | To Line | Comment | Response
--- | --- | --- | --- | --- | --- | ---
12373 | 39 | 20 | | | (3)[3] Global SLR projections exist for 1.5 and 2 scenarios (Schlöussner et al. 2018). | Accepted text now reflects new papers. Some of the suggested were not relevant to 1.5C and so were not used.

5494 | 39 | 22 | 39 | 23 | I find the semicolons (;) confusing. I suggest to rewrite without them. "...contributions from ocean heat uptake and thermal expansion, glacier and ice-sheet mass loss, as well as anthropogenic intervention in water storage on land" [Ismael Nunez-Ribó, Germany] | accepted semicolons removed.

2518 | 39 | 20 | 39 | 27 | Update this discussion with results from Kopp et al 2015, Hay et al 2015, Dagemndorf et al 2017. | Accepted these and several other SEM papers are now assessed.

481 | 39 | 22 | 39 | 27 | I find it more logical to start by the second and third sentences (sea level rise observations) and then to end with the first sentence (contributions to sea level rise). | taken into account this paragraph has been divided into two. The first covers timescales and components. The second observations.

13725 | 39 | 22 | 41 | 8 | GMSL rise = "GMSLR"? Consistency needed | taken into account The first paper is not within the scope of 1.5C. The second is assessed already. The third is grey literature.


16262 | 39 | 24 | 39 | 24 | The way this is phrased, it says that only during the period from late 19th to early 20th century was sea level rising. I would think the intent would say that since that time the sea level has been rising. [Michael MacCracken, United States of America] | taken into account this text has been removed as part of reorganization.

19701 | 39 | 30 | 39 | 33 | Overall comment that this chapter should look at the impacts of climate change on the full range of human rights. Look at the reports and briefings of OHCHR on climate change and human rights for guidance. See also this report by the Special Mandate holders of the Human Rights Council. OHCHR (2015) The Effects of Climate Change on the Full Enjoyment of Human Rights. | taken into account this comment is out of scope for the present section, which focusses on the physical system.


16264 | 39 | 31 | 39 | 31 | by the end of what century—the 22nd? [Michael MacCracken, United States of America] | taken into account this text has been removed as part of reorganization.

145 | 39 | 32 | 39 | 32 | It reads 'present day sea level it should read sea level' [Michele Kim, United Kingdom (of great Britain and Northern Ireland)] | taken into account this text has been removed as part of reorganization.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>478</td>
<td>39</td>
<td>32</td>
<td>39</td>
<td>33</td>
<td>I don't understand this sentence. [David Docquier, Belgium]</td>
<td>Taken into account text has been removed as part of reorganization</td>
</tr>
<tr>
<td>7565</td>
<td>39</td>
<td>33</td>
<td>39</td>
<td>33</td>
<td>should change &quot;ice sheet outflow&quot; to &quot;ice sheet and glacier ablation&quot;; mountain glaciers were also included in ARS and outflow is not the best description of ice mass loss [William Kochtitzky, United States of America]</td>
<td>Accepted paragraph reordered so that it is clear SMB and outflow refer to both ice sheets and glaciers</td>
</tr>
<tr>
<td>7566</td>
<td>39</td>
<td>33</td>
<td>39</td>
<td>33</td>
<td>should change &quot;ice sheet outflow&quot; to &quot;ice sheet and glacier ablation&quot; or &quot;ice mass loss&quot;; mountain glaciers were also included in ARS and outflow is not the best description of global ice mass loss [William Kochtitzky, United States of America]</td>
<td>Rejected outflow is used for comparability with ARS</td>
</tr>
<tr>
<td>11998</td>
<td>39</td>
<td>33</td>
<td>39</td>
<td>33</td>
<td>DELE TE &quot;leaving...&quot; mandated to be shifted... [Paul Doyle, Canada]</td>
<td>Taken into account text this has been removed as part of reorganization</td>
</tr>
<tr>
<td>11999</td>
<td>39</td>
<td>33</td>
<td>39</td>
<td>33</td>
<td>Assume that GMSLR means GMSL rise but do not see acronym explained in text. [Paul Doyle, Canada]</td>
<td>Accepted now use GMSL rise consistently</td>
</tr>
<tr>
<td>5884</td>
<td>39</td>
<td>33</td>
<td>39</td>
<td>36</td>
<td>Please substitute “GMSLR” with “GMSL rise” [Jan A. Lopez-Bustins, Spain]</td>
<td>Accepted now use GMSL rise consistently</td>
</tr>
<tr>
<td>479</td>
<td>39</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>Delete 'of' after assessment. [David Docquier, Belgium]</td>
<td>Taken into account text has been removed as part of reorganization</td>
</tr>
<tr>
<td>480</td>
<td>39</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>in the ARS report, this contribution is called 'thermal expansion' and not 'ocean heat uptake and thermal expansion'. The former terminology is simpler. I think an explanation is needed at the beginning of this sub-section if you decide to keep the latter terminology. [David Docquier, Belgium]</td>
<td>Accepted text revised accordingly</td>
</tr>
<tr>
<td>10431</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>40</td>
<td>...in the ARS assessment (Church et al. 2013)... dropping 'of' [Jonathan Lynn, Switzerland]</td>
<td>Editorial issues with mendeley</td>
</tr>
<tr>
<td>5495</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>41</td>
<td>...dominant component in the ARS assessment of (Church et al... Delete the parenthesis? [Ismael Nunez-Riboni, Germany]</td>
<td>Editorial issues with mendeley</td>
</tr>
<tr>
<td>16265</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>42</td>
<td>Why is the baseline period 1986-2005? Many cities and ecosystem edges were established based on the preindustrial baseline--why is that not used? [Michael MacCracken, United States of America]</td>
<td>Taken into account we use ARS baseline here for comparability</td>
</tr>
<tr>
<td>21146</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>44</td>
<td>SLPs also contribute to long-term sea-level rise through thermal expansion despite their short lifetimes in the atmosphere [Zickfeld et al. 2017]. Centuries of thermal sea-level rise due to anthropogenic emissions of short-lived greenhouse gases, PNAS, doi/10.1073/pnas.1612066114 [Nathan Borgen-Pedam, Switzerland]</td>
<td>Taken into account reference to GMSL removed</td>
</tr>
<tr>
<td>16266</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>44</td>
<td>SLPs also contribute to long-term sea-level rise through thermal expansion despite their short lifetimes in the atmosphere [Zickfeld et al. 2017]. Centuries of thermal sea-level rise due to anthropogenic emissions of short-lived greenhouse gases, PNAS, doi/10.1073/pnas.1612066114 [Kristin Campbell, United States of America]</td>
<td>Taken into account reference to GMSL removed</td>
</tr>
<tr>
<td>12000</td>
<td>40</td>
<td>39</td>
<td>40</td>
<td>45</td>
<td>I think using &quot; mitigate&quot; here will add to the confusion of the use of the word 'virtually everywhere else it means reducing emissions, but not here? Just say &quot;reduces the rate of rise of GMSL&quot; [Michael MacCracken, United States of America]</td>
<td>Accepted text revised accordingly</td>
</tr>
<tr>
<td>8011</td>
<td>40</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>balance between increased warming towards the end of the century and the depletion of low-elevation ice. [Robert Shaprio, United States of America]</td>
<td>Accepted. Text reordered</td>
</tr>
<tr>
<td>5285</td>
<td>40</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>complex sentence. What do you mean? [Bart Van den Hurk, Netherlandis]</td>
<td>Accepted. Text reordered</td>
</tr>
<tr>
<td>16267</td>
<td>40</td>
<td>1</td>
<td>40</td>
<td>2</td>
<td>change to &quot;century and the depletion&quot; [Michael MacCracken, United States of America]</td>
<td>Accepted. Text reordered</td>
</tr>
<tr>
<td>12001</td>
<td>40</td>
<td>2</td>
<td>40</td>
<td>2</td>
<td>ADD &quot;w/o&quot;... to... the century &quot;w/o&quot; the depletion... [Paul Doyle, Canada]</td>
<td>Accepted. Text reordered</td>
</tr>
<tr>
<td>10432</td>
<td>40</td>
<td>7</td>
<td>40</td>
<td>13</td>
<td>iceberg/iceberg not ice berg / ice bergs [Jonathan Lynn, Switzerland]</td>
<td>Taken into account icebergs spelling changed throughout</td>
</tr>
<tr>
<td>5884</td>
<td>40</td>
<td>7</td>
<td>40</td>
<td>13</td>
<td>Please substitute &quot;iceberg&quot; with &quot;icebergs&quot; [Jan A. Lopez-Bustins, Spain]</td>
<td>Taken into account icebergs spelling changed throughout</td>
</tr>
<tr>
<td>8012</td>
<td>40</td>
<td>7</td>
<td>40</td>
<td>7</td>
<td>ice berg should be iceberg [Robert Shaprio, United States of America]</td>
<td>Taken into account icebergs spelling changed throughout</td>
</tr>
<tr>
<td>5496</td>
<td>40</td>
<td>7</td>
<td>40</td>
<td>7</td>
<td>ice berg should be &quot;iceberg&quot;? [Ismael Nunez-Riboni, Germany]</td>
<td>Taken into account icebergs spelling changed throughout</td>
</tr>
<tr>
<td>18009</td>
<td>40</td>
<td>10</td>
<td>40</td>
<td>10</td>
<td>HAPPRIP project, other places such as Page 34 Line 34 use &quot;HAPPR project&quot; or &quot;HAPPRIP in Page 43 Line 43 should keep consistent through the draft? [William Moufouma Okia, France]</td>
<td>Accepted new literature now available</td>
</tr>
<tr>
<td>5286</td>
<td>40</td>
<td>10</td>
<td>40</td>
<td>10</td>
<td>including mechanistic studies on calving processes? [Bart Van den Hurk, Netherlands]</td>
<td>Taken into account. This sentence has been dropped.</td>
</tr>
<tr>
<td>16272</td>
<td>40</td>
<td>12</td>
<td>40</td>
<td>14</td>
<td>taken into account. This is a factor and would be incorporated models looking at the gravitational response to this change in load.</td>
<td>Accepted text revised</td>
</tr>
<tr>
<td>483</td>
<td>40</td>
<td>12</td>
<td>40</td>
<td>15</td>
<td>Rephrase: The Greenland ice sheet contributes to GMSL rise by increases in ice surface melt and increases in ice outflow (e.g. iceberg calving of and melt at the terminus of marine outlet glaciers). While projections of the former process are routinely made, process-based modeling of the latter is in its infancy... [David Docquier, Belgium]</td>
<td>Taken into account. This paragraph has been revised and this text removed.</td>
</tr>
<tr>
<td>485</td>
<td>40</td>
<td>12</td>
<td>40</td>
<td>21</td>
<td>I suggest re-writing this paragraph as it does not read very well. [David Docquier, Belgium]</td>
<td>Taken into account. This paragraph has been revised and this text removed.</td>
</tr>
<tr>
<td>7567</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>ice bergs should be changed to &quot;icebergs&quot; [William Kochtitzky, United States of America]</td>
<td>Taken into account icebergs spelling changed throughout</td>
</tr>
<tr>
<td>487</td>
<td>23</td>
<td>23</td>
<td>40</td>
<td>34</td>
<td>While these results are very interesting, I am wondering if they fit into this report aiming at assessing the impacts at 1.5°C. Anyway, this paragraph seems to be a bit too technical for the purpose of this report. [David Docquier, Belgium]</td>
<td>Taken into account. This is a factor and would be incorporated models looking at the gravitational response to this change in load.</td>
</tr>
<tr>
<td>16268</td>
<td>24</td>
<td>24</td>
<td>40</td>
<td>24</td>
<td>irreversible loss of the ice sheet—by when, during the 21st century which is the period talked about please clarify. [Michael MacCracken, United States of America]</td>
<td>Taken into account. Term clarification is made clear in the remainder of the paragraph.</td>
</tr>
<tr>
<td>486</td>
<td>26</td>
<td>26</td>
<td>40</td>
<td>27</td>
<td>ABB = 'difference between mass gain and mass loss at the ice surface. Rephrase: 'net surface mass balance (SMB, the difference between mass gain at the ice surface, mostly snowfall, and mass loss at the surface, mostly surface melt and subsequent runoff) first become'. [David Docquier, Belgium]</td>
<td>Accepted. This wording is better. Sentence itself has been moved to earlier in the subsection.</td>
</tr>
<tr>
<td>16269</td>
<td>28</td>
<td>28</td>
<td>40</td>
<td>28</td>
<td>2 C number given for the temperature of the ice sheet or for the change in global average temperature? Given that the GIS is losing mass now at 1 C global warming, how is the 2 C figure justified? Clarification is needed. [Michael MacCracken, United States of America]</td>
<td>Taken into account. This is a factor and would be incorporated models looking at the gravitational response to this change in load.</td>
</tr>
<tr>
<td>12002</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>iceberg/iceberg not ice berg / ice bergs [Jonathan Lynn, Switzerland]</td>
<td>Taken into account text this has been removed as part of reorganization</td>
</tr>
<tr>
<td>16270</td>
<td>31</td>
<td>31</td>
<td>40</td>
<td>32</td>
<td>can be tons of millenia—is this an upper limit? If so, please also give the lower limit (for say half or more to be lost—so 10 feet/3 meters of SL rise). As is, the statement is just not helpful. [Michael MacCracken, United States of America]</td>
<td>Accepted now use GMSL rise consistently</td>
</tr>
<tr>
<td>8013</td>
<td>32</td>
<td>32</td>
<td>40</td>
<td>32</td>
<td>There show be Were [Robert Shaprio, United States of America]</td>
<td>Accepted this correction</td>
</tr>
<tr>
<td>11710</td>
<td>32</td>
<td>40</td>
<td>32</td>
<td>32</td>
<td>&quot;Were, not &quot;where&quot; [David Schoeman, Australia]</td>
<td>Accepted this correction</td>
</tr>
<tr>
<td>Comment No</td>
<td>From Page</td>
<td>From Line</td>
<td>To Page</td>
<td>To Line</td>
<td>Comment</td>
<td>Response</td>
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<tr>
<td>16271</td>
<td>40</td>
<td>32</td>
<td>40</td>
<td>34</td>
<td>First, change &quot;where&quot; to &quot;wherever&quot; - Second -cool by how much? Greenland is losing mass when the average global temperature is 1°C and its volume apparently does not shrink going back below 1.5°C (a level too high in my opinion, but seemingly built into the analysis). So, if this is the case, then suggesting there might be regrowth is simply not consistent with the idea being discussed and is misleadingly optimistic. I am all for going back to below 0.5°C and statement might be possible in that case, although I recall an early Wiggly paper suggesting one would have to go back below 300 ppm (even well below) to really stop the loss of mass from ice sheets and ongoing sea level rise. (Michael MacCracken, United States of America)</td>
<td>Accepted/rejected. Where replaced. Clearly, if temperatures were to return to preindustrial greenhouse gas levels it would well occur.</td>
</tr>
<tr>
<td>10043</td>
<td>40</td>
<td>36</td>
<td>40</td>
<td>40</td>
<td>long sentence with parentheses and hard to follow possibly could be simplified e.g. reusing as two sentences (Jonathan Lynn, Switzerland)</td>
<td>Taken into account. This paragraph has been simplified in the SOD.</td>
</tr>
<tr>
<td>3842</td>
<td>40</td>
<td>42</td>
<td>41</td>
<td>3</td>
<td>The paragraph starts with &quot;three main papers&quot;. However, it is not clear what exactly they are, since there are a lot more references in the paragraph. I think two of them are DeConto and Pollard (2015) and Golledge et al. (2015). It is difficult to figure out what the third one is (Woonsup Chio, United States of America)</td>
<td>Taken into account. This section has been replaced by assessment of more recent literature.</td>
</tr>
<tr>
<td>5287</td>
<td>40</td>
<td>44</td>
<td>41</td>
<td>55</td>
<td>RC2.6 should be revised to &quot;RCP2.6&quot;. (David Docquier, Belgium)</td>
<td>Accepted text revised.</td>
</tr>
<tr>
<td>12003</td>
<td>40</td>
<td>48</td>
<td>48</td>
<td>48</td>
<td>CHANGE &quot;outflow, however increases&quot; to &quot;outflow, however, increases.&quot; (Paul Doyle, Canada)</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>12004</td>
<td>40</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>CHANGE &quot;compares&quot;, to &quot;...moderates&quot; (Paul Doyle, Canada)</td>
<td>Rejected. These are two different mass fluxes. They cannot therefore moderate each other.</td>
</tr>
<tr>
<td>16273</td>
<td>40</td>
<td>53</td>
<td>40</td>
<td>56</td>
<td>My understanding is that a key part of the De Conto and Pollard effort has been validating the model against a quite long history of Antarctic ice sheet behavior. This only with this calving mechanism can the past history be credibly simulated. I would think that mention of their validation needs to be mentioned - it really does seem to give their approach with the new mechanism provides more credibility than for other models that generally cannot reproduce the history of ice on Antarctica. I would note also that their mechanism leads to some thinning of ice shelves, etc. (Michael MacCracken, United States of America)</td>
<td>Taken into account. This paragraph has been substantially revised and this confusion has been revised.</td>
</tr>
<tr>
<td>12005</td>
<td>40</td>
<td>54</td>
<td>40</td>
<td>54</td>
<td>CHANGE &quot;...collapse however the&quot; to &quot;...collapse, however, the&quot; (Paul Doyle, Canada)</td>
<td>Taken into account. This paragraph has been substantially rewritten.</td>
</tr>
<tr>
<td>5288</td>
<td>40</td>
<td>54</td>
<td>41</td>
<td>55</td>
<td>However the amount of surface warming required to initiate this process seems very unlikely... I don’t understand this &quot;however&quot;: isn’t this the reason why De Conto and Pollard consider RCP2.6 the only one that can limit Antarctic contributions to GMSL rise? (Woonsup Chio v Van Den, Netherlands)</td>
<td>Taken into account. This section has been replaced by assessment of more recent literature.</td>
</tr>
<tr>
<td>10018</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>55</td>
<td>Row 47 and 52: 1.5 vs 2 °C (Hasan An: Turkey)</td>
<td>Rejected. Where present in the sense of may exist, long-term committed because the SLR will happen even with stabilised global temperatures</td>
</tr>
<tr>
<td>12006</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td>3</td>
<td>Trouble understanding this sentence, &quot;...comparative&quot;, &quot;...perhaps&quot;? (Paul Doyle, Canada)</td>
<td>Accepted text revised.</td>
</tr>
<tr>
<td>7921</td>
<td>41</td>
<td>3</td>
<td>41</td>
<td>3</td>
<td>RCS2.6 should be revised to &quot;RCPS2.6&quot; (Keiko Udo, Japan)</td>
<td>Accepted text revised.</td>
</tr>
<tr>
<td>18100</td>
<td>41</td>
<td>3</td>
<td>41</td>
<td>3</td>
<td>As this &quot;RCS2.6 or RCP2.6&quot; (William Moufouma Gis, France)</td>
<td>Accepted text revised.</td>
</tr>
<tr>
<td>3964</td>
<td>41</td>
<td>5</td>
<td>41</td>
<td>5</td>
<td>The methodology used by Church should be briefly outlined. Currently there is an expectation that the reader will know what this method is (and one does see) that the other method provides more credibility than for other models that generally cannot reproduce the history of ice on Antarctica. (Stefan Henson, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>Taken into account this section replaced by assessment of more recent literature.</td>
</tr>
<tr>
<td>10548</td>
<td>41</td>
<td>5</td>
<td>41</td>
<td>5</td>
<td>DROP comma after projections (Jonathan Lynn, Switzerland)</td>
<td>Taken into account this section replaced by assessment of more recent literature.</td>
</tr>
<tr>
<td>491</td>
<td>41</td>
<td>5</td>
<td>41</td>
<td>8</td>
<td>If there is potential, it would be very useful to use in the present report. Otherwise, do not mention it. (David Docquier, Belgium)</td>
<td>Taken into account this section replaced by assessment of more recent literature.</td>
</tr>
<tr>
<td>11711</td>
<td>41</td>
<td>11</td>
<td>41</td>
<td>12</td>
<td>It is also very likely that over 95% of the world’s ocean will experience sea level rise &quot;the over &quot; here introduces a bit of confusion to the sentence. (David MacCracken, Australia)</td>
<td>Taken into account this section replaced by assessment of more recent literature.</td>
</tr>
<tr>
<td>16275</td>
<td>41</td>
<td>15</td>
<td>41</td>
<td>15</td>
<td>This focus about the rise in sea level by 2100 needs to be augmented by the point that sea level will continue to rise thereafter. I’d also like to suggest another way to present the projections of sea level, and that is to give a range of years for when some level will be reached, for example, a 1 m rise will likely be reached between 2060 and 2150 or something and a 1.5 m rise between 2090 and 2150, a 2 m rise between 2110 and 2160, etc. With respect to sea level, how much the real rise will be, is for many potential decisions, more important than exactly when it will occur (i.e., would policymakers really make a different decision about sea level rise if it were a level to be reached in their child’s versus their grandchild’s lifetime?). So, I think it would be useful to give an indication of how high the suggested equilibrium value will be and time spans for increments of that amount are likely to occur. (Michael MacCracken, United States of America)</td>
<td>Taken into account. This discussion has been revised. We are now clearer on timescales.</td>
</tr>
<tr>
<td>6805</td>
<td>41</td>
<td>15</td>
<td>41</td>
<td>16</td>
<td>Recent investigations highlight an expected increase in flooding frequency due to extreme water levels enhanced by wave action, particularly in the Tropics (Vitousek et al., 2017, Scientific Reports, 7:1399). This aspect of coastal flooding should be highlighted, as such compound dynamics are likely to be the most relevant and impactful changes. (Carlos Lourenco, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>Accepted more recent literature allows a fuller assessment than was possible for the POD.</td>
</tr>
<tr>
<td>6806</td>
<td>41</td>
<td>17</td>
<td>41</td>
<td>17</td>
<td>The assumption that increased mean sea level is the main driver of extreme sea level events (which is perhaps incorrect, and relying exclusively on tide gauges to assess differences in return periods for extreme water levels is likely to grossly underestimate the compound nature of extreme sea level events. Extreme sea level events are often dependent more on atmospheric/oceanographic components leading to storm surge (reduced atmospheric pressure and wave/induced water filling against the coast) than on the changes in RSs. Moreover, for several major global cities, extreme sea levels result from combination of coastal and river flooding. (e.g. Mofthar et al., 2017, PMAS, 114, 37) (Carlos Lourenco, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>Taken into account. While this is true, we could not have literature in the context of 1.5°C.</td>
</tr>
</tbody>
</table>
This looks more like dot-point notes that a considered paragraph... [David Schoeman, Australia]

The indicative bullet points have now been replaced with text. In the revision the impacts on freshwater resources, flooding, sea level rise and land loss are now considered.

I do not think this box 3.4 is justified: “what is a small developing state”, when would stop from being small and become “medium or big”? Should it not make a clearer reference to adaptative capacity? [Zoha Shawoo, United Kingdom (of Great Britain and Northern Ireland)]

Regarding impacts on food production and livelihoods in SIDS: I recall that a further potential impact is reduction of land-based food production in some island areas due to salinization resulting from sea level rise. As I am writing these comments in transit at an airport I’m unable to follow up with specific references for this, but you may like to consider it. [David White, New Zealand]

Ecosystem impacts is now acknowledged in the text. The reference provided has been reviewed. Ecosystem impacts are however largely treated as a gap given the absence of literature specific to SIDS and 1.5.

The reference was consulted as suggested for guidance.

The reference provided was reviewed. Ecosystem impacts are however largely treated as a gap given the absence of literature specific to SIDS and 1.5.

In order to improve this Box 3.4, please visit this reference “GEO SIDS, Small Island Developing States Outlook”, published by UNEP in 2014. [JACQUELINE NDINEO, Swaziland]

The prevision version omitted the word ‘island’ from the title. This version is specific to Small Island Developing States.

The prevision version omitted the word ‘island’ from the title. This version is specific to Small Island Developing States. [Muhammad Mohsin IQBAL, Pakistan]

The indicative bullet points have now been replaced with text. The material is focused on the 1.5 or 2.0 is also noted as a gap.

The indicative bullet points have now been replaced with text. The prevision version omitted the word ‘island’ from the title. This version is specific to Small Island Developing States.

The indicative bullet points have now been replaced with text. The prevision version omitted the word ‘island’ from the title. This version is specific to Small Island Developing States.

The indicative bullet points have now been replaced with text. The prevision version omitted the word ‘island’ from the title. This version is specific to Small Island Developing States.

The indicative bullet points have now been replaced with text. The prevision version omitted the word ‘island’ from the title. This version is specific to Small Island Developing States.

This looks more like dot-point notes that a considered paragraph... [David Schoeman, Australia]

The indicative bullet points have now been replaced with text. The material is focused on the issue of 1.5C and although the issue is mentioned in the context of SIDS, it is largely treated as a gap in the existing literature.

The indicative bullet points have now been replaced with text. The material is focused on the issue of 1.5C and although the issue is mentioned in the context of SIDS, it is largely treated as a gap in the existing literature.

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The indicative bullet points have now been replaced with text. The material is focused on the issue of 1.5C and although the issue is mentioned in the context of SIDS, it is largely treated as a gap in the existing literature.
**Comment Response**

### Comment: **The "updated key risks" section seems to be out of place, perhaps it's supposed to be in box 3.4?**

**Response:**
The text being referenced was not appropriately placed and was not a part of the SIDS Box.

### Comment: **Is it a word missing in this sentence describing what is happening with the concentration of key ions?**

**Response:**
Accepted: missing words added

### Comment: **It would be useful to the reader to mention why 65Ma is considered a potential boundary--namely a major asteroid impact.**

**Response:**
Michael MacCracken, United States of America

### Comment: **Connection to degree of climate change needed for this and other sections of the chapters.**

**Response:**
Elvira Poloczanska, Germany

### Comment: **Where does this section belong to???**

**Response:**
Elvira Poloczanska, Germany

### Comment: **Section 3 should be in Box 3.4**

**Response:**
Moshe Kinn, United Kingdom (of Great Britain and Northern Ireland)

### Comment: **Don't understand meaning of " (PETM, 55.3 Ma" as a reference?**

**Response:**
Paul Doyle, Canada

### Comment: **What is 65 Ma? Million years?**

**Response:**
Correct. Left as is because it is a quote from a paper by Hönisch et al. 2012.

### Comment: **Please consider including this in the executive summary**

**Response:**
Ismael Nunez-Riboni, Germany

### Comment: **The numbering (3) does not match what the reader would expect (it is between 3.3.10 and 3.3.11). Delete (Jonathan Lynn, Switzerland)**

**Response:**
Taken into account - have strengthened the message and included more examples of the impacts. Note that this section is focused on describing the chemical and physical changes while later sections focus on biological and human related responses - including impacts of cumulative stress. Also, we are not comprehensively reviewing ocean chemistry but our setting up the later discussions with respect to 1.5 versus 2°C.

### Comment: **entire paragraph 3.3.11 Ocean chemistry: This paragraph is very weak and does not represent the importance of the chemistry of the ocean has on the Earth's wellbeing. E.g. there are many predictions on how the increased aerosol deposing due to the expansion of arid areas will impact the primary productivity which in turn can have strong feedback mechanisms on climate change. Several good modelling papers have had this as their topic. There also have been numerous papers on the effect of temperature alone, and multiple stressors added to a temperature increase, such as pH, CO2, toxic trace metals, etc. on single species or ecosystems. This topic has been omitted entirely here. I am more than happy to make a larger contribution for this paragraph.**

**Response:**
Sylvia Sander, Monaco

### Comment: **… which dissociates**

**Response:**
… which dissociates

### Comment: **It is unclear in this paragraph whether “inundation” refers to flooding of coastal areas or freshwater input from land.**

**Response:**
On human timescales, carbon dioxide, temperature and hence ocean acidification.

### Comment: **Check your source for the age of the PETM. Storey et al (2007) had this at 55.6 ka.**

**Response:**
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>12374</td>
<td>43</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Table 3.1: Please revisit tropical cyclones attribution in the light of table SPM1s footnote on Atlantic cyclones. Runoff and flooding. It is unclear why multi-model intercomparisons results from ISMIP are insufficient to increase confidence here. There are clear changes in runoff projected and it is very confusing why heavy precipitation and drought get higher confidence levels. Furthermore, the column ‘detected observed changes’ column could be put in perspective of the warming observed period that underlies this statement. In particular, it should be considered how statements on attribution can be linked to observed 0.5°C warming increments. (Bill Hare, Canada)</td>
<td>Accepted: text modified, tables are not being used in latest version.</td>
</tr>
<tr>
<td>12009</td>
<td>43</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>Table 3.1:</td>
<td>Accepted.</td>
</tr>
<tr>
<td>12010</td>
<td>43</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>ADD... &quot;by the&quot; end of &quot;the&quot; century. (Paul Doyle, Canada)</td>
<td>Accepted and text modified.</td>
</tr>
<tr>
<td>3551</td>
<td>43</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>sentence has problem with singular/plural. Exchange has with have [Sylvia Sander, Monaco]</td>
<td>Accepted and text modified.</td>
</tr>
<tr>
<td>10487</td>
<td>43</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>Increasing temperature...... &quot;has led&quot;...... &quot;has led&quot; [Jonathan Lynn, Switzerland]</td>
<td>Accepted and text modified.</td>
</tr>
<tr>
<td>3652</td>
<td>43</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>same as above plural! Must be...... have increased...... same sentence exchange frequency of areas' with number of areas, frequency is a kinetic expression. [Sylvia Sander, Monaco]</td>
<td>Accepted.</td>
</tr>
<tr>
<td>11713</td>
<td>43</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>2% per whal? Year? Decade? Century? [David Schovemaker, Australia]</td>
<td>Accepted - have modified text to ‘by 2% since 1980’</td>
</tr>
<tr>
<td>22</td>
<td>43</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>About the risks of broadening of the ‘dead zones’ in the tropics [Aller et al. 2017] study is strictly limited to the specific coral reefs environment and should not be extrapolated to the tropics senso lato. [Paul TREQUER, France]</td>
<td>Accepted - text modified to ‘Changes in ocean mixing together with increased metabolic rates in the deep ocean has increased the frequency of areas’ (dead zones)’ which are areas where oxygen has fallen below levels that fail to sustain oxygenic life, with increased risks (doubtless every decade, INSERT Diaz and Rosenberg 2008). Drivers are complex and include both climate change and other factors (Aller and Gleden 2015). Recent studies have identified risks for tropical regions as well (Aller et al. 2017). ‘</td>
</tr>
<tr>
<td>12011</td>
<td>43</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>CHANGE....... &quot;for broader regional impacts such as in the tropics&quot;... [Paul Doyle, Canada]</td>
<td>Accepted - see previous comment response.</td>
</tr>
<tr>
<td>3553</td>
<td>43</td>
<td>20</td>
<td></td>
<td></td>
<td>what about the antarctic, i.e. southern ocean. [Sylvia Sander, Monaco]</td>
<td>Accepted - mention of polar regions now added. Reference to increasing acidification, oxygen with latitude, and to the impacts on key organisms such as penguins.</td>
</tr>
<tr>
<td>13729</td>
<td>43</td>
<td>22</td>
<td>23</td>
<td>23</td>
<td>Please clarify that here you are referring to Large Ocean Acidification in particular (not &quot;ocean chemistry&quot; in general). All publications given as reference are about Ocean Acidification [Elvira Poloczanska, Germany]</td>
<td>Accepted - have changed ‘ocean chemistry’ to ‘ocean acidification’.</td>
</tr>
<tr>
<td>16277</td>
<td>43</td>
<td>22</td>
<td>43</td>
<td>31</td>
<td>Given the seriousness of this issue, I would think that a fuller explanation would be appropriate. [Michael MacCracken, United States of America]</td>
<td>The material is focused on the issue of 1.5°C and hence this issue is given some treatment which is important but space precludes us from doing more.</td>
</tr>
<tr>
<td>13894</td>
<td>43</td>
<td>27</td>
<td>43</td>
<td>31</td>
<td>please consider the structure of the chapter, this climate section brings in ecosystems which is not the case in previous sections [Elvira Poloczanska, Germany]</td>
<td>Rejected - Broad biological responses are to be discussed here prior to discussing impacts on ecosystem services and sectors.</td>
</tr>
<tr>
<td>12012</td>
<td>43</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>ADD...the &quot;same&quot; sensitivity.... [Paul Doyle, Canada]</td>
<td>Accepted.</td>
</tr>
<tr>
<td>8015</td>
<td>43</td>
<td>29</td>
<td>43</td>
<td>31</td>
<td>The sentence that starts with ‘Given’ and ends with ‘early stage’ does not make sense!! [Robert Shapiro, United States of America]</td>
<td>Accepted - While many aspects of changes to ocean chemistry are not understood, numerous risks from rapid changes to ocean acidification to biological systems have been identified (Aller et al., 2016; Dove et al., 2013; Gattuso et al., 2015; Kroeker et al., 2013; Pörtner et al., 2014).</td>
</tr>
<tr>
<td>12013</td>
<td>43</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>ADD... chemistry &quot;are&quot; at.... [Paul Doyle, Canada]</td>
<td>Taken into account. Subsections 12 and 13 combined and completely rewritten.</td>
</tr>
<tr>
<td>10386</td>
<td>43</td>
<td>34</td>
<td>34</td>
<td>46</td>
<td>How does this differ from 3.3.1 Global changes in climate?????? [Elvira Poloczanska, Germany]</td>
<td>Taken into account. Subsections 12 and 13 combined and completely rewritten.</td>
</tr>
<tr>
<td>3462</td>
<td>43</td>
<td>34</td>
<td>46</td>
<td>46</td>
<td>Please consider highlighting the important part of the chapter in some way, i.e. as a part of the executive summary or by placing it right after the executive summary [Bjarne Christophersen, Norway]</td>
<td>Taken into account. Subsections 12 and 13 combined and completely rewritten/reviewed.</td>
</tr>
<tr>
<td>493</td>
<td>43</td>
<td>36</td>
<td></td>
<td></td>
<td>What is the point of having only one subsection (3.3.11) within Section 3.3.12? [David Schovemaker, Belgium]</td>
<td>Taken into account. Subsections 12 and 13 combined and completely rewritten/reviewed.</td>
</tr>
<tr>
<td>9795</td>
<td>43</td>
<td>43</td>
<td>17</td>
<td>20</td>
<td>Durack et al. (2012) pointed out that fresh regions in the ocean become fresher and salty regions become saltier in response to observed warming, which is attributed to a water cycle intensification due to global warming and cited by AR5 chapter 30. The last sentence &quot;Some regions...&quot; is not very key point. Please check that. In addition, the word “mountain” used in the ocean will seem not so reasonable. [Ronghua Cai, China]</td>
<td>Taken into account. Subsections 12 and 13 combined and completely rewritten/reviewed.</td>
</tr>
<tr>
<td>10015</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>Instead of writing of “Mitchell et al. (2017)...”, please write “Mitchell et al. (2017)” [JACQUES-ANDRE NDIONE, Senegal]</td>
<td>Taken into account but already mentioned under biomes towards end of box.</td>
</tr>
<tr>
<td>8880</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>HappMIP or HapMIP? A bracket is missing after “2017” [Juan A. Lopez-Bustins, Spain]</td>
<td>Taken into account. Subsections 12 and 13 combined and completely rewritten.</td>
</tr>
<tr>
<td>12014</td>
<td>43</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>Table 3.1: Caption should mention the reference period when quantifying changes. E.g., the mean temp cell for attributed changes uses base period of 1951-2010 perhaps throwing doubt on consistency of analyses. Table needs detailed review when in final draft [Paul Doyle, Canada]</td>
<td>Taken into account. Table 3.1 deleted.</td>
</tr>
<tr>
<td>1155</td>
<td>43</td>
<td>46</td>
<td>51</td>
<td></td>
<td>The table provides a better reflecting of confidence related to global foods than to other aspects of the chapter. [Seeth Westra, Australia]</td>
<td>Taken into account. Table 3.1 deleted.</td>
</tr>
<tr>
<td>2023</td>
<td>43</td>
<td>46</td>
<td>46</td>
<td>52</td>
<td>Please review some studies by Prof. Taikan OKI from the University of Tokyo. There are quite a good number of studies on future projection of precipitation by his group for 1.5 and 2 degree C temp rises. [M. Shirali Ismail, Bangladesh]</td>
<td>Taken into account. Table 3.1 deleted.</td>
</tr>
<tr>
<td>13896</td>
<td>43</td>
<td>46</td>
<td>46</td>
<td>1</td>
<td>This table offers an opportunity to reduce/move much of the text in the sections above, and is a reader-friendly presentation of information. [Elvira Poloczanska, Germany]</td>
<td>Taken into account. Table 3.1 deleted.</td>
</tr>
<tr>
<td>6128</td>
<td>43</td>
<td>46</td>
<td>46</td>
<td>3</td>
<td>Table 3.1: The lack of information about projected changes at equilibrium is quite stark, and is unlikely to change much. I do not think that the HappMIP experiments will tell us everything. This table would be a good point to indicate somehow if transient changes are likely to be significantly different from equilibrium however. [Mat Collins, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account but already mentioned under biomes towards end of box.</td>
</tr>
<tr>
<td>699</td>
<td>43</td>
<td>46</td>
<td>46</td>
<td>3</td>
<td>It is better to add a map to show the observed present climate and population of 1.5 global warming. Readers can see both Table and Figure. [Zong-Ci Zhao, China]</td>
<td>Taken into account. Table 3.1 deleted.</td>
</tr>
<tr>
<td>699</td>
<td>43</td>
<td>46</td>
<td>46</td>
<td>3</td>
<td>It is better to add a map to show the observed present climate and population of 1.5 global warming. Readers can see both Table and Figure. [Zong-Ci Zhao, China]</td>
<td>Taken into account. Table 3.1 deleted.</td>
</tr>
</tbody>
</table>
This table should specify more region names at regional scale. On the other hand, in "Droughts and dryness" row, those region names as "West Africa", "Southern Africa" or "Mediterranean region" should be located at a "Regionally " section, not in "Globally". Please homogenize criteria when displaying results along the table. [Joan A. Lopez-Bustins, Spain]

Table 3.1: I would change the row "Mean precipitation" and "Temperature extremes" to have rows with temperatures first and with precipitation second. [Radom Tolea, Czech Republic]

I am not sure whether this table will improve in the second draft, so that it stands it is meaningless due to the lack of data. The last two columns read the same across the 3 pages. [Maria Jesus Iglesias Bronnes, Spain]

Table 3.1: columns "Projected changes at equilibrium at 1.5 and 2 deg" seems obsolete as it has only contains a "not yet available" which could also be mentioned in cation or text. [Sylvia Sander, Monaco]

Table 3.1: I would use exactly the same order as in the text (i.e. temperature on land, precipitation, drought and dryness, runoff and flooding, etc.). This is not currently the case. It would be much easier for the reader. [David Docquier, Belgium]

While it is interesting to have an assessment for 1.5°C and another assessment for 2°C, the table is too easy to read if there are too many columns. I suggest only including the 1.5°C column, especially when considering the title of this report. [David Docquier, Belgium]


Table 3.1: "Runoff and flooding" section needs some work. Currently, the content is solely about flooding (short-lived flow maxima), not runoff as a whole, and it therefore omits the entire applied and theoretical literature on the effects of climate change on water resources (tonging into water scarcity), as well as water-cooled thermoelectric and hydroelectric power generation capacity (the so-called climate-water-energy nexus) [Sean Fleming, United States of America]

Table 3.1: "Snow, glaciers and permafrost" doesn't include anything about either snow or glaciers. I see a note in the table indicating that the the assessment for snow still needs to be added, but it also needs an assessment for glaciers. As noted in my foregoing comments, and as widely understood by the water resources community, glaciers form the core of continental scale "water towers" in the Himalayas, Alps, Andes, and Northern Rockies. Just the icefields in the mountains around the Tibetan Plateau alone are headwater basins to the Indus, Ganges, Brahmaputra, and Yangtze, helping provide water to a few billion people—a significant fraction of the global population. Changes in these glaciers, reflecting slow dynamical responses to long-term natural climate shifts, and deeply exacerbated now by global anthropogenic climate change, have major water resource implications. For a synopsis, see (and cite) Chapter 8 of Fleming 2017. Where the River Flows: Scientific Reflections on Earth's Waterways. Princeton University Press. Princeton, N.J. Glaciers and glacier change also have significant implications to both freshwater and marine ecosystems: the Gulf of Alaska is a great example - see (and cite) the recent high-profile review article by O'Neil et al. (2015, Bioscience, 65: 499-512). [Sean Fleming, United States of America]

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Table 3.1: I would separate qualitative and quantitative results with colour backgrounds, e.g. light blue background for qualitative results and light red background for quantitative results. [David Docquier, Belgium]

Table 3.1, columns C are missing [Teodoro Georgiadis, Italy] Noted.

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Table 3.1: The SREX provides a logical context for this paragraph because of its focus revised to make this clearer. [Sylvia Sander, Monaco]

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Take into account. Agreed that this topic needs to be covered in greater detail. Refer reader to section 3.5.

Please consider including ocean hypoxia and ecological regime shifts in box 3.5 on tipping points. [Øyvind Christophersen, Norway]

Box 3.5: “Low confidence” is stated many times in relation to results/predictions presented in this box. They way this is phrased at the moment makes it sound as if the science is put in question, not that information is lacking, or that there is high scientific uncertainty associated with the result. Explanations for the low confidence is often too technical. Please consider re-phrasing in a way that makes it clear why there is low confidence at the same time as not undermining the statements [Øyvind Christophersen, Norway]

I am not sure what you mean by “tipping points” here since the text provided “only” provides a comparison between the two temperature scenarios, but not those temperature points where any particular system would change its state (e.g. from ice to melting, from C sink to C source, from a grassland to shrubland, etc.) [Maria Jesus Iglesias Briones, Spain]

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We already are seeing changes in key terrestrial ecosystems—such as forests in northwestern North America; the stress has weakened them and fire is eliminating them such that different ecosystems will eventually emerge. The title needs to be changed and early mention made that we are already passing through or even past some tipping points. [Michael MacCracken, United States of America]

The title seems to suggest that there are no tipping points below 1.5 C, and this appears to be not the case. For example, at least one ice stream in Antarctica is now said to be on a path to empting out below ice that will cause sea level rise of a couple of meters—that alone is a very serious change/tipping point. We already are apparently experiencing an increased rate of extinction—so species are being lost and will not be coming back. We already are seeing changes in key terrestrial ecosystems—such as forests in northwestern North America; the stress has weakened them and fire is eliminating them such that different ecosystems will eventually emerge. The title needs to be changed and early mention made that we are already passing through or even past some tipping points. [Michael MacCracken, United States of America]

There are several key issues with this box:

- # Approach: It is clear that uncertainties related to tipping points are very substantial. The deterministic approach still used at time for individual components of trying to pin-point the “existence” of a tipping point between 1.5 and 2 is therefore not a very promising one and the scientific discussion has long moved beyond this. The assessment should consistently follow a risk approach, assessing ranges for different tipping points and classifying risks of crossing thresholds under 1.5°C and 2°C. Thereby

- # Definition: Give a definition what constitutes tipping points (can be different classes, see e.g. [Oliot et al. 2015])

- # Ice sheets: It has become increasingly clear that there is no one ‘single’ tipping point for large ice sheets, but rather different ones for different glaciers, or full basins. The complexity of the issue needs to be conveyed and seminal papers related to such dynamics need to be cited. [Bill Hare, Germany]

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Please consider including ocean hypoxia and ecological regime shifts in box 3.5 on tipping points. [Øyvind Christophersen, Norway]
Comment Response

1622 47 5 47 9 Would be nice to have a diagram that pedagogically illustrates the concept of tipping point [for example in the case of sea level rise obtained depending on the crossing of some tipping points concerning the melting of land ice] [Nicolae Laccou, Belgium] Taken into account. This is a useful comment however the variety of type of tipping point means that such a diagram would be difficult to create.

21147 47 11 47 13 Additional citation to Xu and Ramathan 2017. Well below 2°C. Mitigation strategies for avoiding dangerous to catastrophic climate changes, PNAS, doi/10.1073/pnas.1618441114 [Nathan Borgford-Pamell, Switzerland] Taken into account. Box is about tipping points not mitigation strategies

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16279 47 15 47 15 Is this low confidence in exactly where a tipping point it, or that there is the tipping point being talked about? For example, there is likely some value at which the Greenland ice Sheet will be lost because once started, as its elevation becomes lower and lower, the faster it will be lost due to the lower altitude being warmer. So, there is quite likely a tipping point here, but exactly where is uncertain. Similarly for ocean acidification, for loss of ecosystems, for thawing of permafrost, etc. [Michael MacCracken, United States of America] Accepted. All use of formal IPCC assessment style language has been removed.

1951 47 15 47 19 Suggest not classifying as "low confidence" as suggesting unrealistic, as modern model results are likely to perform similarly for assessments, and make efforts to assess extent of impacts? Need some way of flagging currently uncertain / poorly understood, but high risk processes and impacts [Andrew Smilovetz, United Kingdom of Great Britain and Northern Ireland] Accepted. All use of formal IPCC assessment style language has been removed.

501 47 21 47 40 This paragraph is too long. Consider reducing and/or breaking down. [David Docquier, Belgium] Accepted. Paragraph shortened.

3658 47 25 47 26 Listing of su-system changes, *fast loss of sea-ice (years-decades)* or land snow (decades), collapse of ocean convection (years-decades), abrupt vegetation changes (decades), reorganization of ocean circulation (decades-centuries), to loss of ice sheets (millennia-centuries) *are in strange order. I suggest to reorder abrupt vegetation changes (decades), fast loss of sea-ice (years-decades) or land snow (decades), to loss of ice sheets (centuries-millennia), collapse of ocean convection (years-decades), reorganization of ocean circulation (decades-centuries)* to keep them thematically together [Styliana Sander, Monaco] Taken into account. This sentence has been deleted.

500 47 27 47 28 I do not understand this sentence. [David Docquier, Belgium] Accepted. This sentence has been reworded.

12015 47 39 47 40 Change last sentence to read Types of tipping points that may be triggered at lower levels of warming discussed below [Paul Doyle, Canada] Accepted. This sentence has been reworded.

2123 47 42 47 42 Is this correct? I have just looked at the graph of Arctic sea ice, and it looks to me that it is declining linearly. [Neville Nicholls, Australia] Agreed. Non-linearity deleted

21148 47 42 47 52 Between 1979 and 2011, the declining Arctic sea ice resulted in a reduced albedo that, if the radiative forcing were averaged over the globe, was equivalent to 25% of the forcing from CO2 during the same timeframe (Pistone et al 2014. Observational determination of albedo decrease caused by vanishing Arctic sea ice, PNAS, doi/10.1073/pnas.1318201111) [Nathan Borgford-Pamell, Belgium] Taken into account. Useful information but does not fit into tipping-point context.

10673 47 42 47 52 Between 1979 and 2011, the declining Arctic sea ice resulted in a reduced albedo that, if the radiative forcing were averaged over the globe, was equivalent to 25% of the forcing from CO2 during the same timeframe (Pistone et al 2014. Observational determination of albedo decrease caused by vanishing Arctic sea ice, PNAS, doi/10.1073/pnas.1318201111) [Kristin Campbell, United States of America] Taken into account. Useful information but does not fit into tipping-point context.

20405 47 42 47 52 This paragraph is illustrative of the stiffness of the concept of tipping points and its lack of a clear definition. First it is not clear to me what is meant by "non-linear". non-linear with respect to what variable? Second where is the tipping point? Sea ice decreases with global warming. Does it decrease (in cover or volume) more per 0.1°C warming in a particular range of global temperature change? Sure, an ice-free Arctic (provisionally in September) is a threshold, but I don't see what makes it a tipping point. I think the concept is more useful for ice sheets and oceans and deep convection, which could show on-off behaviour, than for sea ice which responds much more continuously to warming. [Olivier Boucher, France] Taken into account. This is part of a wider discussion that the authorship team will need to have around the definition of tipping points.


11174 47 42 47 55 The number of models reflecting specific characteristics is mentioned several times, but not the total number of models...adding this information would provide useful context. [David Schoeman, Australia] Taken into account. This is discussed in the main body of the chapter, here we can only offer a summary. [David Docquier, Belgium]


6292 47 45 47 47 Achnas vs Atlantica? 2 models out of how many? [Nathanael Metia, New Zealand] Agreed. In all such instances, total population is now also given.

11775 47 49 47 49 If 39% really "about as likely as not"? If so, this suggests substantial uncertainty... and a probability of 0.3 is as likely as 0.5... [David Schoeman, Australia] Taken into account. This and other use of uncertainty language removed.

13899 47 50 47 50 Impacts to be defined. [Erika Potschanka, Germany] Taken into account. Useful information but does not fit into tipping-point context.

2326 47 48 47 3 See comment on Box 3.3 regarding Chadburn et al (2017) results. Regarding "quasi-linear" response - if we consider that a number of factors affect the response of permafrost to changes in air temperature, and in some cases these factors will also change under a changing climate, then we may not have a response even close to linear. The transfer of heat through the ground is not a linear process so I think things are more complex then presented here. [Sharon Smith, Canada] Accepted. Replaced with consequentials.

6650 48 48 48 48 Transformation of coastal and shallow marine ecosystems (without permafrost) may be another type of relevant scenario to be considered in relation to CH4 dynamics. [Castor Muñoz Sobrino, Spain] Taken into account. This is covered under biomass.

502 48 48 48 3 What is the point of having only one sub-section (3.3.13.1) within Section 3.3.13? [David Docquier, Belgium] Accepted. SOD has an entirely rewritten section 3.3.12/13.

2327 48 48 48 48 See earlier comment and reference to Cooper et al (2017) which is a relevant issue to discussion of methane release from thawing permafrost. [Sharon Smith, Canada] Taken into account. This is discussed in the main body of the chapter, here we can only offer a summary. [David Docquier, Belgium]

7468 48 48 48 12 Consider including how models are there in total, where 4 and 9 can be put in context. [Sylviard Christophersen, Norway] Agreed. In all such instances, total population is now also given.
Comment Response

6651 48 15 48 16
This scenario might be quite similar to that recorded at the end of the Early Holocene (a notable warming that ultimately resulted in the 8.2 ka cold/very cold event) [Castor Muñoz Sobrino, Spain]
Taken into account. This yields a very crude estimate. Other available techniques offer a better means making projections.

16280 48 18 48 23
And if one calculates the sea level sensitivity from the last glacial maximum, it is about 20 m per degree C, presumably at equilibrium, and given there was likely no land major land ice when the Earth was perhaps 4-5 °C warmer; then this implies perhaps a 15 m per degree C for the future–again at equilibrium, which may be quite long. [Michael MacCracken, United States of America]
Taken into account. The intention is to provide a summary not detailed assessment.

2522 48 18 48 23
During the Last Interglacial, global average sea surface temperature was about 0.5° ± 0.3°C above the preindustrial level (Hoffman et al., 2017), while polar temperatures were comparable to those projected for 1°C–2°C of global mean warming above the preindustrial level (Kopp et al., 2009). The 1°C comparison is therefore a bit too facile.
For an alternative perspective on the Greenland contribution during this time period, see Yau et al. (2015), who estimate a Greenland contribution at 121 ka of 4.6 m.

2522 48 18 48 23
Hoffman, J. S., Clark, P. U., Parnell, A. C., & He, F. (2017). Regional and global sea-surface temperatures during the last glaciation. Science, 355(6322), 276-279.
Rejected. This is not done elsewhere in the report and we believe this is not compatible with the overview nature of this box.

2522 48 18 48 23

3559 48 19
remove comma between sentences: “...the Greenland Ice Sheet (GIS) are in retreat...” [Sylvia Sander, Monaco]
Accepted. Typos corrected.

5888 48 19 48 19
Some typographic mistakes were found in this line: [Joan A. Lopez-Bazán, Spain]
Accepted. Typos corrected.

1563 48 19 48 22
Make the sentence easier to read: is the main message that we have a 6-9 m sea level rise commitment from today’s 1 °C warming? [Noé Lecocq, Belgium]
Rejected. This is not done elsewhere in the report and we believe this is not compatible with the overview nature of this box.

11716 48 26 48 26
“Irreversible” needs some VERY careful defining, or at least a few caveats...failure to do so introduces needs to be caveated (and do their models match the Eemian change in sea level?). [Michael MacCracken, United States of America]
Rejected. The statement is could become...not acceptable - to me anyway - since the sentence can be reworded to eliminate it. [Paul Doyle, Canada]

1564 48 28 48 29
For clarity to the reader, indicate the warming obtained in RCP2.6 [Noé Lecocq, Belgium]
Rejected. An overview of this nature has to be selective. We have attempted to identify key issues with global consequences.

1568 48 31 48 32
This "less than a meter" for RCP2.6 is, I believe, for the Antarctic contribution only. And it is likely this low as the temperature returns to below 1.5 °C in the future and does not stay at 1.5 °C as presumed to be the new sustainable level in this report. I think this statement is thus unambiguously optimistic and needs to be caveated (and do their models match the Eemian change in sea level?). [Michael MacCracken, United States of America]
Rejected. An overview of this nature has to be selective. We have attempted to identify key issues with global consequences.

13900 48 34 48 34
The biomere regionalisation is not defined, do you mean ecosystems? Does this include marine? [Elvira Poloczanska, Germany]
Rejected. Marine examples are given.

13901 48 34 48 35
Some typographic mistakes were found in this line: [Joan A. Lopez-Bazán, Spain]
Accepted. Wording tidied to make this more apparent.

16282 48 34 48 36
A lot of work has been done on insect responses to expected climate change and there are several review papers, including the one: Musolin D.L. & Saulich A.Kh., 2012. Responses of insects to the current climate change: from physiology and behaviour to range shifts. Entomological Review, 2012. Vol. 92 (7): 715-740. [Robert Kopp, United States of America]
Accepted. Sentence deleted.

6311 48 34 48 41
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Accepted. Wording tidied to make this more apparent.

13902 48 36 48 36
There are studies on rising tree lines that could be included here [Elvira Poloczanska, Germany]
Rejected. An overview of this nature has to be selective. We have attempted to identify key issues with global consequences.

16206 48 37 48 37
We note that... Realizing that use of first person is appealing more and more in technical papers, I still do not like it, especially when it is used in a redundant manner. Suggest that using it here is totally redundant as most of its use in other sections of this draft. [Paul Doyle, Canada]
Accepted. Sentence deleted.

16283 48 38 48 39
It really needs to be said explicitly that such transformations are clearly possible—such changes are well documented to have occurred in records from Earth history. What is uncertain is more precisely how much warming for how long will lead to the transformations. But make clear they could and have occurred in the past and persisted for very long times. [Michael MacCracken, United States of America]
Accepted. Sentence deleted.

5499 48 38 48 40
Delete an extra comma [Krzysztof Niznik-Ribon, Germany]
Rejected. An overview of this nature has to be selective. We have attempted to identify key issues with global consequences.

12017 48 38 48 40
... assessed **at** present .... [Paul Doyle, Canada]
Accepted. Sentence deleted.

7465 48 39 48 41
Please consider adding a time scale for degradation of tropical coral reefs and the irreversibility of this [Avnir Christophersen, Norway]
Rejected. An overview of this nature has to be selective. We have attempted to identify key issues with global consequences.

8016 48 47 48 47
may significantly reduces these are 'should be 'reduce' [Robert Shriver, United States of America]
Rejected. An overview of this nature has to be selective. We have attempted to identify key issues with global consequences.

9317 48 47 48 47
The last word in “Restricting global warming to 1.5°C may significantly reduces” should be singular as “reduce.” [Siir KILKIS, Turkey]
Accepted. Sentence deleted.

2716 48 47 48 49
Critical point, needs to be highlighted more in box and in executive summary [Fenny Ungracht, South Africa]
Taken into account. Timescales are discussed earlier in this box.

11717 48 48 48
Avoid compound nouns like “high-latitude tipping point risks”...failure to do so introduces ambiguity [David Schoeman, Australia]
Accepted. Sentence deleted.
### IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>11718</td>
<td>48</td>
<td>50</td>
<td>48</td>
<td>50</td>
<td>To assign...perhaps the assignment of would be better? [David Schieman, Australia]</td>
<td>Accepted. Sentence reworded.</td>
</tr>
<tr>
<td>4572</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>Fig 3.13: Add number from Fig 3.16 to header of column [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>10488</td>
<td>49</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>These figures good example of figures that would benefit from pop-up definitions of regional hotspots and risk types by hovering cursor over acronym in electronic version [Jonathan Lynn, Switzerland]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>13730</td>
<td>49</td>
<td>1</td>
<td>50</td>
<td>30</td>
<td>This is a really useful and systematic way of using the hotspot concept [Pasha Ehsasht, Australia]</td>
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</tr>
<tr>
<td>503</td>
<td>49</td>
<td>1</td>
<td>51</td>
<td>14</td>
<td>Ref to figures wrong. Must be Figures 3.13, 3.14, 3.15 [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>1195</td>
<td>49</td>
<td>1</td>
<td>51</td>
<td>36</td>
<td>As mentioned in Comment 12, it is strange to have a supplementary sub-section (3.3.13) after the global synthesis (3.3.12). I would include the text of Section 3.3.13 in a new box instead of having it in the main text [David Docquier, Belgium]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>2124</td>
<td>49</td>
<td>1</td>
<td>51</td>
<td>15</td>
<td>Note: Will improve information on regions in FGD.</td>
<td></td>
</tr>
<tr>
<td>13903</td>
<td>49</td>
<td>3</td>
<td>30</td>
<td>30</td>
<td>Provide a definition of hotspots for the SR – it is used in many ways. This section is only considering hotspots of climate change which may not necessarily be the same geographically as hotspots of ecosystem or human system change (e.g. an extreme climate event does not necessarily infer extreme ecological consequences). If these hotspots cannot be linked with impacts on ecosystems or human systems they are not meaningful in this report. They should be characterized accordingly [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>8827</td>
<td>49</td>
<td>3</td>
<td>49</td>
<td>25</td>
<td>This figure concerns previous section [David Docquier, Belgium]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4567</td>
<td>49</td>
<td>4</td>
<td>49</td>
<td>7</td>
<td>Please rephrase presence and list link property with next [Alain Baru, Nigeria]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>3560</td>
<td>49</td>
<td>4</td>
<td>49</td>
<td>7</td>
<td>Reference to figures wrong: Must be Figures 3.13, 3.14, 3.15. Please also check other ref to figures in this paragraph [Sylvia Sander, Monaco]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>504</td>
<td>49</td>
<td>3</td>
<td>49</td>
<td>1</td>
<td>There seems to be confusions in figure titles [David Docquier, Belgium]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>20780</td>
<td>49</td>
<td>4</td>
<td>49</td>
<td>4</td>
<td>These figures 3.15, 3.16, 3.17 must be revised with the represented figures. It seemed to be Figures 3.13, 3.14, 3.15 [Amir Hussein, Egypt]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>13731</td>
<td>49</td>
<td>4</td>
<td>49</td>
<td>4</td>
<td>This is a really useful and systematic way of using the hotspot concept [Pasha Ehsasht, Australia]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>13732</td>
<td>49</td>
<td>4</td>
<td>49</td>
<td>6</td>
<td>Should say: ‘Warneltburger et al. [in review]...’ [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4568</td>
<td>49</td>
<td>7</td>
<td>49</td>
<td>7</td>
<td>Change &quot;Fig 3.18&quot; by &quot;Fig 3.16&quot; [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>13904</td>
<td>49</td>
<td>7</td>
<td>49</td>
<td>7</td>
<td>Rather than pointing out global land, please state that much of the Arctic, Antarctica and the ocean is therefore not included [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>13905</td>
<td>49</td>
<td>7</td>
<td>49</td>
<td>7</td>
<td>Shouldn’t this be Fig 3.16? [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>5467</td>
<td>49</td>
<td>10</td>
<td>49</td>
<td>10</td>
<td>Please rephrase presence and list link property with next [Alain Baru, Nigeria]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4569</td>
<td>49</td>
<td>11</td>
<td>49</td>
<td>11</td>
<td>Change &quot;Fig 3.15&quot; by &quot;Fig 3.13&quot; [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4570</td>
<td>49</td>
<td>14</td>
<td>49</td>
<td>14</td>
<td>Change &quot;Fig 3.15&quot; by &quot;Fig 3.14&quot; [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4573</td>
<td>49</td>
<td>20</td>
<td>49</td>
<td>20</td>
<td>Change &quot;Fig 3.15&quot; by &quot;Fig 3.13&quot; [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>11074</td>
<td>49</td>
<td>23</td>
<td>49</td>
<td>23</td>
<td>Instead of cumulative, should be cumulative [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>7168</td>
<td>49</td>
<td>27</td>
<td>50</td>
<td>38</td>
<td>Consider sorting the columns of figures 3.13-3.15 by the number of the region in figure 3.16. This will group the regions closely (e.g., for Africa) in the table and will simply the interpretation of the differences presented in these figures between various regions [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>20658</td>
<td>49</td>
<td>60</td>
<td>49</td>
<td>60</td>
<td>This figure concerns previous section [David Docquier, Belgium]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4573</td>
<td>50</td>
<td>14</td>
<td>49</td>
<td>15</td>
<td>Add number from Fig 3.16 to header of column [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>4574</td>
<td>50</td>
<td>15</td>
<td>49</td>
<td>15</td>
<td>Add number from Fig 3.16 to header of column [Radim Tolzak, Czech Republic]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>2478</td>
<td>50</td>
<td>50</td>
<td>49</td>
<td>50</td>
<td>Where are the abbreviations for the y-axis in Figures 3.13, 3.14, and 3.15? [Lisa Lucero, United States of America]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>10611</td>
<td>50</td>
<td>1</td>
<td>50</td>
<td>14</td>
<td>Caption should be in same page as figure [Elvira Poloczanska, Germany]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>8828</td>
<td>50</td>
<td>11</td>
<td>50</td>
<td>16</td>
<td>Editorial - copyedit to be completed prior to publication</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>6179</td>
<td>51</td>
<td>36</td>
<td>49</td>
<td>36</td>
<td>Minor comment: Figure 3.16 is already included in Figures 3.9, 3.10 and 3.11 [Varanese Panatto, Argentina]</td>
<td>Accepted. Sections completely rewritten</td>
</tr>
<tr>
<td>12377</td>
<td>51</td>
<td>1</td>
<td>51</td>
<td>51</td>
<td>Figure 3.16: It might be better to put this figure before 3.13, 14 and 15. [Zelena Ley, Guatemala]</td>
<td>Taken into account: the figure has been removed (but is included in the supplementary information document)</td>
</tr>
<tr>
<td>13734</td>
<td>51</td>
<td>1</td>
<td>51</td>
<td>66</td>
<td>Sections 3.4.1 and 3.4.2 focus almost exclusively on plant species; impacts and risks for animal species should also be considered [Elvira Poloczanska, Germany]</td>
<td>Taken into account: the figure has been removed (but is included in the supplementary information document)</td>
</tr>
<tr>
<td>13733</td>
<td>51</td>
<td>1</td>
<td>51</td>
<td>85</td>
<td>In section 3.4 there is a strong imbalance in amount of information and pages dedicated to Terrestrial and wetland systems (3.4.1; 13pp) and all the other systems (3.4.2-3.4.5; 17pp) [Elvira Poloczanska, Germany]</td>
<td>Taken into account: the figure has been removed (but is included in the supplementary information document)</td>
</tr>
<tr>
<td>507</td>
<td>51</td>
<td>34</td>
<td>51</td>
<td>51</td>
<td>Fig 3.16: Why is this figure placed here? It should be at the beginning of the chapter when talking about SREX regions for the first time. [David Docquier, Belgium]</td>
<td>Taken into account: the figure has been removed (but is included in the supplementary information document)</td>
</tr>
</tbody>
</table>
Comment Response

8652 51 5 37
Of course this needs to be a manageable document of synthesis, but most of these named large regional domains contain huge diversities in environmental, ecological, demographic, social. Intra-regional differences might be considered sometimes, e.g. to realistically project risks in natural and managed ecosystems. [Castor Muñoz Sobrino, Spain]

21278 51 16 37
This section of chapter 3, should be improved by more examples about phenoological changes of vegetation cover related to climate change [Vasel EL ZERIY, Algeria]

13735 51 18 21
clarify that you are talking about PLANT species here! Provide examples for regions [Elvira Poloczanska, Germany]

13906 51 19 1 Consider adding characterization of vulnerability [Elvira Poloczanska, Germany]

13907 51 19
As with the climate sections, much is a repetition of text in AR4 and AR5, please think how to summarise this information to increase focus on 1.5 and 2C [Elvira Poloczanska, Germany]

5034 51 19 19 perhaps include examples in this section. [Madzska Zónka, United Kingdom of Great Britain and Northern Ireland]

9136 51 19 61 1
This section should give more consideration to compounding impacts of climate drivers and the implications for adaptation (including limits to adaptation). The report appears to be generally lacking in this area. For example, Table 3.4 speaks to marine biodiversity loss at a high rate of climate change; and reduced biodiversity, fisheries abundance and corresponding protein losses to human-induced coral bleaching and mortality increases exacerbated by ocean acidification; however, the respective adaptation measures do not give consideration to the physical destruction of these systems by damaging cyclones and extreme precipitation (increased sedimentation, etc). Further, given the limitations of the proposed adaptation measures in this table, especially as this relates to small islands, the issue of limits to adaptation needs to be discussed more thoroughly in the text of this section. [Susana De Beaumelle Scott, Saint Lucia]

5625 51 19 95 16
Here are my concluding remarks about Section 3.4 (Observed impacts and projected risks in natural and managed ecosystems). The present report is related to benefits and challenges of keeping the Earth's temperature increase under 1.5°C in comparison to 2.0°C. Speaking here about concrete temperature values (1.5 vs 2°C) makes the reader think on studies where the different impacts of those two possible scenarios have been quantified. However, most often are concerned about the reduction of marine ecosystems that the change is qualitative, not quantitative. Contrary to the cases of physical oceanography or meteorology, there is still large need for mechanistic and statistical models shedding light on the effect of climate change on marine ecosystems. As I know, there are neither specific studies focusing on climate scenarios with path and endpoints of 2°C and 1.5°C, nor comparisons of the effect of such scenarios on marine ecosystems... [Ismael Núñez-Riboni, Germany]

5626 51 19 95 16
...I cannot recall a study comparing the effects of, say, RCP8.5 vs RCP4.5. Only through such modeling it would be possible to measure the different impacts for marine ecosystems in 1.5°C and 2°C worlds. In the absence of such modelling, the only thing that can be said for sure is that the smaller the temperature increase in comparison to pre-industrial values, the better (at least in general). This is what we already know from the AR5. So, I see little point on such a long Section 3.4. Adding little in comparison to the AR5 focusing on a particular scenario (i.e., 1.5°C world) from which we know qualitatively nothing and, which as far as I understand, is unrealistically reachable in the praxis. Wouldn't it be better to simply refer the reader to Chapter 6 of the AR5 and summarise the few new findings in a couple of paragraphs only?... [Ismael Núñez-Riboni, Germany]

13736 51 21 24
list systems in the same order as they are following [Elvira Poloczanska, Germany]

4575 51 22 24
Change ""3"" by [Radim Tolar, Czech Republic]

505 51 22 24
Be coherent in both this sentence and the ordering of the 5 sub-sections. [David Docquier, Belgium]

13737 51 22 24
Disc provide full name or definite abbreviation above [Elvira Poloczanska, Germany]

13908 51 22 24
Why change from inland water systems to wetland systems? This excludes freshwater ecosystems such as lakes and rivers from this chapter, which incidentally are included in a subheading with wetlands under the Arctic section below. Plus isn't there now an overlap with low-lying areas, many of which incorporate extensive wetlands eg mangrove[s]? [Elvira Poloczanska, Germany]

13738 51 22 24
this statement from AR5 is of high confidence [Elvira Poloczanska, Germany]

6236 51 24 24
observed (not observed). [Muhammed Mohsin IQBAL, Pakistan]

4578 51 24 24
Change ""observed"" by ""observed"" [Radim Tolar, Czech Republic]

3651 51 24 24
Type ""observed"" by ""observed"" [Sylvia Sander, Monaco]

509 51 24 24
Type: ""observed"" instead of ""observed"" [David Docquier, Belgium]

1953 51 24 24
observed should read observed [Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland)]

13739 51 24 24
should say ""observed impacts"" [Elvira Poloczanska, Germany]

12019 51 24 24
THPO, ""observed..."" [Paul Doyle, Canada]

19195 51 24 24
Change ""observed"" by ""observed"" [Rubén Retuerto, Spain]

6653 51 24 24
Change "observed" by ""observed"" [Castor Muñoz Sobrino, Spain]

5660 51 26 26
The acronym UNEP/CMS appears here for the first time in this chapter (the only one I'm reading), is it defined somewhere else? Perhaps to define it here again? [Ismael Núñez-Riboni, Germany]

12020 51 26 26
TYPO, ""include..."" [Paul Doyle, Canada]

2761 51 26 24
It would be important to add ""climate migrants""/""climate refugees"". They will be millions in the future. [Jonathan Gómez-Camerlo, Spain]

20957 51 31 31
Taken into account and has dedicated section in restructured section

13467 51 31 31
Taken into account and has dedicated section in restructured section

7015 51 38 38
Risk of food nutrition insecurity [Christos Zerofos, Greece]

13909 51 42 42
the discussion in the two introduction paragraphs in section 3.4.1.1 applies to all the ecosystem sections. [Elvira Poloczanska, Germany]
13910 52 42 To In relation to degree of (regional, local) climate change? [Elvira Poloczanska, Germany] Rejected: Not necessary
13911 52 3 52 3 Provision of safe water is an ecosystem service, access to this ecosystem service is not itself an ecosystem service [Elvira Poloczanska, Germany] Taken into account: the paragraph has been rewritten
13912 52 3 52 3 By safe water do you mean quantity and quality? [Elvira Poloczanska, Germany] Taken into account: the paragraph has been rewritten
10582 52 7 52 13 The ecosystem response includes, but not only a degradation on species richness over time, and displacement, as well as increased or decreased rates of growth. The observations motivated aid at introducing in detail the following sections [Elmer Bricelj-Elszndo, Costa Rica] Taken into account: the paragraph has been rewritten
510 52 7 52 13 This paragraph seems unnecessary and talks about two very different things (ecosystem vulnerability and projection confidence). [David Docquier, Belgium] Taken into account: the paragraph has been rewritten
19196 52 8 52 9 It is difficult to assume that an ecosystem could adapt without changing their structure, composition and function [Ruben Reberto, Spain] Taken into account: the paragraph has been rewritten
5501 52 9 52 13 Use numbers for the 3 reasons (1) climate change projected, 2) ecosystem responses, 3) etc. [Iamn Nunez-Riboni, Germany] Taken into account: the paragraph has been rewritten
13913 52 9 52 9 Suggest and/or function, as a system may change its composition eg in terms of species, but keep its functions [Elvira Poloczanska, Germany] Taken into account: the paragraph has been rewritten
4324 52 12 52 12 2°C it is not clear to me [teodoro georgiadis, Italy] Taken into account: 2°C or more
13914 52 16 Phenology shifts are not referred to again in the following section (4.1.2) however biome shifts are. Consider the structuring of these sections [Elvira Poloczanska, Germany] Taken into account: a paragraph has been added on the projections
13915 52 16 Phenology shifts are not referred to again in the following section (4.1.2) however biome shifts are. Consider the structuring of these sections [Elvira Poloczanska, Germany] Taken into account: a paragraph has been added on the projections
6236 52 16 52 29 Spring advancement of 2.8±0.35 days/decade is the change in seasonal phenology not in plant or animal phenology. For animal species, the change in phenology would mean change in animal growth stges. Please check and add relevant data if available. [Muhammad Mohsin IQBAL, Pakistan] Taken into account: it concerns plants and has been precised
1352 52 16 52 37 Sub-section "Changes in phenology" There is nothing on consequence for 1.5°C versus 2°C warming for phenology. Authors may want to change this list of text. [GREGORY INSAROV, Russian Federation] Taken into account: a paragraph has been added on the projections
1312 52 16 52 37 Sub-section "Changes in phenology" There is nothing on consequence for 1.5°C versus 2°C warming for phenology. Authors may want to change this list of text. [GREGORY INSAROV, Russian Federation] Taken into account: a paragraph has been added on the projections
2717 52 16 52 37 Africa seems to be left out of this discussion - would be good to include in discussion, if literature allows, and if not, to state this [Penny Unrath, South Africa] Taken into account: much less data, but two references have been added
1313 52 17 52 18 Indicate period for this statement. Provide reference to the WG contribution and chapter of the ARS. [GREGORY INSAROV, Russian Federation] Corrected
1335 52 17 52 18 Indicate period for this statement. Provide reference to the WG contribution and chapter of the ARS. [GREGORY INSAROV, Russian Federation] Corrected
13916 52 17 52 18 In most of northern hemisphere ecosystems, could you be more specific, does this include tropical, boreal, and polar? Which ecosystems? [Elvira Poloczanska, Germany] Taken into account: between 35°N and 72°N, it has been added
12480 52 17 52 19 Hong and Kim [2011] showed that extreme weather event such as tropical cyclone can cause substantial changes in phenology. [Hong, J. and J. Kim (2011) Impact of the Asian monsoon climate on ecosystem carbon and water exchanges: A nested analysis and its ecosystem modeling implication. Global Change Biology, 17, 1900-1916. (Jayko Hong, Republic of Korea) Taken into account: we focus on more recent literature; moreover this paper does not concern phenology
11078 52 17 52 37 When assessing the sensitivity to an increase of 1.5°C GMB it is interesting to notice that some authors have suggested that increases in maximum temperatures should be considered instead of increases in mean temperatures when studying changes in phenology since leaf onset is mainly triggered by daytime temperatures (Tan et al. 2014; Peng et al. 2015; Piao et al. 2015). Piao et al. (2015) found that an increase of 1°C in Tmax would advance leaf unfolding dates by 4.7 days in Europe and 4.3 days in the United States, which is more than the advance when considering an increase of mean temperature by 1°C. [Peng et al. 2013: http://www.nature.com/doifinder/10.1038/nature12434 Piao et al. 2015: http://www.nature.com/doifinder/10.1038/ncomms7911 Tan et al. 2014: http://dx.doi.org/10.1111/j.1365-2403.2012.04885.x (Anna Sönnenschein, Argentina) Taken into account: it has been added a sentence about the daytime temperature
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>20273</td>
<td>52</td>
<td>18</td>
<td></td>
<td></td>
<td>This sentence is unclear. Does this mean that 72% of species are affected by the spring advancement? Or a specific phenological stage (e.g. bud burst, leaf unfolding of native deciduous trees?) It is advancing by 2.3 days for 72% of species? What is the definition of spring in the previous sentence? (Aaron Glenn, Canada)</td>
<td>Taken into account: it has been precised that 72% of the plant species respond to warming with earlier flowering</td>
</tr>
<tr>
<td>7259</td>
<td>52</td>
<td>18</td>
<td>52</td>
<td>18</td>
<td>of species 'not' of the species (Butt Nathalie, Australia)</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13917</td>
<td>52</td>
<td>18</td>
<td>52</td>
<td>18</td>
<td>could you give the taxonomic groups this applies to, as otherwise this sentence is misleading (Elvira Poloczanska, Germany)</td>
<td>Corrected</td>
</tr>
<tr>
<td>12021</td>
<td>52</td>
<td>19</td>
<td>52</td>
<td>19</td>
<td>&quot;TPo. &quot; needs &quot; (Paul Doyle, Canada)</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>13918</td>
<td>52</td>
<td>21</td>
<td>52</td>
<td>21</td>
<td>the same could be said for plants, eg day length (Elvira Poloczanska, Germany)</td>
<td>Taken into account: this is rephrased for plants in the paragraph</td>
</tr>
<tr>
<td>17266</td>
<td>52</td>
<td>21</td>
<td>52</td>
<td>21</td>
<td>For animals, what animals? (Thackeray et al. 2018)</td>
<td>Taken into account: egg laying for birds</td>
</tr>
<tr>
<td>7630</td>
<td>52</td>
<td>23</td>
<td></td>
<td></td>
<td>it is not clear to me what 'recent amplified responses to climate variability' means (Sophie Faustel, United Kingdom of Great Britain and Northern Ireland)</td>
<td>Taken into account: sentence reworded</td>
</tr>
<tr>
<td>11077</td>
<td>52</td>
<td>23</td>
<td>52</td>
<td>23</td>
<td>Suggestion, insert here. &quot;In a global study, Buitenhof et al. (2015) showed that the phenology of vegetation activity changed strongly on 54% of all land surface between 1981 and 2012.&quot;</td>
<td>Taken into account: good suggestion, added!</td>
</tr>
<tr>
<td>11079</td>
<td>52</td>
<td>23</td>
<td>52</td>
<td>23</td>
<td>When considering responses of plants versus animals: &quot;Thackeray et al. (2018) advertised for the threats to ecosystems functioning that results from the fact that different species forming part of the same ecosystem respond differently to climate change. Using mid-century climate change projections, they showed that the timing of phenological events could change more for primary consumers than for species in other trophic levels (6.2 versus 2.5–2.9 days earlier on average), with substantial taxonomic variation (1.1–14.8 days earlier on average).&quot; (Thackeray et al. 2016: <a href="http://www.nature.com/nature/journal/v535/n7611/full/nature18608.html?footnotetab=true">http://www.nature.com/nature/journal/v535/n7611/full/nature18608.html?footnotetab=true</a> [Anna Sörenaaon, Argentina])</td>
<td>Taken into account: see reply to comment 20543</td>
</tr>
<tr>
<td>7256</td>
<td>52</td>
<td>28</td>
<td>52</td>
<td>28</td>
<td>should be &quot;air temperature increase?&quot; (Butt Nathalie, Australia)</td>
<td>Taken into account: this sentence has been removed according to the wish to shorten</td>
</tr>
<tr>
<td>19197</td>
<td>52</td>
<td>31</td>
<td>52</td>
<td>31</td>
<td>Since this chapter is reviewing 1.5 °C impacts, it would be helpful to precise the magnitude of air temperature responsible for affecting 32% of the vegetation (Ruben Roitou, Spain)</td>
<td>Taken into account: this sentence has been removed according to the wish to shorten</td>
</tr>
<tr>
<td>1954</td>
<td>52</td>
<td>31</td>
<td>52</td>
<td>31</td>
<td>1985–2012 should read &quot;1985 to 2012&quot; (Andrew Smedley, United Kingdom of Great Britain and Northern Ireland)</td>
<td>Taken into account: this sentence has been removed</td>
</tr>
<tr>
<td>10583</td>
<td>52</td>
<td>31</td>
<td>52</td>
<td>37</td>
<td>As ecosystem phenological response, it is expected that the growth season increases in time, which in high latitudes translates into increased growth of the biomass (Elmer Briño-Escobedo, Costa Rica)</td>
<td>Taken into account: this paragraph has been removed according to the wish to shorten</td>
</tr>
<tr>
<td>7262</td>
<td>52</td>
<td>31</td>
<td>52</td>
<td>37</td>
<td>could japanese cherry blossom records be cited here as another example of spring advance, and accelerating spring advance over recent decades? (Butt Nathalie, Australia)</td>
<td>Taken into account: this paragraph has been removed</td>
</tr>
<tr>
<td>13919</td>
<td>52</td>
<td>31</td>
<td>52</td>
<td>37</td>
<td>Why focus on this one location? There are many examples in the literature so please be explicit this is an example and why it was selected (Elvira Poloczanska, Germany)</td>
<td>Taken into account: this paragraph has been removed</td>
</tr>
<tr>
<td>3867</td>
<td>52</td>
<td>31</td>
<td>52</td>
<td>37</td>
<td>this paragraph seems much too specific/plausible compared to the rest of the section (Christopher Royer, Germany)</td>
<td>Taken into account: this paragraph has been removed</td>
</tr>
<tr>
<td>7261</td>
<td>52</td>
<td>32</td>
<td>52</td>
<td>33</td>
<td>remove 'have been' (Butt Nathalie, Australia)</td>
<td>Taken into account: this paragraph has been removed</td>
</tr>
<tr>
<td>13920</td>
<td>52</td>
<td>40</td>
<td></td>
<td></td>
<td>Abundance not explicitly discussed in this section (but richness is) (Elvira Poloczanska, Germany)</td>
<td>Rejected: a paper like this of Stephens et al 2016 is based on abundance</td>
</tr>
<tr>
<td>6588</td>
<td>52</td>
<td>40</td>
<td>52</td>
<td>67</td>
<td>Although there are some examples about the impacts of the past climate change on species distribution compared to the number of all species living in earth, changing in distribution ranges of limited species can be attributed to climate change over the past years, and most species which have changed in distribution range can only be attributed to the land use change or invasions bias over the past years, and many species distributions did not change over the past years, and they may be not sensitivity to the past climate change or the change delay to the past climate change. In addition, expanding of alien species is obvious in recent years, but changing in the distribution may be resulted from other reasons except climate change. reference Wu Jiangou, Shi Yingjie; Attribution index for changes in migratory bird distributions. The role of climate change over the past 50 years in China. Ecological Economics,2016;131:147-155. [Jiangou Wu, China]</td>
<td>Taken into account: this paper is cited in the phenology section</td>
</tr>
<tr>
<td>3873</td>
<td>52</td>
<td>40</td>
<td>53</td>
<td>14</td>
<td>Section 3.4.1.1.2 should include biome shifts attributed to anthropogenic climate change and the section should be titled something like &quot;Changes in biomes and species ranges and species extinction&quot;. The text should read something like 1945 Chapter 4 confirmed, with high confidence, that field research has detected elevated and latitudinal shifts of biomes in boreal, temperate, and tropical ecosystems and, with medium confidence, that the biome shifts are attributable more to anthropogenic climate change than other factors (Gonzalez et al. 2010, Settele et al. 2014). Gonzalez, P., R.P. Neilson, J.M. Lesthian, and R.J. Drakak, 2015: Global patterns in the vulnerability of ecosystems to vegetation shifts due to climate change. Global Ecology and Biogeography 19: 755-768. Settele, J., R. Schulte, R.A. Betts, S. Pann, R. Leadley, D. Nepstad, J.T. Overpeck, and M.A. Taboada. 2010. Terrestrial and inland water systems. In Intergovernmental Panel on Climate Change. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Cambridge University Press, Cambridge, UK. [Patrick Gonzalez, United States of America]</td>
<td>Taken into account: we have done this change in the biome section</td>
</tr>
<tr>
<td>21279</td>
<td>52</td>
<td>40</td>
<td>53</td>
<td>57</td>
<td>this section should refer clearly to the impact of climate change on biodiversity. (Wael EL ZEREFY, Algeria)</td>
<td>Rejected: I think that the topic discussed here is not so large</td>
</tr>
<tr>
<td>17664</td>
<td>52</td>
<td>40</td>
<td>53</td>
<td>9</td>
<td>The report is focussed on the impacts of 1.5 degree C and 2.0 degree C, does the extinction species is solely due to warming temperature? If yes, how the warming is about 1 degree C as stated in the text so that a sentence might be needed to clarify on this findings. (Peridan Perdana, Indonesia)</td>
<td>Taken into account: as stated in the beginning of the first paragraph, we focus on the temperature effect</td>
</tr>
<tr>
<td>1314</td>
<td>52</td>
<td>40</td>
<td>53</td>
<td>9</td>
<td>Sub-section Change in species range, abundance and extinction! There is nothing on consequence for 1.5°C versus 2°C warming for species range, abundance and extinction. You may want to adjust this text. (GREGORY INSAROV, Russian Federation)</td>
<td>Taken into account: with the merging observation-projections, this is now clearer</td>
</tr>
<tr>
<td>1354</td>
<td>52</td>
<td>40</td>
<td>53</td>
<td>9</td>
<td>Sub-section Change in species range, abundance and extinction! There is nothing on consequence for 1.5°C versus 2°C warming for species range, abundance and extinction. You may want to adjust this text. (GREGORY INSAROV, Russian Federation)</td>
<td>Taken into account: with the merging observation-projections, this is now clearer</td>
</tr>
</tbody>
</table>
Comment No | From Page | From Line | To Page | To Line | Comment | Response
--- | --- | --- | --- | --- | --- | ---
13921 | 52 | 41 | 52 | 43 | which taxonomic groups and i me these predominately NTH? There is no citation [Ehrva Polotszcanka, Germany] | Corrected
6654 | 52 | 41 | 52 | 43 | In some territones these type of changes may also affect the regional distribution of a number of vareable or rare habitats/ecosystems (e.g. seabirds) | Taken into account: I know this paper, but I do not find it in information useful for this section
7467 | 52 | 43 | 52 | 46 | Regarding reported changes in species richness: is it possible to state towards what direction (more or less species)? [Byrryn Christhenowsen, Norway] | Taken into account: declined, but the paragraph has been simplified and this part removed
13922 | 52 | 44 | 52 | 45 | No currently, other drivers of change generally dominate ?? [Ehrva Polotszcanka, Germany] | Taken into account: declined, but the paragraph has been simplified and this part removed
18019 | 52 | 47 | 42 | 45 | In this statement also based on (Murphy and Romanuk 2014)? If not it might be worth providing some evidence/refernce from relevant papers. [Wllian Millhouse Otta, France] | Taken into account: declined, but the paragraph has been simplified and this part removed
20276 | 52 | 48 | 52 | 48 | Outward wording: for "has likely been underestimated" [Aaron Glenn, Canada] | Taken into account: declined, but the paragraph has been simplified and this part removed
7031 | 52 | 49 | 52 | 49 | This sentence does not make sense to me [Sophie Feustel, United Kingdom (of Great Britain and Northern Ireland)] | Corrected: the sentence has been rewritten
13923 | 52 | 49 | 52 | 49 | It what? Please provide taxonomic grounds [Ehrva Polotszcanka, Germany] | Taken into account: added
13919 | 52 | 49 | 52 | 49 | It is not clear to me if 976 refers to the number of studies or to the number of local extinctions reported in the 27 studies [Rubén Retuerto, Spain] | Taken into account: topics, precised
1315 | 52 | 49 | 52 | 51 | I indicate period for this statement. [GREGORY INSAROV, Russian Federation] | Taken into account: the period is variable depending on the publication, usually between mid 20th century to beginning 21st century
1395 | 52 | 49 | 52 | 51 | I indicate period for this statement. [GREGORY INSAROV, Russian Federation] | Taken into account: the period is variable depending on the publication, usually between mid 20th century to beginning 21st century
7468 | 52 | 49 | 52 | 52 | Evidence on species extictions attributed to climate change is new since AR5, where such evidence was referred to as somewhat sporadic. Please consider highlighting the clearer attribution of extinction, especially local extinction, to climate change. This attribution should preferably also be stated in the executive summary [Byrryn Christhenowsen, Norway] | Taken into account: this reference has been added in the phenology section
13924 | 52 | 50 | 52 | 50 | Climate change or changing climate? [Ehrva Polotszcanka, Germany] | Taken into account: I agree but is not recent literature
12022 | 52 | 52 | 52 | 57 | Break this extremely long sentence into two with some minor wording [Paul Doyle, Canada] | Taken into account: for reasons of shortening, the sentence has been removed
17716 | 52 | 54 | 52 | 54 | May be relevant to add species e.g. Sturmius et al. (2011), Plant Pathology provides a review for diseases [Sissel et al. (2014), Nature Climate Change] | Taken into account: topics, precised
1956 | 52 | 56 | 52 | 56 | Insert space after "2016," [Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland)] | Revised: not relevant for the topic
1196 | 52 | 57 | 52 | 57 | For fig. 17, we could not locate Table S2 as listed at the end of the caption. [Petra Tschakert, Australia] | Taken into account:
13888 | 52 | 1 | 52 | 1 | Rejected: it corresponds to the citation [Jorge Carrasco, Chile] | Taken into account: Rejected: it corresponds to the citation
1929 | 52 | 3 | 53 | 1 | Climate change can also interact and augment the effects of other stressors on species (e.g., habitat loss and fragmentation, invasive species) [Martyka-Piingle, Cristvyl S., Tava G. Martin, and Jonathan R. Rhodes. “Interactions between climate and habitat loss effects on biodiversity: a systematic review and meta-analysis.” Global Change Biology 18.4 (2012): 1239-1252] | Taken into account: this reference has been added in the phenology section
9589 | 53 | 1 | 53 | 10 | Most examples come from northem American or Europe, lacking the exmaples about the response of species distributions or interaction to the past climate change in other regions for example Asia and African please add some context related to other regions or companion examples in different regions references [Wu Jianqiu, (2016), Climate Change:2016,134(747):1686-1691. [Jiaoguo Wu, China] | Taken into account: changed to better include other regions
10584 | 53 | 1 | 53 | 5 | Figures confirmed from paper Taylor and Kumar 2016. Should it not be cited by them instead of saying that they confirm the sensivity? [Ezemer Birattle Esclado, Costa Rica] | Taken into account: for reasons of shortening, the sentence has been removed
13925 | 53 | 5 | 53 | 9 | This applies to marine systems as well, consider its placement in the chapter [Ehrva Polotszcanka, Germany] | Taken into account: the figure is not really useful given that the observed impact section was too short
7283 | 53 | 6 | 53 | 6 | Move of species redistriution to the end of the sentence to clarify the meaning [Bull Nathale, Australia] | Corrected
8829 | 53 | 7 | 53 | 7 | This is a redundant '; that should be deleted. [Kai Fang, China] | Taken into account: figure removed
15017 | 53 | 7 | 53 | 9 | Move of species redistriution to the end of the sentence to clarify the meaning [Bull Nathale, Australia] | Taken into account: figure removed
4325 | 53 | 7 | 53 | 9 | Probably a reference is needed [Vincenzo Gempradis, Italy] | Taken into account: the reference is needed
19058 | 53 | 9 | 53 | 9 | The title of the Fig. 3.17 need to be he relaxed [Heta Elabasouny, Egypt] | Taken into account: figure removed
12032 | 53 | 10 | 53 | 10 | Fig 3.17 carries a number of different captions which probably distract from the caption. [Paul Doyle, Canada] | Taken into account: added appropriate caption
5721 | 53 | 10 | 53 | 14 | This is a redundant ! should be deleted. [Kai Fang, China] | Taken into account: figure removed
4731 | 53 | 10 | 53 | 14 | Fig. 3.17 is described as Fig. 3.17. Please modify accordingly! Also the image is extremely blur [Byrryn Christhenowsen, Norway] | Taken into account: figure removed
4577 | 53 | 12 | 53 | 14 | This is a redundant ! should be deleted. [Kai Fang, China] | Taken into account: figure removed
9711 | 53 | 12 | 53 | 12 | Change "ecosystems" to "ecosystem" [Radim Tolasz, Czech Republic] | Taken into account: text revised
3562 | 53 | 13 | 53 | 13 | typo: ecosystems [Sylvia Sander, Monaco] | Taken into account: typo: ecosystems
4722 | 53 | 13 | 53 | 14 | Changes in anthrop vector and pathogen distributions are not included - perhaps they should be unless it is explicitly mentioned that these are excluded. [Nicholas Oglen, Canada] | Taken into account: figure removed
### 1928
14 Spelling correction needed for ecosystems health - it should be ecosystem health. "[Map develop a figure based on Poel et al. (2017).]" should also be edited to past tense. [Crystal Marythska Pong, Canada]

**Response:** Taken into account: figure removed

### 2479
14 Rare figures 3.19, explain and discuss, especially the impact of the loss of resources/sentiments to humans. [Lisa Lucero, United States of America]

**Response:** Taken into account: figure removed

### 7469
29 Compared to ch. 3.4.1.2.3, this section do not seem to consider the broad range of ecosystem functions. Consider including more, or explaining why the information is more restricted here. [Brynd Chrisltofson, Norway]

**Response:** Taken into account: some points have been added but I do not understand where is the disequilibrium (GPP, NPP, carbon, fires, pathogens are in both subsections now merged)

### 7597
29 As a soil ecologist I really miss a good mention here to global SOM decline. [Maria Jesus Iglesias Briones, Spain]

**Response:** Taken into account: the paragraph has reordered, SOM is implicit in it

### 7512
13 The information is general, not specific about 5°C. [Hong Yang, Switzerland]

**Response:** Taken into account: I think that it is now more balanced

### 18016
13 These sections seem to depend heavily on AR5, with less obvious linkage with the issue of 1.5°C and 2°C warming. Could the authors provide further clarification? [When Moufouma Okia, France]

**Response:** Taken into account: AR5 is just the starting point, afterward there is a lot of new literature and finally the 1.5/2°C warming is discussed

### 12989
14 Clarify "ARS-Chap 4 is from WGII. WGIII is [Jose Carrascos, China]

**Response:** Corrected: ARS-WGII chapter 4 (Battelle et al. 2014)

### 18014
18 ARS-Chap of which WG? Possibly WGIII? [When Moufouma Okia, France]

**Response:** Corrected: see reply to comment 20279

### 12481
4 Forest in monsoon region can be threatened by increased intensity and the number of tropical cyclones as a reduction of tea leaf areas. [Hong, J. and J. Kim (2011) Impact of the Asian monsoon climate on ecosystem carbon and water exchanges: A wavelet analysis and its ecosystem modeling implication, Global Change Biology, 17, 1990-1996.][Jayak Hong, Republic of Korea]

**Response:** Taken into account: but there is not a clear evidence at now of cyclones increase

### 15959
19 The word preindustrial should be pre-industrial to be similar in all chapters. [Heba Elbasiouny, Egypt]

**Response:** Taken into account: added

### 19199
21 However, in some species prolonged exposure to elevated CO2 results in decreased rate of photosynthesis (see Grodzinski et al., 1996. Adv Space Res. 18(4-5): 203-211). [Ruben Retuerto, Spain]

**Response:** Corrected: see reply to comment 20279

### 11080
21 Suggestion, insert here: However, climate change can contribute much to elevated CO2 results in decreased rate of photosynthesis. [Elvira Poloczanska, Germany]

**Response:** Taken into account: given the publication year, it is assumed to have been taken into account by AR5

### 12074
26 Here, we need to consider the tradeoff as well: I would want to start with Davidson et al.2010-Nature 464:185-173 as well as other cross-referenced papers. [Delphine Shi, United States of America]

**Response:** Taken into account: sure but difficult to add something here because of restricted place

### 7294
26 Potentially reducing the magnitude of the positive feedback between climate and the carbon cycle is a bold statement, that doesn’t necessarily follow from the preceding finding, and may not take into account the limits to plant use efficiency (which we don’t know about yet). I think the statement should be made more equivocal, or include this caveat. [Butt Nathalie, Australia]

**Response:** Taken into account: sentence modified

### 20277
26 CO2 fertilization and/or N deposition? Insert “CO2” before “fertilization” if this is what is meant here to clarify. [Aaron Glenn, Canada]

**Response:** Taken into account: yes. This is a good suggestion; unfortunately I missed it; I will check if this may be corrected for the next version

### 13928
26 Consider language for clarity: “often”?” “green effect”? [Elvira Polocan, Germany]

**Response:** Taken into account: given the publication year, it is assumed to have been taken into account by AR5

### 9590
20 Moving this to section 3.4.1.1.2: [Jiangpu Wu, China]

**Response:** Taken into account: done

### 7632
30 I would add fire here as a very important synergistic effect of climate change and fragmentation/deforestation [Sophie Fauset, United Kingdom (of Great Britain and Northern Ireland)]

**Response:** Taken into account: this sentence is removed

### 18015
29 Please note inconsistent form of unit, sometimes “g-1”, and others “g-2” [When Moufouma Okia, France]

**Response:** Editorial - copyedit to be completed prior publication

### 7265
4 The recent slowdown of deforestation is now reversing, for example, in Brazil, and land clearing in Queensland, Australia, so this may need to be acknowledged. [Butt Nathalie, Australia]

**Response:** Taken into account: added

### 10585
6 Reference concerning this? [Emelie Briceño-Eiszendo, Costa Rica]

**Response:** Taken into account: reference added

### 7633
4 Could add reference to Brien et al. 2015 Nature showing that increases in Amazon biomass have slowed in last decade [Sophie Fauset, United Kingdom (of Great Britain and Northern Ireland)]

**Response:** Taken into account: added

### 17177
4 Add other disturbances (storms, pests), e.g. Sesti et al., 2014 Nature Climate Change [Ana Bastos, France]

**Response:** Taken into account: added

### 12075
4 This a good suggestion, unfortunately I missed it; I will check if this may be corrected for the next version

**Response:** Taken into account: given the publication year, it is assumed to have been taken into account by AR5

### 19200
7 Anderweg et al (2015) stated that "The terrestrial biosphere is currently a strong carbon (C) sink but may switch to a source in the 21st century as climate-driven losses exceed CO2-driven C gains...". It is not clear to me if such statement is consistent with the interpretation that total ecosystem respiration has decreased in response to increases of nighttime temperature. In fact, the manuscript follows saying: "Munoz-Rojas et al (2016) demonstrated increased rates of soil respiration..." [Ruben Retuerto, Spain]

**Response:** Corrected: see reply to comment 20279

### 20279
7 This reference actually indicates that global NEE and TER variability has increased due to nighttime temperature increases and that higher TER correlates with nocturnal warming in the tropics. Suggest rewording this sentence as something like: Anderweg et al. (2015) show that the total ecosystem respiration, at the global scale, has increased in response to increases of nighttime temperature in the tropical regions." [Aaron Glenn, Canada]

**Response:** Corrected: Anderweg et al (2015) show that total ecosystem respiration, at global scale, has increased in response to increased nighttime temperatures in the tropics, which suggests that C stored in tropical forests may be vulnerable to future warming.

### 4580
7 Change "Pg C / year / °C" by "Pg C year-1 °C-1" [Hong Yang, Switzerland]

**Response:** Taken into account: figure removed

### 7634
9 There is also paper showing that terrestrial carbon sink across African intact tropical forests (though this is an AR5 WGII chapter 4) [Sophie Fauset, United Kingdom (of Great Britain and Northern Ireland)]

**Response:** Taken into account: it is cited in AR5

### 13927
10 This sentence is not written clearly [Elvira Polocan, Germany]

**Response:** Taken into account: this sentence is removed

### 12024
10 HYPO... "increasing"? [Paul Doyle, Canada]

**Response:** Editorial - copyedit to be completed prior publication
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

Comment No | From Page | From Line | To Page | To Line | Comment | Response
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12007 | S4 | 12 | S4 | 12 | I would suggest to use "because of lower atmospheric moisture" instead of "because of drying air" [Rubén Retuerto, Spain] | taken into account: this sentence is removed

13025 | S4 | 18 | S4 | 18 | ...2013 with temperature "being" the main... [Paul Doyle, Canada] | boreal forest productivity has increased as a result of warming (medium confidence) during the 1980s but many areas have experienced productivity decline (high confidence) because of drying air (which can lead to increased fire frequency and intensity) and lack of adaptation.

4581 | S4 | 21 | Change "Pg C/yr" by "Pg C yr^-1" [Radim Toláš, Czech Republic] | Editorial - copyedit to be completed prior to publication

3843 | S4 | 21 | S4 | 29 | I could not figure out what is the point of the paragraph. It starts with a reduction of the carbon sink such as peatlands and then moves on to another mitigation tool. Then what was the first mitigation tool? [Wocqroup CN, United States of America] | taken into account: paragraph completely rewritten

10593 | S4 | 21 | S4 | 24 | Which reference is this one on the reference list? [Elemer Briceño-Elizondo, Costa Rica] | taken into account: it is a good remark and alternative references have been added

19625 | S4 | 21 | S4 | 29 | Similar remark as to one made above for chapter 4. There are three references in chapter 4 page 22, lines 38-39 on table nature of soil C with rising T. Should include these references with comment in this chapter in contrast to the optimistic nature of lat (2014). [Doreen Stainy, United States of America] | taken into account: it is a good remark and alternative references have been added

12026 | S4 | 22 | S4 | 24 | Forests must be... [Paul Doyle, Canada] | Editorial - copyedit to be completed prior to publication

6656 | S4 | 22 | S4 | 24 | Shallow seawealc marine ecosystems capable of accumulating great amount of muddy sediment that is very rich in organic matter (estuarine ecosystems, saltmarshes, etc) could be also listed here. [Castor Muñoz Sobrino, Spain] | taken into account: this is mentioned in wetland section

12077 | S4 | 23 | S4 | 23 | and... "a powerful"... [Paul Doyle, Canada] | taken into account: a few complementary reference on the carbon sequestration by the soils

12078 | S4 | 24 | S4 | 29 | Should also add examples from recent long-term studies and meta-analysis articles that confirm the hypothesis of increased soil carbon sequestration under different management practices. Org farming and associated soil organic carbon buildup is one such example (Gättinger et al.-2012-PNAS:109-4. 1933. Journal of Plant Nutrition and Soil Science). 2012:198-203. But, tradeoff mechanisms like higher soil organic matter will increase chances of greater GHG emission (Hadden and Grella-2017-Agri and Forest Meteorology1-9, McGaa et al.-2015-Agric. Human values-32:259-263) by increasing substrates (and/or favorable biological condition or other non-farm operations) should be considered as well. [Debjani Sihi, United States of America] | taken into account: I have added a few complementary reference on the carbon sequestration by the soils

12079 | S4 | 24 | S4 | 29 | Also, it should be kept in mind that in terrestrial system, the feedback in soil quality-temperature relation is not always straightforward. E.g. For a given time, uptake or terrestrial system may contain more recalcitrant organic matter but organic matter in wetlands may be more fresh due to lower decomposition at anerobic condition. Thus, we should not always generalize the rate parameters in global climate model like previously done (Kirschbaum etal-2004-Quarto Change Bist-10:1870-1877, Knorr etal.-2005-Nature-433:298–301), but also value the importance of reoxid condition and wetland vs wetland area to correctly account for temperature response of greenhouse gas emission (SIH etal-2016-Biogeochemistry-131-103-109). [Debjani Sihi, United States of America] | taken into account: I have added a few complementary reference on the carbon sequestration by the soils

10594 | S4 | 24 | S4 | 29 | Forest soil carbon sequestration and changes are generally understudied on carbon sink estimations. This sink as LAT 2014 presents is changeable according to management conditions, type of crop, depth of soil layers etc. It could be of great value in this section to enhance information on the importance of carbon soil management. [Elemer Briceño-Elizondo, Costa Rica] | taken into account: this section is not only on mitigation, but we give a few information to emphasize the role of the soil

4582 | S4 | 25 | Change "Pg C/yr" by "Pg C yr^-1" [Radim Toláš, Czech Republic] | Editorial - copyedit to be completed prior to publication

13298 | S4 | 27 | S4 | 27 | spell out DDC [Elvira Poloczanska, Germany] | taken into account: this sentence is removed

6658 | S4 | 32 | S4 | 13 | Valuable or rare ecosystems (peatlands, coastal lagoons, etc) also may be threatened at mid-latitudes (e.g. Muñoz Sobrino et al. 2005, 2016) and subtrropical areas (e.g. rainforest, cloud forests, etc) [Castor Muñoz Sobrino, Spain] | taken into account: it is cited in AR5

12990 | S4 | 33 | S4 | 36 | add the appropriate cite after..."... Chapter 4..." [Settle et al. 2014] [Jorge Carrasco, Chile] | taken into account: unfortunately it is not possible discuss more that point, but the paragraph has been revised

13299 | S4 | 34 | S4 | 36 | provide citation for polar bear study [Elvira Poloczanska, Germany] | Editorial - copyedit to be completed prior to publication

1930 | S4 | 34 | S4 | 36 | declining in number] should read as "declining in numbers" [Chrysal Mortensen-Pompie, Canada] | taken into account: it is cited in AR5

2335 | S4 | 37 | S4 | 38 | Lantz et al. (2013, Ecosystems (2013) 16: 47–59) discusses shrub proliferation in the tundra and is relevant here. The latest Arctic Report Card and State of the Climate reports could also be referenced as they also describe changes that are occurring in the Arctic. [Sharon Smith, Canada] | Editorial - copyedit to be completed prior to publication

13930 | S4 | 37 | S4 | 38 | what is confirmed by recent literature? Does this refer to tundra, polar bears... [Elvira Poloczanska, Germany] | taken into account: I think that the text is clear now

6237 | S4 | 40 | S4 | 40 | should remove ( ) [Rubén Retuerto, Spain] | Editorial - copyedit to be completed prior to publication

1902 | S4 | 40 | S4 | 40 | Please remove ( ) [Rubén Retuerto, Spain] | Editorial - copyedit to be completed prior to publication

1931 | S4 | 40 | S4 | 40 | Mortensen et al(2014) should read Mortensen et al (2014) [Chrysal Mortensen-Pompie, Canada] | Editorial - copyedit to be completed prior to publication

13740 | S4 | 40 | S4 | 40 | Should say... Mortensen et al (2014). [Elvira Poloczanska, Germany] | Editorial - copyedit to be completed prior to publication

Do Not Quote, Cite, or Distribute Page 73 of 152
Comment Response

1903
54
40
54
42
It is not very informative that "...showed a positive trend and 51 a negative trend" without referring to the particular nature of the traits (Rubin Netzuno, Spain)
Taken into account: it is more informative (delay / advance in phenology)

1391
54
42
42
42
are predictions a taxonomic group? [Elvira Poloczanska, Germany]
Taken into account: they are not taxa but trophic levels, it is now corrected

7635
54
47
In some areas woolly encroachment into savanna is also occurring - Michael & Fimtrup 2013 Phil. Trans. Roy. Soc. B [Sophie Fauset, United Kingdom (of Great Britain and Northern Ireland)]
Taken into account: added

8692
54
47
56
Lacking examples related to the alpine or mountain ecosystems, the functions of ecosystems have changed over the last years. [Jiangwu Wu, China]
Taken into account: some have been added

17719
54
50
4
50
Do you mean all animal and plant species or just plants? [Ana Bastos, France]
Taken into account: plant

2718
54
50
50
50
When Mediterranean species is mentioned, does this refer to studies looking only at the region around the Mediterranean sea, or does it include species in Mediterranean biomes in other parts of the world – i.e. America, Western Cape? [Penny Urquhart, South Africa]
Taken into account: Mediterranean region, it has been precised

6238
54
50
54
51
For the Mediterranean species, it has been observed shift in phenology, range contraction, and health decline because of - - - is suggested to be rewritten as 'For the Mediterranean species, shift in phenology, range contraction and health decline has been observed because of - - -' [Muhammad Mohsin (Pakistan), Pakistan]
Editorial - copyedit to be completed prior to publication

7266
54
50
54
52
woudnt -> For Mediterranean species, shifts in phenology, range contraction, and health decline to decreases in precipitation and increases in temperature, have been observed; [Butt Nathalie, Australia]
Editorial - copyedit to be completed prior to publication

9318
54
51
54
51
The phrase "it has been observed shift in" may be revised to read: 'a shift has been observed in". The same phrase is used in the summary table on page 63. [Sirk KUSIS, Turkey]
Editorial - copyedit to be completed prior to publication

17720
54
52
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52
At the same time, Garmin et al. (2011, PRAS) have pointed to an increase in deforestation from insects in Mediterranean regions linked to increasing drought [Ana Bastos, France]
Taken into account: not enough new

15004
54
52
54
53
I would rephrase this sentence: "The area percentage...the last 30 years," (Rubin Reisusoro, Spain)
Taken into account: sentence modified

10595
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54
57
Is there input to severity of the rainy season in concert to length? [Eileen Brooklin-Elizondo, Costa Rica]
Taken into account: mainly length

6239
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56
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56
The word 'the other estimates' is suggested to be replaced with 'that' [Muhammad Mohsin (Pakistan), Pakistan]
Editorial

7267
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57
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1
and an increase in fire incidence and severity in the southern Sierra Nevada mountain forests in this region - should this be mentioned too? [Butt Nathalie, Australia]
Taken into account: fire incidence/intensity added

15602
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55
Resolution of figure 3.18 is low page 3-55 [Fathy Elsheiby, Egypt]
Editorial - copyedit to be completed prior to publication

8240
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1
The word 'production' is suggested to be replaced with 'productivity'; [Muhammad Mohsin (Pakistan), Pakistan]
Corrected

11179
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13
This paragraph is not well developed. Much of the wording is clunky, and there are several issues with selection of words (e.g., "unprecedented" requires context, "unprecedented over what timescale"), there are unitalicized generic and specific epithets, etc. [David Scheraman, Germany]
Corrected

1932
55
3
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13
This paragraph doesn't really flow very well. For example, the example of the tropical fish Geophagus brasiliensis (the species name should also be italicised) needs to be linked in with climate change explaining that invasive aquatic species are benefiting from climate change. This paragraph is also relatively short in comparison that freshwater ecosystems are among the most threatened. Another example that could also be used is with waterfowl. Climate change is likely to cause further changes in wetlands by shifting the seasonal availability and distribution of water and resultant vegetation communities (e.g., Withn, P. & van Kooten, G. C. The effect of climate change on optimal wetlands and waterfowl management in Western Canada. Ecol. Econ. 70, 788-805, doi:10.1016/j.ecolecon.2010.11.019 (2011)). [Chrysalis Mentreja-Pingto, Malaysia]
Taken into account: reference added

7866
55
4
New papers on tropical peatland carbon stocks with first estimates for these areas and large amounts of carbon - Dargie et al Nature 2017 for Congo Basin and Draper et al. 2014 Environmental Research Letters [Sophie Fauset, United Kingdom (of Great Britain and Northern Ireland)]
Taken into account: references added

7268
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8
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10
Under sentence – ecosystem water? [Butt Nathalie, Australia]
Corrected

12029
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9
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9
...Yellow River ‘had a slightly...’ [Paul Doyle, Canada]
Corrected

4583
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10
Change "manyyears" by "many y-1" [Radim Tolarik, Czech Republic]
Taken into account: mm y-1

3844
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12
The sentence 'Tropical fish...' looks out of place [Woonsup Choi, United States of America]
Taken into account: removed

4938
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10
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11
Geophagus brasiliensis should be Geophagus brasiliensis (in italics) [Alejandro Gareana, Spain]
Taken into account: sentence removed

13741
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10
55
11
Species names in italics [Elvira Poloczanska, Germany]
Taken into account: sentence removed

20280
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12
Geophagus brasiliensis. This sentence seems out of place, the connection between it and the rest of the paragraph is not clear. [Aaron Glenn, Canada]
Taken into account: sentence removed

13742
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12
what is the potential consequence of higher growth rates in the invasive species? [Elvira Poloczanska, Germany]
Taken into account: sentence removed

13029
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11
...introduced "into the NAME River in southwest Australia from South America..." [Paul Doyle, Canada]
Taken into account: sentence removed

13473
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13
on what measurements in the estimation by Xu et al based? What is the reason for the high resilience? More details needed. [Elvira Poloczanska, Germany]
Taken into account: sentence removed

13744
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14
Is Smith et al. Under review? Please specify [Elvira Poloczanska, Germany]
Editorial - copyedit to be completed prior to publication

7269
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18
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18
This section, Biome shifts, doesn't include anything about Antarctica, and it is not included in the map in Figure 3.18, but there is already evidence of changes in ecological communities due to invasives being able to establish and persist due to climate change - should this be included? [Butt Nathalie, Australia]
Accepted, will be taken into account in final draft subject to suitable citations being located

1316
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18
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28
Figure 3.20 is taken from another source, not from Warszawski et al. (2013). Nothing on biome shifts is available from this figure. Authors team may want to provide correct references where this and some other figures are taken from, and to check references to figures, too. [GREGORY INSAROV, Russian Federation]
Correted

1358
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18
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28
Figure 3.20 is taken from another source, not from Warszawski et al. (2013). Nothing on biome shifts is available from this figure. Authors team may want to provide correct references where this and some other figures are taken from, and to check references to figures, too. [GREGORY INSAROV, Russian Federation]
Correted

13745
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18
55
38
 revise numbering of Figures in the text [Elvira Poloczanska, Germany]
Editorial - copyedit to be completed prior to publication
Comment | From Page | From Line | To Page | To Line | Comment | Response
--- | --- | --- | --- | --- | --- | ---
3874 | S5 | 18 | S5 | 38 | This section needs to provide a more comprehensive review spanning more of the approximately dozen published references on biome shift projections. Correctly, the section mainly reviews just one reference. The text should read something like a review of a dozen published biome shift projections indicates an approximate doubling of the fraction of global area with a potential biome shift in 2100, from ~5% to 10% from a 1.5°C to a 2°C global temperature increase (Bello et al. 2015). The fraction of global area with a potential biome shift could further increase from 10% to 16% from a 2.4°C emissions scenario (B11) to a 4°C (emissions scenario A2) global temperature increase. The ten and land use change impacts on global terrestrial ecosystems and river flows in the HadGEM2-ES Earth system model using the representative concentration pathways. Biogeosciences 12: 1317-1338. Gonzalez, P., R.P. Neilson, J.M. Lenihan, and R.J. Drapek. 2010. Global patterns in the vulnerability of ecosystems to vegetation shifts due to climate change. Global Ecology and Biogeography 19: 755-768. | Accepted, will be taken into account in final draft
988 | S5 | 19 | S5 | 28 | This paragraph mixes up the warszawski et al. and garten et al. paper. Wierzchowski and Pocztóczanska, Germany used only the five ISIMIP GCM while Garten et al. used 19 GCMs. The figure you are referring to as being part of warszawski et al. (i.e. 3.20) which most likely actually refers to figure 3.18) is actually from garten et al. (which is correctly stated in the figure caption). | Corrected
13932 | S5 | 20 | S5 | 20 | which biome terminology? (Elvira Pocztóczanska, Germany) | Corrected
511 | S5 | 21 | S5 | 21 | i am guessing you are talking about Fig. 3.18 (ie not Fig. 3.20). [David Dicoucou, Belgium] | Corrected
552 | S5 | 21 | S5 | 21 | figure 3.30 is mentioned here, but it appears only in page 89: that is, more than 40 pages later. why? [Ismael Nunez-Riboni, Germany] | Corrected
10590 | S5 | 21 | S5 | 38 | Text refers to figure 3.30, however caption cites figure 3.18. The figure 3.30 is on page 89 on another section with other content. This needs correction. [Elvira Pocztóczanska, Costa Rica] | Corrected
10606 | S5 | 21 | S5 | 38 | Text refers to figure 3.30, however caption cites figure 3.18. The figure 3.30 is on page 89 on another section with other content. This needs correction. [Elvira Pocztóczanska, Costa Rica] | Corrected
8830 | S5 | 21 | S5 | 38 | Figure 3.30 is wrong should be Figure 3.18. [Subhra Alam, Bangladesh] | Corrected
9712 | S5 | 21 | S5 | 38 | Unclear whether this fraction is responding to Figure 3.18 below since it doesn't match the citation above. I would recommend to rework the order and citation. [Kai Fang, China] | Corrected
1956 | S4 | 24 | S4 | 24 | Remove brackets surrounding approximately [Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland)] | Text revised
17268 | S5 | 24 | S5 | 28 | A reference to support this statement is needed here. [Maria Jesus (gisesus Briones, Spain)] | Text revised
3875 | S5 | 25 | S5 | 25 | The text needs a citation for what it calls an "earlier study." [Patrick Gonzalez, United States of America] | Text revised
904 | S5 | 32 | S5 | 32 | The figure has poor visual quality. [Mila Buzian, Hungary] | Text revised
12013 | S5 | 32 | S5 | 32 | Fig. 3.20 must be Fig 3.16 [Paul Doyle, Canada] | Corrected
12021 | S5 | 34 | S5 | 34 | Add the appropriate cite after “,” Chapter 4” (Sollie et al. 2014) [Jorge Camacho, Chile] | Corrected
4584 | S5 | 36 | S5 | 36 | Change format of “C (Radim Tolaš, Czech Republic)” | Corrected
11720 | S5 | 36 | S5 | 36 | Why is the "degree" sign here not correctly aligned in the vertical plane? [David Schoeman, South Africa] | Corrected
13933 | S6 | 1 | S6 | 1 | This is the kind of specification that would be needed for the other impact sections too. [Elvira Pocztóczanska, Germany] | Text revised
9693 | S6 | 1 | S6 | 14 | Clarifying the effects of 1.5°C above pre-industrial levels on species distribution or extinction of species climate change in future may result in increasing the risk of extinction for some species, or increasing vulnerability or dangerous for some species. In addition, the content of this report need to assess the effects of climate change related to 1.5? above pre-industrial levels, so much more assessment should be the effects of 1.5°C above pre-industrial levels on biodiversity. In addition, error of reference. Providing more references. [Jianguo Wu, China] | Accepted, will be taken into account in final draft
1957 | S6 | 1 | S6 | 14 | Replace “with” with correct symbol and for ranges replace hyphen with “to.” [Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland)] | Corrected
2460 | S6 | 5 | S6 | 5 | Need page number for this quote [Lisa Lourie, United States of America] | Corrected
7470 | S6 | 8 | S6 | 14 | This sentence highlights the important point in the Executive Summary (Bolland Kristoffersen, Norway) | Corrected
19005 | S6 | 8 | S6 | 9 | Rephrase this sentence as “in comparison, with 2°C warming these projected losses were reduced by 80%.” or “in comparison, these projected losses were reduced by 60% if warming were constrained to 2°C” (Accent Haerpert, Spain) | Text revised
11721 | S6 | 8 | S6 | 9 | His sentence doesn’t make sense “in comparison, with 2°C warming these projected losses were reduced by 80% if warming were constrained to 2°C” [David Schoeman, Australia] | Text revised
20382 | S6 | 9 | S6 | 9 | Delete “if warming were constrained to 2°C” as it’s redundant in the sentence. [Aaron Glenn, Canada] | Text revised
7770 | S6 | 9 | S6 | 9 | Should be “Constrained to 1.5°C” (But Nathalie, Australia) | Text revised
13934 | S6 | 9 | S6 | 9 | Repetition of the end of the sentence [Elvira Pocztóczanska, Germany] | Text revised
5933 | S6 | 12 | S6 | 12 | An extra closing parenthesis should be deleted after “warming” [Ismael Nunez-Riboni, Germany] | Text revised
20283 | S6 | 13 | S6 | 14 | Miss is missing from Smith et al. citation [Aaron Glenn, Canada] | Corrected
11726 | S6 | 13 | S6 | 14 | Here and in many places throughout the text, full citations are missing. [Maria Jesus (gisesus Briones, Spain)] | Text revised
11722 | S6 | 13 | S6 | 14 | Citation is missing a year [David Schoeman, Australia] | Corrected
17721 | S6 | 14 | S6 | 14 | Forest fires are expected to change under changing climate. Sturrock et al. (2008, Canadian Journal of Plant Pathology) provide a review of studies. | Accepted, will not include in next draft
9869 56 17 57 8 It is misleading that within this section reference is only made to CMIP5 coupled climate vegetation models because some of the studies that are being cited are not coupled models but GCMs (e.g. Friend et al. 2014 [Christopher Reyer, Germany])

8493 56 23 57 23 Uptake of what? [Elvira Poloczanska, Germany]

7472 56 25 56 26 Please consider clarifying this sentence. [Øyvind Christophersen, Norway]

13038 56 26 56 26 should this mean climate change? [Elvira Poloczanska, Germany]

13397 56 27 56 27 Is this carbon by vegetation? Or by vegetation carbon sinks/to? [Elvira Poloczanska, Germany]

7271 56 30 56 30 replace "net with little" (Butt Nathalie, Australia)

11723 56 30 56 30 There is few published literature...? [David Schoeman, Australia] check/clarify

12031 56 30 56 30 There is "very little" published literature...? [Paul Doyle, Canada]

12078 56 31 56 33 Also, north looking at 5th et al-2017-COS-bio-10.1111lqch.13835 where gradual warming increase GWP, particularly CH4 production in a subtropical wetland system. This paper is also an important candidate as it highlights the importance of considering the rate of warming in addition to magnitude of warming in climate models. [Oesper Sih, United States of America]

4555 56 34 Add explanation of "GPP" [Radim Tolasz, Czech Republic]

9393 56 34 56 34 spell out GPP [Elvira Poloczanska, Germany]

7637 56 35 56 35 1 % per year of what? [Sophie Fauset, United Kingdom (of Great Britain and Northern Ireland)]

1318 56 44 56 44 Check Figure 3-21 is the right figure here to refer to. [GREGORY INSAROV, Russian Federation]

1338 56 44 56 44 Check F 3-21 is the right figure here to refer to. [GREGORY INSAROV, Russian Federation]

8831 56 44 56 44 Figure 3-21 is wrong should be Figure 3-19 [Sudita Aien, Bangladesh]

13746 56 44 56 44 revise numbering of Figures in the text [Elvira Poloczanska, Germany]

13940 56 46 56 46 spell out NPP if first use [Elvira Poloczanska, Germany]

7272 56 49 56 50 Should be "signal to noise" related to noise? [Butt Nathalie, Australia]

20284 56 55 Replace "nutrient, limitation" with "nutrient limitations" [Aaron Glenn, Canada]

7638 56 55 The reader to the main message of the data (currently the message was not clear to me), and ideally less use of acronyms if possible. [Jordan Harold, United States of America]

12032 56 55 CHANGE entire line to read, "Nitrogen and other nutrients will limit the terrestrial carbon cycle response to..." [Paul Doyle, Canada]

13941 56 55 56 56 sentence poorly worded [Elvira Poloczanska, Germany]

3845 56 55 57 3 I could not figure out what is the point of the paragraph. It starts with the role of nitrogen and then moves on to permafrost thaw. [Woonsup Choi, United States of America]

13942 56 55 56 57 see in text in this sentence [Elvira Poloczanska, Germany]

11724 56 56 56 57 One too many "thaws" in "high confidence in thawing of permafrost thaw" [David Schoeman, Australia]

2328 56 56 57 3 See earlier comments regarding Chadburn et al (2017) and issue of timing of these changes and complete loss of permafrost over the area that they predict. [Sharhon Smith, Canada]

20285 56 57 Delete "than". It’s redundant [Aaron Glenn, Canada]

13943 57 1 57 2 use appropriate language – save doesn’t give explanation, does this mean that stabilization at 2C would result in the thawing/loss of an extra 2 million km2 of permafrost compared to stabilization at 1.5? [Elvira Poloczanska, Germany]

1319 57 3 57 3 Burke et al. 2017 is not in the reference list. [GREGORY INSAROV, Russian Federation]

1359 57 3 57 3 Burke et al. 2017 is not in the reference list. [GREGORY INSAROV, Russian Federation]

7473 57 6 57 8 This statement merits to be explained in more detail because of its significance for natural carbon sequestration and because it initially seems out of context. [Öyvind Christophersen, Norway]

7474 57 9 57 10 Consider using a legend to show which colour represents which model. [Øyvind Christophersen, Norway]

13359 57 9 57 17 Figure 3.19: This is a complex set of graphs, which would benefit from a legend for the different colours, heading subheadings for each plot to direct the reader to the main message of the data (currently the message was not clear to me), and ideally less use of acronyms if possible. [Jordan Harold, United Kingdom (of Great Britain and Northern Ireland)]

10597 57 9 57 17 Clarity of figure needs improvement. Tendancies area consistent with effects on tropical ecosystems, which area reflected on the global average. [Elmer Briceño-Elizondo, Costa Rica]

10598 57 9 57 17 Clarity of figure needs improvement. Boreal systems present expected trends. [Elmer Briceño-Elizondo, Costa Rica]
Comment No From Page From Line To Page To Line
13948 57 16 58 14 Are you referring to section 3.4.1.1? please specify [Eleina Poloczanska, Germany] We are grateful for your suggestion, and will be including consideration of it in the next draft
1360 58 11 58 11 Siberian ecosystems are in polar deserts, tundra, steppe inter alia. Authors may want to specify ecosystem type. [GREGORY INSAROV, Russian Federation] We are grateful for your suggestion, and will be including consideration of it in the next draft
13722 58 18 58 18 Suggestion: introduce results for impacts of storms and pests, if studies exist, otherwise mention that the same exercise has not been done for other disturbances [Ann Batastini, France] text revised
1314 58 12 58 14 This section is not very clear to read, try to avoid too much generalisation [Elvira Poloczanska, Germany] Noted.
4586 57 12 57 13 Leave out "the" [Radim Tolasz, Czech Republic] corrected
20286 57 19 57 21 Replace "found" with "modelled". I also suggest replacing "acting as small carbon sink" with "were carbon neutral". I don't think 11.25 g/m^2a is significantly different from 0, especially with that interannual variability reported and uncertainty with both the model and underlying validation measurements used [r^2 value of 0.571 for NPP, Fig. 3; r^2 ranging from 0.31 to 0.67 for eddy covariance measurements, Fig. 4] [Aaron Glenn, Canada] text revised
5620 57 11 57 11 Please... change "too right" to "too left" [Ruben Rueda, Spain] corrected
12006 57 11 57 11 Leave out "the" [Radim Tolasz, Czech Republic] corrected
13033 57 11 57 11... significantly different from 0, especially with that interannual variability reported and uncertainty with both the model and underlying validation measurements used [r^2 value of 0.571 for NPP, Fig. 3; r^2 ranging from 0.31 to 0.67 for eddy covariance measurements, Fig. 4] [Aaron Glenn, Canada] text revised
19019 57 35 57 35 Instead of writing "0.5°C above pre-industrial" (Figure 10.5 panel A, Meeth et al. 2007), Romero-Lankao et al. (2014) (Box 26-[-]) please write "0.5°C above pre-industrial; Figure 10.5 panel A, Meeth et al. 2007. Romero-Lankao et al. (2014, Box 26-[-])" [JACQUES-ANDRE NDIONE, Benin] Citation will be improved in final draft
5731 58 26 58 26 For forest ecosystems you might wish to add Siedl et al. 2017. Highlighting the importance of interactions of different disturbance agents under climate change. Siedl R, D Thom, M K, D Martin-Benito, M Petrasen, G Vecchiano, J Wild, D Aascol, M Pet, J Hortianemi, Mj Lensor, V Trelais, P Martra, M Svoboda, M Fabrik, TA Nagel, CPO Rayer (2017) Forest disturbances under climate change, Nature Climate Change 7:395-402 DOI 10.1038/nclimate3303 [Christopher Rayer, Germany] Accepted, will utilise in next draft provided information relevant to 1.5 or 2°C warming can be deduced or inferred
13601 58 16 58 16 Note that... [Christopher Reyer, Germany] Accepted - editorial work to be done prior to final copyedit
9986 57 24 58 25 No references are provided. [Christa Hure, United Kingdom] Add reference to be included in final draft
966 57 21 58 23 Cleaving... 1.5°C above pre-industrial levels on carbon stocks in terrestrial ecosystems. [Jianguo Wu, China] text revised
13610 58 11 58 11 Siberian ecosystems are in polar deserts, tundra, steppe inter alia. Authors may want to specify ecosystem type. [GREGORY INSAROV, Russian Federation] We are grateful for your suggestion, and will be including consideration of it in the next draft
10597 58 24 58 24 Added to "4C" [Mustafa Tufan Türe, Turkey] text revised
13174 58 28 58 28 Are you referring to section 3.4.1.1 please specify [Eleina Poloczanska, Germany] text revised
19206 57 1 57 3 Figure 10.5 panel A, Meeth et al. 2007. Romero-Lankao et al. (2014, Box 26-[-]) please write "0.5°C above pre-industrial; Figure 10.5 panel A, Meeth et al. 2007. Romero-Lankao et al. (2014, Box 26-[-])" [JACQUES-ANDRE NDIONE, Benin] Citation will be improved in final draft
13944 58 4 58 4 The ecosystem section here contain little text for each ecosystem, could the subheading be removed and texted merged into a single section by themes (eg forests, polar, wetlands) summarized in a schematic? Eg see Fig 30:12 AR5 WG1 Chp 30. Further much of this text has no reference to future change [Eleina Poloczanska, Germany] Section restructured
10596 58 18 58 20 Nothing in the Americas? Further is this a repetition of AR5? [Elvira Poloczanska, Germany] We are grateful for your suggestion, and will be including consideration of it in the next draft
**Table 3.2** The symbol for “Precipitation” (in header) is not used in the table. [Radim Tolasz, Czech Republic] Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

Many key aspects on adaptations and drivers are empty. Regarding precipitation, cannot it be considered a driver in any of the key risks listed here? [Elvira Poloczanska, Germany] Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

Stipa species should be *Stipa baicalensis* (in italics) [Alejandro Cearreta, Spain] Editorial - copyedit to be completed prior to publication

*Stipa* species should be *Stipa* species (in italics) [Alejandro Cearreta, Spain] Editorial - copyedit to be completed prior to publication

The adaptation option for the reduction in terrestrial carbon sink in Table 3.2 is repeated [Elemer Briceño-Elizondo, Costa Rica] Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

"Stipa baicalensis" should be *Stipa baicalensis* (in italics) [Alejandro Cearreta, Spain] Editorial - copyedit to be completed prior to publication

It is unclear why such detail is given for a single species. It should be said why this species is so important (I am not familiar with it but do not work in dryland systems) [Sophie Faust, United Kingdom of Great Britain and Northern Ireland] This is a good question, but it can be interesting to have an example of adaptation in a steppic biome

The adaptation comments for the Amazon tipping point in table 3.2, given the magnitude of the sinks and issue, seem to poor to be put as general as here. The table and drivers are considered now in Ch 4 and are beyond the scope of Ch 3. Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

Table 3.2: Running out of time. Only able to glance at it. [Paul Doyle, Canada] Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

Tab 3.2 - The symbol for “Precipitation” (in header) is not used in the table. [Paul Doyle, Canada] Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

What is the significance of feathergrass...i.e., why highlight it here. If it is only an example to illustrate a principle/concept, then add that context. If not, provide other examples, too. [David Schoeman, Australia] Yes, it does not make sense. It has been revised in the new text.

...in the two paragraphs, there is nothing on consequence for 1.5°C versus 2°C warming for dryland ecosystems: savannas, shrublands, grasslands, deserts. You may want to adjust this text. [GREGORY INSAROV, Russian Federation] Here it just indicated the effects of elevated temperature, and to show the tendency. However, we still rewrite the text in order to make sense.

...in the two paragraphs, there is nothing on consequence for 1.5°C versus 2°C warming for dryland ecosystems: savannas, shrublands, grasslands, deserts. You may want to adjust this text. [GREGORY INSAROV, Russian Federation] Here it just indicated the effects of elevated temperature, and to show the tendency. However, we still rewrite the text in order to make sense.

In the two paragraphs, there is nothing on consequence for 1.5°C versus 2°C warming for dryland ecosystems: savannas, shrublands, grasslands, deserts. You may want to adjust this text. [GREGORY INSAROV, Russian Federation] Here it just indicated the effects of elevated temperature, and to show the tendency. However, we still rewrite the text in order to make sense.

In the two paragraphs, there is nothing on consequence for 1.5°C versus 2°C warming for dryland ecosystems: savannas, shrublands, grasslands, deserts. You may want to adjust this text. [GREGORY INSAROV, Russian Federation] Here it just indicated the effects of elevated temperature, and to show the tendency. However, we still rewrite the text in order to make sense.
Table 3.2: This is a very important and instructive table! However, for accessibility, the text in the table should preferably be shortened to state main points and be phrased in a non-technical way. (B. V. Chr. Christensen, Norway)

7269 60 1 61 1

Table 3.2: In AR5, the last column of the similar table for terrestrial ecosystems for many risks was mainly based on authors' judgements, not on literature. For this SR we have very low/literature, so this approach is even more superficial. Authors need to consider another way to sum up the SR findings. (Gregory Insarov, Russian Federation)

5723 60 1 61 1

Table 3.2: For the sector "water", the above mentioned study Marx et al. should be included. (Andreas Marx, The quality of his table 3.2 should be improved. There is no need to have the title original title of the table included in top… Please, clip this former [0x595] 65

1

1

I'm assuming that this is an AR5 table standing proxy for a table to be developed...if not, why compare with 2º and 4º C warming? (David Schoeman, [0x595] 60

62

1

specify the year of "Smith et al." (Wilfran Moufouma Okia, France) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

9690 60 1 61 1

Table 3.2 lacking adaptation options description. (Jianguo Wu, China) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

2069 61

Table 3.2: This is a very important and instructive table! However, for accessibility, the text in the table should preferably be shortened to state main points and be phrased in a non-technical way. (B. V. Chr. Christensen, Norway)

9798 60 17 7 11

Biogeographic distribution shift and phenology changes in the ocean are also very obvious as that in terrestrial ecosystem (Loarie et al. 2009; Burrows et al. 2011, 2014). It would be better to assess the related issues in 3.4.3 ocean systems not so reasonable. (Ronghua Cai, China) We are grateful for your suggestion, and will be including consideration of it in the next draft.

12992 62 1

Check the font in table [Jorge Gamboa, China]

5470 62 1 62 1

Please add risk of alien invasive species that may arise from climate change scenarios (Mylo Barau, Nigeria) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

1370 62 3 62 3

Upper left cell: it is written "Wiers (2016) reported that 47% of the 376 found could be attributed to climatic change, especially in tropical regions and freshwater habitats". Explain what is 376 for (Gregory Insarov, Russian Federation) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

18018 62 3 62 3

specify the year of "Smith et al." (William Moufouma Osia, France) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

3863 63

Table modellismen ecosystems: change to shift has been observed in phenology… [Sylvia Sander, Monaco] Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

17723 63

Northwestern ecosystems: "flying point" to "3ºC warming" [Ara Basios, France]

5751 63

Annex 3.1: Table 3.3.3.3 key economic sectors: For the sector "water", the above mentioned study Marx et al. should be included. (Andreas Marx, Germany) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

6341 63 10

Under-sub-heading "Tree mortality and forest loss: threatened (not threatened)" (Muhammad Mohsin QBAL, Pakistan) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD. Covered only risk and related observed impacts.

2361 64

Table 3.2 Transformation of Arctic Ecosystems: Some additional references are relevant and a few examples are here provided. For changes in permafrost conditions the latest State of Climate report published in BAMS (see Romanovsky et al. contribution) is relevant (This report and Arctic report Card are relevant for the other issues mentioned in this text for the Arctic). Also Lantz et al. (2013, Ecosystems 16:47–59) discusses shrub proliferation in the tundra. The accompanying information regarding wooded tundra in the 3rd column (avoided risks) is confusing. With warming, greening or shrubification of the tundra has been predicted so the greater loss of wooded tundra doesn’t make sense. For the permafrost comment, see previous comments regarding results of Chadburn et al. (2017). (Sharon Smith, Canada)

17724 64 64

Spread of pests and diseases. A recent study has found that beetles might damage fire risk and exacerbate it (as stated in the third columns) by reducing fuel load. See Meige et al. 2016 ERL (Ara Basios, Canada) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

10669 64 1

Adaptation options for forested forest: Why are there no measures considered? (Elmer Enzo, Costa Rica) Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD.

Table 3.12 will be revised for the final draft, a placeholder only is included in the SOD

835 65 2 65 38 Nothing is mentioned about Table 3.3 ([Luna Alam, Bangladesh])

Table 3.2 will be revised for the final draft, a placeholder only is included in the SOD

3570 65 3 6 46 This entire sub-chapter needs to be revised. It reads like a string of unrelated references which out of context often don’t make full sense. [Sylvia Banner, Monaco]

Taken into account - text revised

11728 65 3 71 11 His whole section needs a lot of attention… I include some specific comments below, but the whole things needs an overhaul [David Schoeman, Australia]

Taken into account - text revised

12379 65 5 Section 3.4.2.1 is particularly underdeveloped and is lacking a number of important observed impacts and adaptation for coastal and low-lying areas. Currently the section only briefly addresses SLR. However, there have been observed impacts on shoreline changes, coastal ecosystems (including wetlands and coral reefs), biodiversity, wetness resources, locations of settlements, health, industries (including tourism, fisheries and agriculture), human health, relocation, displacement and migration of coastal residents. This section should also include discussion of the challenges facing small island countries in particular in assessing existing impacts which likely contributes to not as many studies of observed impacts. See for e.g. (Thomas, A., & Benjamin, L., 2017). Management of loss and damage in small island developing states: implications for a 1.5°C or warmer world. Regional Environmental Change, 1-10.) [Paul Doyle, Canada]

Accepted - impacts taken into account where relevant to 1.5 deg and this chapter. Reference now cited.

13568 65 5 This section is poorly written and it is difficult to follow the main findings. [Elvira Poloczanska, Germany]

Accepted - impacts taken into account where relevant to 1.5 deg and this chapter. Reference now cited.

9001 65 5 65 31 Clearing the effects of 1.5°C above pre-industrial levels. [Jianqiu Wu, China]

Rejected - don’t understand comment

9173 65 6 7 Cross reference to relevant sections of Chapter 1 demonstrating on-going SLR [Robert Kay, United States of America]

Noted. Authors from Chapters 1 and 3 had extensive discussions on the representation of Earth system components with long times scales (where rate of change is related to GMST) to ensure consistent representation.

14345 65 6 65 31 Another impact that is not mentioned in the current version of the report concerns the impact that coral degradation may also lead to a decrease in bed roughness and therefore higher waves at coral reef islands (see e.g. Quattrocchi et al., 2015. The influence of coral reefs and climate change on wave-driven flooding of tropical coastlines. Journal of Geophys. Research) [Alessandro Giardino, Netherlands]

Accepted - sentence added

15022 65 6 65 8 Observations of sea-level rise are likely (and are) to be felt first through slow onset events… What is the sense of the "(and are)" in parenthesis? Deleclaye? [Email Nunoo-Addo, Germany]

Accepted - permanent inundation added

16286 65 6 65 8 Saying "flooding" implies something temporary-low-lying islands are subject to increasing inundation, so permanent effect, and this needs to be mentioned. [Michael MacCracken, United States of America]

Accepted - permanent inundation added

12036 65 7 65 7 bespoke very unusual British word, maybe a synonym would be a better choice. [Paul Doyle, Canada]

Accepted - text revised

12037 65 10 65 10 taken into account - text now removed

5004 65 10 65 10 Observations of sea-level rise are likely (and are) to be felt first through slow onset events… What is the sense of the "(and are)" in parenthesis? Deleclaye? [Email Nunoo-Addo, Germany]

Accepted - words removed

11729 65 10 65 17 A paragraph with some strong (perhaps speculative) statements, but no citations [David Schoeman, Australia]

Taken into account - paragraph no longer exists. Statements made and changed elsewhere in the text.

2523 65 10 65 17 Another important early effect of sea-level rise is the increased frequency of tidal flooding; see, for example, Sweed and Park (2014).

Accepted - sentence added


Accepted - references added

13569 65 65 11 11 implications for low-lying small islands dependent on ground water as fresh water source? [Elvira Poloczanska, Germany]

Accepted - observation reference added (Pearce et al. 2017)

13960 65 65 11 11 use ecosystems rather than biological systems [Elvira Poloczanska, Germany]

Taken into account - sentence moved and changed, but accepted revision.

2108 65 65 14 Accepted - text revised

Not only impacts on barrier ecosystems affect the coastal dynamics. Changing ocean conditions also raise vulnerability of boreal coastline through warmer winters, which impedes the solidification of coastal icefoot, thus increasing the coastline vulnerability to winter storms, which did not used to be affected by those storms. This process is currently significantly accelerating the coastal evolution of the St. Lawrence Estuary and Gulf (Eastern Canada), both in terms of floods and erosion. This is superimposed to the fact that Eastern Canada is a hotspot of sea-level rise: contribution of thermal expansion combined with post-glacial subsidence. (We are aware that the St. Lawrence is not in the Arctic; located around 46-6 degrees of latitude) REFERENCES: GOOD REVIEW: Government of Canada, 2016. Coastal Assessment. Available on http://www.mrcc.gc.ca/inonrmn/resources/policies/impacts-adaptation/notes/assessments/20161838; Rueb, B., Neumair, U., Dumont, D., Brant, E., Sennville, S., Caven, J., 2016. Recent wave climate and expected future changes in the seasonally ice-infested waters of the Gulf of St. Lawrence, Canada. Climate Dynamics, 46, 449-468. doi:10.1007/s00382-015-2592-3 [Ursule Boyer-Villemaire, Canada]

Accepted - reference to Rueb added. Detail added appropriate to size of report.

12038 65 12 65 12 "TYPO... "simultaneous...." [Paul Doyle, Canada]
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>9170</td>
<td>65</td>
<td>34</td>
<td>65</td>
<td>41</td>
<td>At mid-latitudes, there is a great confidence about the reduced protection offered by the coastal sea cover, which increases the coastline exposure to erosions and floods. (Ursula Boyer-Villemaire, Canada)</td>
</tr>
<tr>
<td>9171</td>
<td>65</td>
<td>34</td>
<td>65</td>
<td>41</td>
<td>Globally, there is a lack in attribution studies connecting coastal erosion with climate change, oceanographic and meteorological indicators. This is partly due to the complexity of wave patterns due to anthropogenic structures (Dzidz, B., Bernath, P., Boucher-Browas, G., Lambert, A., Fraser, C., Barnet, R. L., &amp; Vardel-Watts, S. (2015). Coastal RA &amp; field debris measurements and wave runup empirical model. Journal of Marine Science and Engineering, 3(3), 560-590. (Ursula Boyer-Villemaire, Canada)</td>
</tr>
<tr>
<td>9172</td>
<td>65</td>
<td>34</td>
<td>65</td>
<td>41</td>
<td>Currently, for calculating damaging levels with the inclusion of runup and climate probabilities, only semi-empirical with combinatorial statistical analysis have been used. (REFERENCE: Boyer-Villemaire et al., 2019. <a href="https://www.oceus.org/publication-scientifique/2016/Syntheses-Report-A9-Qc.pdf">https://www.oceus.org/publication-scientifique/2016/Syntheses-Report-A9-Qc.pdf</a> (Ursula Boyer-Villemaire, Canada)</td>
</tr>
<tr>
<td>473</td>
<td>65</td>
<td>34</td>
<td>65</td>
<td>45</td>
<td>Perhaps it would be more “clean” to the readers, if examples of the socio-environmental impacts in other water-source/body areas are presented as well, such as lakes, lagoons, etc., since all the wetlands face similar risks due to the climate change. (Spyros Schismenos, China)</td>
</tr>
<tr>
<td>2125</td>
<td>65</td>
<td>35</td>
<td>65</td>
<td>35</td>
<td>Not sure I understand this. Even though some sea level rise is committed because of past warming, won’t a greater warming lead to more sea level rise? But I think this statement is saying that it’s not correct. (Neville Nicholls, Australia)</td>
</tr>
<tr>
<td>6807</td>
<td>65</td>
<td>35</td>
<td>65</td>
<td>35</td>
<td>Yes meaning of this sentence is unclear. What is commitment to sea level rise? (Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland))</td>
</tr>
<tr>
<td>13965</td>
<td>65</td>
<td>35</td>
<td>65</td>
<td>41</td>
<td>Risk levels and their changes should be assessed in line with approaches used in the AR5 synthesis report. (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>13966</td>
<td>65</td>
<td>36</td>
<td>65</td>
<td>36</td>
<td>sentence is unclear (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>2720</td>
<td>65</td>
<td>39</td>
<td>65</td>
<td>41</td>
<td>Reduced protection offered by the coastal sea cover, which increases the coastline exposure to erosions and floods. (Penny Unghaart, South Africa)</td>
</tr>
<tr>
<td>2128</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>43</td>
<td>Could you mean to imply that the small island will migrate? (Neville Nichols, Australia)</td>
</tr>
<tr>
<td>4179</td>
<td>65</td>
<td>43</td>
<td>48</td>
<td>48</td>
<td>In addition to small islands, women, primarily in developing countries are compromised due to lack of information and the ability to decipher such information. Relaying on traditional knowledge but also partnering with communities to help them have disaster plans in place and to be able to report on climate data will be essential. (<a href="http://www.trust.org/item/2014105084703-1d0kn">http://www.trust.org/item/2014105084703-1d0kn</a>) (Michelle Leslie, Canada)</td>
</tr>
<tr>
<td>5605</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>43</td>
<td>What is meant with migration of small islands? (throw out some idea of island then the population, right?) (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>13967</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>43</td>
<td>Migration of small island populations? Should this paragraph be included in the human system section? (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>16288</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>43</td>
<td>Warming needs adjustment: small islands (like trees) do not migrate. Populations may migrate and relocate as islands are flooded and then temporarily inundated, but islands do not migrate. Whether cultural communities can migrate is a tougher question—sort of like talking about ecosystems migrating; can one tear apart a community and then have all its members reassemble elsewhere in a way that keeps the culture? I’d not want to be defending that hypothesis—migration relocation will mean changes and disruption/made adequacy of Indigenous knowledge for new areas, etc. (Michael MacCracken, United States of America)</td>
</tr>
<tr>
<td>2622</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>48</td>
<td>add reference to equity and justice concerns, eg. distributive justice? (Zoha Shawoo, United Kingdom (of Great Britain and Northern Ireland))</td>
</tr>
<tr>
<td>19023</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>66</td>
<td>The paragraph is well written, and the analysis is quite excellent! (JACQUES-ANDRE NIDOME, Senegal)</td>
</tr>
<tr>
<td>11732</td>
<td>65</td>
<td>43</td>
<td>65</td>
<td>66</td>
<td>There has been a sudden and jarring change from discussion of physical-ecological interactions/impacts to human impacts..this needs at least some ensemble to provide context. (David Schoeman, Australia)</td>
</tr>
<tr>
<td>13968</td>
<td>65</td>
<td>44</td>
<td>65</td>
<td>44</td>
<td>Currently being made or have been made, give an example (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>13751</td>
<td>65</td>
<td>45</td>
<td>65</td>
<td>46</td>
<td>Is adaptation a topic for chapter 3, or is it better left to chapter 4? (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>13752</td>
<td>65</td>
<td>46</td>
<td>65</td>
<td>48</td>
<td>Need consistency in terminology in report; community knowledge, local knowledge, indigenous knowledge, traditional knowledge. Which is it? (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>4732</td>
<td>65</td>
<td>46</td>
<td>65</td>
<td>66</td>
<td>There is no information regarding the riparian areas. Only delta and later coastal areas. It would be more accurate riparian areas to be mentioned as well, since they are connected to deltaic territories at a great level in multiple ways. (Spyros Schismenos, China)</td>
</tr>
<tr>
<td>11733</td>
<td>65</td>
<td>46</td>
<td>65</td>
<td>66</td>
<td>Discusses impacts at 2º to 5º C of warming, which seems beyond the ambit of this Report. To be pertinent, these results need to be interpreted in the light of 15ºC... (David Schoeman, Australia)</td>
</tr>
<tr>
<td>5506</td>
<td>65</td>
<td>46</td>
<td>65</td>
<td>46</td>
<td>What is meant with “health security” (Enriqa Nunez-Ribon, Germany)</td>
</tr>
<tr>
<td>13969</td>
<td>65</td>
<td>46</td>
<td>65</td>
<td>46</td>
<td>Increased salinity due to sea level rise? please be clear (Enriqa Polszczanka, Germany)</td>
</tr>
<tr>
<td>12043</td>
<td>65</td>
<td>5</td>
<td>65</td>
<td>6</td>
<td>Temperature up to 5ºC? (Write... (Paul Doyle, Canada)</td>
</tr>
<tr>
<td>12044</td>
<td>65</td>
<td>6</td>
<td>65</td>
<td>7</td>
<td>There is an opening parenthesis which never closes “(up to 5...’ (Enriqa Nunez-Ribon, Germany)</td>
</tr>
<tr>
<td>15212</td>
<td>65</td>
<td>6</td>
<td>65</td>
<td>6</td>
<td>Change “up to 5ºC” by “up to 5ºC” (Ruben Reierts, Spain)</td>
</tr>
<tr>
<td>15213</td>
<td>65</td>
<td>6</td>
<td>65</td>
<td>10</td>
<td>To my understanding it is not clear the meaning of this long sentence (Ruben Reierts, Spain)</td>
</tr>
<tr>
<td>12044</td>
<td>65</td>
<td>7</td>
<td>65</td>
<td>7</td>
<td>found that “in the Schninhof... (Paul Doyle, Canada)</td>
</tr>
<tr>
<td>9602</td>
<td>65</td>
<td>7</td>
<td>65</td>
<td>8</td>
<td>A1B 1.8°C and B1 2.1°C in the 2100s) - using the different climate change scenarios from RCP scenarios. (Jiaquan Wu, China)</td>
</tr>
<tr>
<td>12043</td>
<td>65</td>
<td>8</td>
<td>65</td>
<td>10</td>
<td>Accepted - wording changed in response to comment 12045</td>
</tr>
<tr>
<td>11734</td>
<td>65</td>
<td>8</td>
<td>65</td>
<td>10</td>
<td>What are “low conditions?” (David Schoeman, Australia)</td>
</tr>
</tbody>
</table>

IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3
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<table>
<thead>
<tr>
<th>Comment No</th>
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<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>13446</td>
<td>66</td>
<td>10</td>
<td>66</td>
<td>11</td>
<td>It is also essential to mention high altitude regions and their impacts due to climate change. Increasing flooding might lead to landslides and cloud bursts. I am unsure if there are studies covering this issue, but would be a good option to mention them here. (HICAP project from ICIMOD)</td>
<td>Rejected - beyond scope of coastal zones</td>
</tr>
<tr>
<td>4180</td>
<td>66</td>
<td>12</td>
<td>66</td>
<td>22</td>
<td>Sea-level rise will result in hundreds of millions of people being displaced. What will happen to these climate refugees? How will countries work to relocate their displaced citizens and sell other countries adopt immigration policies for people displaced as a direct result of climate change?</td>
<td>This is an important point that is beyond the scope of the special report. It will be considered in the AR6.</td>
</tr>
<tr>
<td>2481</td>
<td>66</td>
<td>12</td>
<td>66</td>
<td>12</td>
<td>First clear mention of risks to humans...</td>
<td>Noted</td>
</tr>
<tr>
<td>3333</td>
<td>66</td>
<td>12</td>
<td>66</td>
<td>22</td>
<td>You can refer to Yotulut et al (2017), which estimated global inundation impacts due to SLR and astronomical tide high tide using MOCNESS. It shows potential inundated areas varied 370 thousand km² (RCP2.6) to 430 thousand km² (RCP8.5) and affected population varied 55.3 million (RCP2.6, SSP1) to 166 million (RCP8.5, SSP3) in 2100.</td>
<td>Thanks. Papers will be revised for TOD.</td>
</tr>
<tr>
<td>13971</td>
<td>66</td>
<td>12</td>
<td>66</td>
<td>22</td>
<td>Should this paragraph be in the human system section?</td>
<td>Taken into account - text edited</td>
</tr>
<tr>
<td>11730</td>
<td>66</td>
<td>12</td>
<td>66</td>
<td>22</td>
<td>This paragraph is a jumbled mess that needs fixing (Ned Schieren, Australia)</td>
<td>Taken account - paragraph has been changed and rewrote in light of new literature</td>
</tr>
<tr>
<td>2127</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>13</td>
<td>You use “by 2030” twice in this sentence. Delete one of these. Just another of the many examples that indicate that no-one has actually read through this draft before it was sent out to review. It really does raise questions about whether or not the science in this assessment is as reliable (or not) as the standard of the language used. (Neville Nicholls, Australia)</td>
<td>Noted</td>
</tr>
<tr>
<td>3666</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>13</td>
<td>If there is no further adaptation? Who decides about that, why should there be or shouldn’t there be any different adaptation then now?</td>
<td>Taken into account - wording has been omitted in the paragraph / section changed.</td>
</tr>
<tr>
<td>3846</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>14</td>
<td>Does the sentence “By 2030, if...” mean that the 23 coastal megacities are not coastal cities now? Because of sea level rises will they become coastal cities?</td>
<td>Taken into account - section has been removed</td>
</tr>
<tr>
<td>4590</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>13</td>
<td>In the sentence “400 million people could be living in 23 coastal megacities, 370 million in Asia, Africa and South America” the 30 million people is missing. [Radin Tolasz, Czech Republic]</td>
<td>Accepted - section has been removed</td>
</tr>
<tr>
<td>12046</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>11</td>
<td>Redundant - 0.3 m by 2030, 400...</td>
<td>Delete the second “by 2030” [Paul Doyle, Canada]</td>
</tr>
<tr>
<td>19214</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>11</td>
<td>Please, remove the second “by 2030” [Robin Retamar, Spain]</td>
<td>Accepted - section has been removed</td>
</tr>
<tr>
<td>9320</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>14</td>
<td>A recent study by Tapia et al. (2017) put forth the cities with relatively high to medium sensitivities to climate vulnerabilities. In the study, an indicator-based vulnerability assessment to five climate threats were evaluated for 571 European cities. The impacts included heat waves and human health, vulnerabilities to pluvial and fluvial floods, coastal flooding as well as the impact of droughts on water supply. The reference is “Tapia, C., Alboi, B., Falci, E., Mentzab, M., Martinis, J., Fernández, J., Jaburo, T., Lejarazu, A., Profiling urban vulnerabilities to climate change: An indicator-based vulnerability assessment for European cities, Ecological Indicators, Vol. 78, pp. 142-155, 2017.”</td>
<td>Rejected - paper is not focused sufficiently on 1.5C.</td>
</tr>
<tr>
<td>13972</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>14</td>
<td>Sentence sounds awkward, inappropriate use of “If” [Elvira Poloczanska, Germany]</td>
<td>Accepted - section has been removed</td>
</tr>
<tr>
<td>2524</td>
<td>66</td>
<td>13</td>
<td>66</td>
<td>15</td>
<td>Where does the 0.3 m by 2030 number come from? This seems extremely high. By comparison, Kopp et al. (2014)a very large range of 2030 relative to 2000 is 11-18 cm</td>
<td>Accepted - omission - section has been removed</td>
</tr>
<tr>
<td>3657</td>
<td>66</td>
<td>14</td>
<td>66</td>
<td>14</td>
<td>Subsidence will enhance those exposed. I am assuming “those refers to the continents, but it is not clear. [Elvira Sander, Monaco]</td>
<td>Accepted - section has been removed</td>
</tr>
<tr>
<td>2525</td>
<td>66</td>
<td>15</td>
<td>66</td>
<td>17</td>
<td>The study of Jevrejeva et al. (2016) cited here is highly problematic, as it uses a time-slice-based analysis of a phenomenon (sea-level change) with a great deal of lag in its GMSL rise under RCP 8.5 at 50-100 years, when global mean temperature hits 2.0°C is quite different from GMSL rise in 2100 in a world stabilised at 2.0°C. The latter is, I suspect, of greater interest to most of the users of this report than the transient sea level at the moment the world overshoots 2.0°C. [Robert Kopp, United States of America]</td>
<td>Accepted - the commitment to SLR is a challenge here. Reference kept, reduced and made clearer.</td>
</tr>
<tr>
<td>3568</td>
<td>66</td>
<td>16</td>
<td>66</td>
<td>16</td>
<td>Please add “global behind 100% of” [Neville Nicholls, Australia]</td>
<td>Taken into account - section has been removed. See 2525.</td>
</tr>
<tr>
<td>9405</td>
<td>66</td>
<td>16</td>
<td>66</td>
<td>17</td>
<td>Replacing the effects of 1.5°C above pre-industrial levels [Jianguo Wu, China]</td>
<td>Taken into account - sentence has been removed. See 2525.</td>
</tr>
<tr>
<td>13973</td>
<td>66</td>
<td>17</td>
<td>66</td>
<td>17</td>
<td>An updated estimate should be used. Also sea-level rise does not stop in 2083. [Elvira Poloczanska, Germany]</td>
<td>Accepted - reference added</td>
</tr>
<tr>
<td>6808</td>
<td>66</td>
<td>20</td>
<td>66</td>
<td>22</td>
<td>Perhaps it is worth including the compound effects of fluvial flooding here as well [e.g. Moflahan et al., 2017, PNAS, 114, 37, 37] [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Accepted - section has been removed</td>
</tr>
<tr>
<td>3569</td>
<td>66</td>
<td>24</td>
<td>66</td>
<td>45</td>
<td>These three paragraphs need thorough rewriting. They are [Elvira Sander, Monaco]</td>
<td>Accepted - see 10209.</td>
</tr>
<tr>
<td>13753</td>
<td>66</td>
<td>24</td>
<td>65</td>
<td>29</td>
<td>See point above (gill line 45) “better left to chapter 4? This chapter is about impacts [Elvira Poloczanska, Germany]</td>
<td>Taken into account - adaptation is important in coastal zones. With adaptation estimates at 1.5C now in SOD.</td>
</tr>
<tr>
<td>19215</td>
<td>66</td>
<td>24</td>
<td>66</td>
<td>25</td>
<td>I suggest to rephrase this sentence. It seems quite obvious that “adaptation pathways...help broaden possibilities of adaptation” [Robin Retamar, Spain]</td>
<td>Accepted - section has been rewriten.</td>
</tr>
<tr>
<td>11736</td>
<td>66</td>
<td>24</td>
<td>66</td>
<td>25</td>
<td>This is circular... “adaptation pathways...help broaden possibilities of adaptation” [David Schoeman, Australia]</td>
<td>Accepted - section has been rewriten.</td>
</tr>
<tr>
<td>10209</td>
<td>66</td>
<td>24</td>
<td>66</td>
<td>45</td>
<td>This has very little to do with SR1.5 - delete? [Mans Forland, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - adaptation remains important so needs acknowledgement. Impacts depend on combined effects so has been kept. Wetlands section has had substantial revision.</td>
</tr>
<tr>
<td>11376</td>
<td>66</td>
<td>25</td>
<td>66</td>
<td>26</td>
<td>Life adaptation in coastal systems “is not widespread practice in coastal zones” [Go and look at Laura Arnold’s work on the armouring of European coasts...and similar work by various folk in Australia, among several other places. Adaptation is so commonplace as to be one of the most significant threats to ocean-exposed beaches, globally (see recent reviews by Deleo, Schlacher, Dogan, etc...). [David Schoeman, Australia]</td>
<td>Rejected - common referred to adaptation pathways, not defences. Text has been revised due to new material / other reviewer comments.</td>
</tr>
<tr>
<td>Comment No</td>
<td>From Page</td>
<td>From Line</td>
<td>To Page</td>
<td>To Line</td>
<td>Comment</td>
<td>Response</td>
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<tr>
<td>1469</td>
<td>66</td>
<td>27</td>
<td>66</td>
<td>28</td>
<td>Globally, adaptation must consider both threats and solutions, including subsidence (which may be greater than the effects of sea-level rise at 1.5°C and 2°C). This statement should also be supported by some references, e.g. The Chao Phraya Delta in Thailand has been sinking by 5-15 cm year-1 and the Mekong Delta in Vietnam by 2 cm year-1 because of intense groundwater use and/or natural consolidation in addition to sea-level rise (Giovan et al., 2014; Takagi et al., 2016). References: Girgin, L., Synyaki, J., Constantinescu, S., Day, J., 2014. Protect the world’s deltas. Nature, 516, pp. 31–33. Takagi, H., Theo, N. D., Ahn, L. T., 2016. Sea-level rise and land subsidence: impacts on flood projections for the Mekong Delta’s largest city. Sustainability, 8(5), DOI: 10.3390/su8050959. (Hiroshi Takagi, Japan)</td>
<td>Accepted - references to papers now added</td>
</tr>
<tr>
<td>19024</td>
<td>66</td>
<td>27</td>
<td>66</td>
<td>29</td>
<td>I think that this analysis tackle the issue of adaptation limits. Please, you can refer to &quot;Box TS.8. Adaptation Limits and Transformation&quot;, from the Technical Summary (TS) of WGIII (AR5), JACQUES-ANDRE NIDONE, Senegal</td>
<td>Accepted - reference add in adaptation section.</td>
</tr>
<tr>
<td>6809</td>
<td>66</td>
<td>27</td>
<td>66</td>
<td>29</td>
<td>An important, yet often overlooked topic on coastal response to sea level rise, is the analysis of the embayed or geologically constrained beaches and barriers. Coastal sedimentary systems that are backed by rocky cliffs or artificial structures have limited adaptation potential and the likely continued rise in sea level will potentially lead to submergence and complete disappearance of many such systems. Although sediment availability and accommodation space will play a fundamental role in each system, it is anticipated that some are likely to erode or become submerged. Recent modeling investigation by Trenhaile (2017). Marine Geology, in press) provide support to such scenarios. Considering the prevalence of rocky shores around the world’s coastlines, this is likely to have widespread impacts and significant economic implications. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - Presently insufficient evidence to relate to 1.5°C. Constrained wetlands (e.g. coastal squeeze) is now noted in text.</td>
</tr>
<tr>
<td>6810</td>
<td>66</td>
<td>27</td>
<td>66</td>
<td>29</td>
<td>Overall, there is an absolute lack of consideration for impacts and risks on rocky coastal areas. Increases in sea level rise and storms will potentially lead to increase in mass movements and cliff failures on both hard and soft-rock cliffs. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account - rejected - lack of evidence in literature at 1.5 deg, but an acknowledgement of change added in text.</td>
</tr>
<tr>
<td>6811</td>
<td>66</td>
<td>27</td>
<td>66</td>
<td>29</td>
<td>Not only dual but multiple threats. On this point, perhaps earthquakes hazards are not the most relevant when considering coastal areas (although they are not negligible). Perhaps tsunamis and typical and extra-tropical cyclones are the most relevant hazards for which to target coastal adaptation to climate change. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Accepted - sentence reworded in light of comments</td>
</tr>
<tr>
<td>13974</td>
<td>66</td>
<td>27</td>
<td>66</td>
<td>30</td>
<td>Longer term perspective is missing. What is projected over centuries in a 1.5°C world? Start with AR6 synthesis report. [Ehriva Poloczanska, Germany]</td>
<td>Accepted - new journal articles now submitted, so reference to this has been included. This is important.</td>
</tr>
<tr>
<td>2526</td>
<td>66</td>
<td>31</td>
<td>66</td>
<td>37</td>
<td>The units used in this paragraph is somewhat confusing and lacking in context. 12 cm/100 yr = 1.2 mm/yr, well below the current rate of GMSL rise. [Robert Kopp, United States of America]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>3672</td>
<td>66</td>
<td>32</td>
<td>66</td>
<td>32</td>
<td>if sea-level rise over one hundred year timeframe provided the sufficient sediment exists. [Syliva Sander, Monaco]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>19216</td>
<td>66</td>
<td>32</td>
<td>66</td>
<td>32</td>
<td>Chane &quot;cmof&quot; by &quot;cm of&quot; [Ruben Rabetu, Spain]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>5508</td>
<td>66</td>
<td>32</td>
<td>66</td>
<td>32</td>
<td>&quot;cmof should be &quot;cm of&quot; [Ismael Nunez-Hibon, Germany]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>1933</td>
<td>66</td>
<td>32</td>
<td>66</td>
<td>32</td>
<td>A space is needed between &quot;of up to 8-9cmof rise&quot; [Chrystal Mantyka-Pringle, Canada]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>4326</td>
<td>66</td>
<td>32</td>
<td>66</td>
<td>32</td>
<td>cmof change in &quot;cm of&quot; [Riccardo Georgiadis, Italy]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>9066</td>
<td>66</td>
<td>32</td>
<td>66</td>
<td>32</td>
<td>Literature is old; please add new literatures [Jiangguo Wu, China]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>13975</td>
<td>66</td>
<td>34</td>
<td>66</td>
<td>36</td>
<td>how do these relate to the levels of sea level rise expected under 1.5 or 2°C???? [Ehriva Poloczanska, Germany]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>12047</td>
<td>66</td>
<td>35</td>
<td>66</td>
<td>35</td>
<td>When &quot;talos&quot; of ... [Paul Doyle, Canada]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>3673</td>
<td>66</td>
<td>36</td>
<td>66</td>
<td>37</td>
<td>sentence structure revised. &quot; When the rate of sea-level rise was greater than this in the Holocene, mangrove systems collapsed (Elsdon and Stoddart 1991). [Syliva Sander, Monaco]</td>
<td>Taken into account - paragraph removed and replaced with more appropriate text on wetlands</td>
</tr>
<tr>
<td>3674</td>
<td>66</td>
<td>37</td>
<td>66</td>
<td>37</td>
<td>Salinisation may lead to shifts to more salt-tolerant plants (Biasco et al. 1996).&quot; like what plants? Mangroves are already very salinity tolerant. [Syliva Sander, Monaco]</td>
<td>Accepted - sentence removed and a new reference to wetlands and salinization of ecosystems has been added</td>
</tr>
<tr>
<td>13976</td>
<td>66</td>
<td>37</td>
<td>66</td>
<td>37</td>
<td>This sentence is hanging on its own. should be expanded as an introduction in this paragraph on how coastal vegetation may shift [Ehriva Poloczanska, Germany]</td>
<td>Accepted - sentence removed and a new reference to wetlands and salinization of ecosystems has been added</td>
</tr>
<tr>
<td>11738</td>
<td>66</td>
<td>39</td>
<td>66</td>
<td>40</td>
<td>This statement is ridiculous: &quot;The projections given only take account of sea-level rise and subsidence, but not any additional sediment gain from river deposition, which could reduce the rate of loss&quot;. The impoundment of rivers is a major issue around the world. and this, along with extensive sand mining in many parts of the world, are starving beaches of their sand, exacerbating the effects of sea-level rise. Please go and do a proper literature search for impacts to soft-sediment shores, and especially beaches. [David Schoeman, Australia]</td>
<td>Taken into account. This part of the text has been extensively reworded in light of new literature. The scope of this must focus on 1.5C.</td>
</tr>
</tbody>
</table>
**Comment No** | **From Page** | **From Line** | **To Page** | **To Line** | **Comment** | **Response**
--- | --- | --- | --- | --- | --- | ---
2024 | 66 | 41 | 45 | Sundarbans, in Bangladesh is the largest mangrove in the world. High density literature review of this forest. There are credible evidences that the main species of Sundarbans, i.e. "Sundarn tree" is suffering from "Trop Dying" problem due to increase in salinity level. Also the low saline tolerant species like "Gore these are replaced by high saline tolerant species like "Goren" as the salinity level along the entire forest is increasing. Intrusion of salinity is further aggravated due to upstream withdrawal of water along the Gangetic river at Farakka Barrage site inside India, so that during dry season, sea water can enter the forest because of low upstream fresh water flow. The South-West region of the country, known as Gangetic Delta Region or GDA is severely affected from salinity intrusion due to this couple effects of sea level rise as well as upstream withdrawal of water. [Mir Sirajul Islam, Bangladesh]

**Response**

Taken into account: Salinity intrusion added to text. Dams/barrages added to text. Rejected: "Trop dying problem" (see doi: 10.11648/j.ajaf.20140204.20) - more evidence required to add detail.

12048 | 66 | 44 | 66 | Eliminate "Temporarily..." [Paul Doyle, Canada]

**Response**

Accepted: - this section has been rewriten in light of new literature

4593 | 66 | 45 | Change "km^2" by "km^2 y^-1 " (2x) [Radim Tolasz, Czech Republic]

**Response**

We are grateful for your suggestion, and will be including consideration of it in the next draft

3575 | 67 | 67 | entire chapter: this is a very well written sub-chapter. It is not only a string of references, but follows a line of thought and makes very good points. Well done. I wish some of the other chapters would be written this good. [Sylvia Sander, Monaco]

**Response**

We are grateful for your suggestion, and will be including consideration of it in the next draft

1727 | 67 | 67 | Many key aspects on adaptations and avoided risks are empty. Is the column "drivers" needed? They are all related to sea level increase. [Maria Jesus (Gomez Brownes, Spain)]

**Response**

Accepted: text has been simplified.

1249 | 67 | 67 | Table 3.3 not mentioned in text but very useful. Noted [Paul Doyle, Canada]

3903 | 67 | 67 | 4 | While 3.3 lacking of adaptation options [Hongwu Wu, China]

**Response**

Taken into account - table is being revised

6812 | 67 | 67 | 6 | Although stated as incomplete, therefore subjected to major changes, the column on avoided risks has details that do not related all to avoid risks, but to potential impacts. [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]

**Response**

Taken into account - table is being revised

11739 | 67 | 67 | 4 | A major ecosystem service overlooked in this table is the fact that beaches and associated dunes (which I am assuming fall into this category) provide extensive buffering between the ocean and some of the world's most valuable residential real estate. [David Schoweni, Australia]

**Response**

Taken into account - beaches and shoreline section revised, but within the scope of report

16289 | 67 | 67 | 15 | The ocean is also vital for maintaining life on Earth, generation of oxygen and more--including its vital roles for life on Earth in an estimate of the dollar value of goods and services is simply not an adequate description of the ocean ecosystem. [Michael MacCracken, United States of America]

**Response**

Accepted: text has been simplified.

4594 | 67 | 67 | 12 | Change "$ (US) 2.4 Trillion" by "$ (US) 2.4 US Trillion" [Radim Tolasz, Czech Republic]

**Response**

Editorial - copy-editing for consistency to be completed prior to publication

9688 | 67 | 67 | 12 | It would be better to say "$ (US) 2.4 Billion USD instead of saying "$ (US) 2.4 Trillion" [Mustafa Tufan Turp, Turkey]

**Response**

Editorial - copy-editing for consistency to be completed prior to publication

12380 | 67 | 67 | 12 | Cost of ecosystem services of $2.4 Billion (Hoegh-Guldberg 2015) seems to be a very precise number - do we have a range? [Bill Hare, Germany]

**Response**

Accepted: We have now provided a range and avoid specific numbers.

13977 | 67 | 67 | 12 | Is this grey literature? Follow protocol [Evina Potzczanka, Germany]

**Response**

Hoegh-Guldberg at al. 2015 is grey literature and will be processed accordingly.

2128 | 68 | 4 | 68 | Another example of a sentence which a reader will have great trouble understanding because of the poor language and lack of any editing. I chose this one for the example because it refers to a study led by one of the CLA's. So I am surprised that the sentence referring to this study is incomprehensible. [Neil Nicofo, Australia]

**Response**

Accepted: Text has been carefully modified and clarified

3576 | 68 | 5 | 68 | I would suggest to change "which by which" [Ruben Rebolledo, Spain]

**Response**

Accepted: Text has been carefully modified and clarified

19217 | 68 | 6 | 68 | Reword sentence thusly...... since AR5 "with" the focus on the ocean and its systems "having" increased significantly...... [Paul Doyle, Canada]

**Response**

Accepted: Text has been carefully modified and clarified

12050 | 68 | 68 | 6 | Reword sentence thusly...... since AR5 "with" the focus on the ocean and its systems "having" increased significantly...... [Paul Doyle, Canada]

**Response**

Accepted: Text has been carefully modified and clarified

3996 | 68 | 68 | 8 | The statement of "growing evidence" needs references [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)]

**Response**

Accepted: - this section has been rewritten in light of new literature

9321 | 68 | 68 | 9 | We need "however" in the sentence removed from the statement for better grammar "the world's largest habitat, the deep sea, remains one of the least understood on the planet, however, despite the growing evidence that current changes in the deep ocean may exacerbate significant risks of irreversible changes within the Earth's climate system" [Stir Kulis, Turkey]

**Response**

Accepted: Text has been rewritten and now addresses this issues.

11740 | 68 | 68 | 8 | Current changes? Changes in ocean currents? Or changes that are currently happening? [David Schoweni, Australia]

**Response**

Accepted: Text has been rewritten and now addresses this issue.

12051 | 68 | 68 | 10 | Reword sentence thusly...... tipping points "of the ocean", as well as how humans are changing this vast part of the earth" , is likely...... [Paul Doyle, Canada]

**Response**

Accepted: Text has been rewritten and now addresses this issue.

2129 | 68 | 12 | Another example of poor language - "regionally, the ocean can be separated into a number of global regions..." The number of mistakes in this short clause is staggering. Can an ocean be "separated"? Why start the sentence with "regionally" and then a few words later say you are separating the ocean into "regions"? And what is a "global region" anyway? Please try harder to write sentences that a reader will understand [Neville Nicholls, Australia]

**Response**

Accepted: Text has been rewritten and now addresses this issue.

12052 | 68 | 12 | 68 | DELETE. "Regionally," [Paul Doyle, Canada]

**Response**

Accepted: Text has been rewritten and now addresses this issue.

2130 | 68 | 14 | This phrase ("A range of ocean systems operate within these ocean regions...") is meaningless and is an example of just words that add nothing to the reader's understanding of the subject. More "philosophy" is required throughout this chapter. And why are these regions now "complex regions"? Do you mean they are bordered by convoluted land masses? [Neil Nicofo, Australia]

**Response**

Accepted: Text has been rewritten and now addresses this issue.

6401 | 68 | 18 | 68 | Much of the discussion centres on ocean basins, which is correct and understandable. However, a significant proportion of the world's population interacts with coastal resources only and it wonder whether attention should be drawn to this. This is particularly so with regards to aquaculture [Neville Nicholls, Australia]

**Response**

Taken into account - the global regions match those of the oceans chapter in AR5 which is being taken into account - the global regions match those of the oceans chapter in AR5 which is being

3987 | 68 | 19 | 68 | The references to all the different tables here was very confusing [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)]

**Response**

Accepted: - tables have been collapsed into one. Explanation has been simplified.

5509 | 68 | 20 | 68 | 21 | there are examples of high levels of attribution of changes to climate change, and not. Hard to understand this sentence, please rewrite. [Isamet Kurnaz-Ribon, Germany]

**Response**

Accepted: tables have been collapsed into one. Explanation has been simplified.

3977 | 68 | 21 | 68 | there are examples of high levels of attribution of changes to climate change, and not [Sylvia Sander, Monaco]

**Response**

Accepted: tables have been collapsed into one. Explanation has been simplified.

2589 | 68 | 21 | 68 | There are examples of high levels of attribution of changes to climate change, and not..." [Carlos Loureiro, United Kingdom (of Great Britain and Northern Ireland)]

**Response**

Accepted: - tables have been collapsed into one. Explanation has been simplified.

1934 | 68 | 21 | 68 | Incomplete sentence "there are examples of high levels of attribution of changes to climate change, and not..." [Sylthee Marjanja-Pinge, Indonesia]

**Response**

Accepted: Text has been rewritten and now addresses this issue.
The full set of projected key risks, avoided risks at 1.5 °C and adaptation options have been laid out in Table 3.4 which is an update and modification to Table 3.3. The Table 3.3 of AR5 is "Catalogue of climate change adaptation options for the management of freshwater resources". The Table 3.4 of the present report looks a lot more like Table 6.6 of the AR5. [Ismael Ruiz-Bilioni, Germany]

Confused by the repeated mentioning of Table 3.4 as whether this table is the one in this report or in AR5? [Paul Doyle, Canada] Accepted - tables have been collapsed into one. Explanation has been simplified.

This section includes proposed adaptations in broad direction. If possible, can the authors add some adaptation practices that have been applied in a region or provide more information if there is further elaboration in the next section or chapter? If possible, the author can review Pedersen and Winkler (2014) published in Environmental Management discussed about land use and climate feedbacks, also proposed a summary to define adaptation options. [Perdian Pedersen, Indonesia]

It is a little odd that the text describes the contents of Table 3.4 referring to row 17. However, it would help if the table itself would have a column with row numbers so that the reader does not have to count each row from the beginning. (for instance, in Section 3.4.3.1.4, we refer to row 13.) Considering this is a table that spans through many pages, it is a bit complicated to count so many rows. [Ismael Ruiz-Bilioni, Germany]

There is a contradiction here. On the one hand "warming and stratification are leading to reduced oxygen concentration in ocean water generally" - i.e. both in surface, subsurface and deep waters. But on the other hand most current model projections suggest a decrease in global NPP compared to contemporary values (cf above) with the exception of the Southern Ocean, a restructuring of phytoplankton communities and important regional heterogeneity are expected (Bopp et al. 2013, Dutkiewicz et al. 2014). [Paul TREGUER, France]

We have worked to make this clearer in text. There are general trends in ocean oxygen, for example, plus specific issues associated with particular regions (increased coupling, localised increases in NPP, decreases in deepwater oxygen as per Bakun et al. 2015)

We have worked to make this clearer in text. There are general trends in ocean oxygen, for example, plus specific issues associated with particular regions (increased coupling, localised increases in NPP, decreases in deepwater oxygen as per Bakun et al. 2015)

There is a section further below dealing with fisheries, this section would be better placed concentrating on fish (or marine biodiversity) with the fisheries text moving to the fisheries and livelihoods section (3.4.3.2.3) and fisheries production sections (4.4.5.1.3 and 3.4.5.2.3) [Elena Poloczanska, Germany]

Changes in the productivity of ocean systems is rapidly mentioned in the present version but not well argumented. Indeed, if most current model projections suggest a decrease in global NPP compared to contemporary values (e.g. Bopp et al. 2013) and a decreased in export production (e.g. Dutkiewicz et al. 2013, Fu et al. 2016) which means less consumption of diatom in subsurface and deep waters and thus a decreased extension of the di-oxygen minimum zones of the world ocean. So, it is not clear why di-oxygen concentration should decrease in "ocean water generally" (cf. line 57. page 68). [Paul TREGUER, France]

This is just unintelligible. [David Schoeman, Australia]

Accept: more complete treatment of productivity changes in the open ocean.

Changes in the productivity of ocean systems is rapidly mentioned in the present version but not well argumented. Indeed, if most current model projections suggest a decrease in global NPP compared to contemporary values (e.g. Bopp et al. 2013) and a decreased in export production (e.g. Dutkiewicz et al. 2013, Fu et al. 2016) which means less consumption of diatom in subsurface and deep waters and thus a decreased extension of the di-oxygen minimum zones of the world ocean. So, it is not clear why di-oxygen concentration should decrease in "ocean water generally" (cf. line 57. page 68). [Paul TREGUER, France]

What is a "fixed organism"? [David Schoeman, Australia] Accepted: typo - removed.

Reference needed for this statement [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)] Accepted: rewritten

I think it is OK that the text describes the contents of Table 3.4 referring to row 17. However, it would help if the table itself would have a column with row numbers so that the reader does not have to count each row from the beginning. (for instance, in Section 3.4.3.1.4, we refer to row 13.) Considering this is a table that spans through many pages, it is a bit complicated to count so many rows. [Ismael Ruiz-Bilioni, Germany]

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What is a "fixed organism"? [David Schoeman, Australia] Accepted: typo - removed.

There is a section further below dealing with fisheries, this section would be better placed concentrating on fish (or marine biodiversity) with the fisheries text moving to the fisheries and livelihoods section (3.4.3.2.3) and fisheries production sections (4.4.5.1.3 and 3.4.5.2.3) [Elena Poloczanska, Germany]

These changes add to other drivers of primary as well as fisheries productivity such as changes to where isotherms are located as the ocean warms. [Guillem Chust, Spain]

There is a section further below dealing with fisheries, this section would be better placed concentrating on fish (or marine biodiversity) with the fisheries text moving to the fisheries and livelihoods section (3.4.3.2.3) and fisheries production sections (4.4.5.1.3 and 3.4.5.2.3) [Elena Poloczanska, Germany]

These changes add to other drivers of primary as well as fisheries productivity such as changes to where isotherms are located as the ocean warms? This is just unintelligible. [David Schoeman, Australia]

This is just unintelligible. [David Schoeman, Australia]

There is a section further below dealing with fisheries, this section would be better placed concentrating on fish (or marine biodiversity) with the fisheries text moving to the fisheries and livelihoods section (3.4.3.2.3) and fisheries production sections (4.4.5.1.3 and 3.4.5.2.3) [Elena Poloczanska, Germany]

These changes add to other drivers of primary as well as fisheries productivity such as changes to where isotherms are located as the ocean warms? [David Schoeman, Australia]

These changes add to other drivers of primary as well as fisheries productivity such as changes to where isotherms are located as the ocean warms? This is just unintelligible. [David Schoeman, Australia]

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These changes add to other drivers of primary as well as fisheries productivity such as changes to where isotherms are located as the ocean warms? This is just unintelligible. [David Schoeman, Australia]

There is a section further below dealing with fisheries, this section would be better placed concentrating on fish (or marine biodiversity) with the fisheries text moving to the fisheries and livelihoods section (3.4.3.2.3) and fisheries production sections (4.4.5.1.3 and 3.4.5.2.3) [Elena Poloczanska, Germany]
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>2133</td>
<td>68</td>
<td>50</td>
<td></td>
<td></td>
<td>I cant imagine why fishing infrastructure couldn't change quickly enough to keep up with the changes projected. These don't seem rapid, in the context of the flexibility of fishing operations. (Neville Nicholls, Australia)</td>
<td>Suggestion declined: keeping up with change add to economic burden. Given that most fishing is subsidized, added costs of trying to keep up with the changing fish stock and technology are likely to be difficult challenges.</td>
</tr>
<tr>
<td>12059</td>
<td>68</td>
<td>52</td>
<td>68</td>
<td>53</td>
<td>Reword sentence thus...assistance might be needed to provide employment for out of work fishermen. [Paul Doyle, Canada]</td>
<td>Accepted: rewritten</td>
</tr>
<tr>
<td>7480</td>
<td>68</td>
<td>56</td>
<td>68</td>
<td>19</td>
<td>References needed throughout this paragraph [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Accepted: rewritten - with overlap significantly reduced.</td>
</tr>
<tr>
<td>12060</td>
<td>69</td>
<td>1</td>
<td>76</td>
<td>36</td>
<td>Due to looming deadline, unable to even pen this section of draft. (Paul Doyle, Canada)</td>
<td>We think the reviewer for their efforts and contribution.</td>
</tr>
<tr>
<td>12381</td>
<td>69</td>
<td>3</td>
<td>69</td>
<td>5</td>
<td>Do we have any quantitative estimates for how much the number of hypoxic areas has increased? [Bir Hare, Germany]</td>
<td>Did the put refers to the growth of dead zones as being exponential - text now reads: The number of dead zones has been increasingly exponentially over the past few decades (Altieri and Gedan, 2015; Diaz and Rosenberg, 2008: Schmidtt et al., 2017). (Diaz, R. J.; and Rosenberg, R. (2008): Spreading Dead Zones and Consequences for Marine Ecosystems. Science (80-. ). 321, 926–929. doi:10.1126/science.1156401.)</td>
</tr>
<tr>
<td>11743</td>
<td>69</td>
<td>4</td>
<td>69</td>
<td>4</td>
<td>&quot;Off limits&quot; is a bit casual for a report like this. [Gerald Schoeman, South Africa]</td>
<td>Accepted: rewritten</td>
</tr>
<tr>
<td>12382</td>
<td>69</td>
<td>7</td>
<td>69</td>
<td>19</td>
<td>This section could reference other sections with examples of coral that have been affected by acidification [Bir Hare, Germany]</td>
<td>Accepted: fact rewrite</td>
</tr>
<tr>
<td>7481</td>
<td>69</td>
<td>7</td>
<td>69</td>
<td>9</td>
<td>The value 30% is given in the increase in proton concentration since pre-industrial time, while in section 3.3.11 (p. 34, line 35-35) the value 28% is used. (Byvend Christophersen, Norway)</td>
<td>Now 30% increase in acidity is being used across the report. This make up is essentially rounds off the estimate to 30%.</td>
</tr>
<tr>
<td>3847</td>
<td>69</td>
<td>9</td>
<td>69</td>
<td>11</td>
<td>1. &quot;and growth,&quot; -&gt; growth of what? 2. If the sentence meant declining calcification, then &quot;increases in de-calcification&quot; looks redundant [Woomap Choi, United States of America]</td>
<td>Accepted: editorial - copy edit to be completed prior to publication.</td>
</tr>
<tr>
<td>3970</td>
<td>69</td>
<td>10</td>
<td>69</td>
<td>10</td>
<td>Add section number to &quot;sea ocean chemistry above&quot; [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Accepted: rewritten - with overlap significantly reduced.</td>
</tr>
<tr>
<td>13755</td>
<td>69</td>
<td>16</td>
<td>69</td>
<td>17</td>
<td>There is an increasing amount of field studies on the impact of different pCO2 levels on organisms and communities [Elnira Poloczanska, Germany]</td>
<td>Accepted: added reference to ecosystem engineers.</td>
</tr>
<tr>
<td>5471</td>
<td>69</td>
<td>22</td>
<td>69</td>
<td>22</td>
<td>this structure is unclear - ecosystem services or resources? [Aluwa Baruah, Nigeria]</td>
<td>Accepted: rewritten. Depends on the context.</td>
</tr>
<tr>
<td>17273</td>
<td>69</td>
<td>22</td>
<td>69</td>
<td>24</td>
<td>a discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Accepted: added reference to ecosystem engineers.</td>
</tr>
<tr>
<td>4253</td>
<td>69</td>
<td>51</td>
<td></td>
<td></td>
<td>The word &quot;curtailment&quot; in the phrase &quot;coastal development often curtailment these opportunities&quot; should be &quot;curtail&quot; [Sit KILKIS, Turkey]</td>
<td>The word &quot;curtailment&quot; in the phrase &quot;coastal development often curtail these opportunities&quot; should be &quot;curtail&quot; [Sit KILKIS, Turkey]</td>
</tr>
<tr>
<td>5109</td>
<td>69</td>
<td>49</td>
<td>69</td>
<td>56</td>
<td>There is an increasing amount of field studies on the impact of different pCO2 levels on organisms and communities [Elnira Poloczanska, Germany]</td>
<td>Accepted: new mention in SLR section</td>
</tr>
<tr>
<td>3581</td>
<td>69</td>
<td>50</td>
<td></td>
<td></td>
<td>Would rather prefer to see these organisms referred to as &quot;physical ecosystem engineers&quot; for which abundant literature is available. [Maria Jesus Schoeman, South Africa]</td>
<td>Accepted: fact rewrite</td>
</tr>
<tr>
<td>3791</td>
<td>69</td>
<td>19</td>
<td>69</td>
<td>19</td>
<td>A few lines discussing projections of multiple stressors would be a good fit here, e.g. <a href="https://doi.org/10.1038/s41467-022-03248-6">https://doi.org/10.1038/s41467-022-03248-6</a></td>
<td>Accepted: text rewrite to include mention of multiple stressors: text now includes: Importantly, stress factors rarely operate in isolation. Consequently, the effect of global warming at 1.5°C versus 2°C, has to be considered in the light of multiple interactive factors that may accumulate over time to produce complex effects within human and natural systems.</td>
</tr>
<tr>
<td>7482</td>
<td>69</td>
<td>22</td>
<td>70</td>
<td>10</td>
<td>Please consider including a paragraph on ecological regime shifts in this sub-chapter [Byvend Christophersen, Norway]</td>
<td>Accepted: rewritten - with overlap significantly reduced.</td>
</tr>
<tr>
<td>3972</td>
<td>69</td>
<td>27</td>
<td>69</td>
<td>27</td>
<td>How 5?? [Stephanie Henson, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Accepted: removed</td>
</tr>
<tr>
<td>5109</td>
<td>69</td>
<td>49</td>
<td>69</td>
<td>56</td>
<td>A discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Accepted: new mention in SLR section</td>
</tr>
<tr>
<td>3581</td>
<td>69</td>
<td>50</td>
<td></td>
<td></td>
<td>There is an increasing amount of field studies on the impact of different pCO2 levels on organisms and communities [Elnira Poloczanska, Germany]</td>
<td>Accepted: new mention in SLR section</td>
</tr>
<tr>
<td>5122</td>
<td>69</td>
<td>51</td>
<td>52</td>
<td>59</td>
<td>The word &quot;curtailment&quot; can be replaced with &quot;curtail&quot; [Muhammad Mohsin Iqbal, Pakistan]</td>
<td>Accepted: curtail now used</td>
</tr>
<tr>
<td>2592</td>
<td>69</td>
<td>52</td>
<td>69</td>
<td>62</td>
<td>A discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Accepted: new mention in SLR section</td>
</tr>
<tr>
<td>6244</td>
<td>69</td>
<td>55</td>
<td></td>
<td></td>
<td>&quot;and between storms coastal&quot; [Muhammad Mohsin Iqbal, Pakistan]</td>
<td>Accepted: curtail now used</td>
</tr>
<tr>
<td>3973</td>
<td>69</td>
<td>55</td>
<td>69</td>
<td>66</td>
<td>&quot;and between storms coastal&quot; [Muhammad Mohsin Iqbal, Pakistan]</td>
<td>Accepted and rewritten, referring to reference</td>
</tr>
<tr>
<td>6213</td>
<td>69</td>
<td>55</td>
<td>69</td>
<td>66</td>
<td>&quot;and between storms coastal&quot; [Muhammad Mohsin Iqbal, Pakistan]</td>
<td>Accepted and rewritten, referring to reference</td>
</tr>
<tr>
<td>2153</td>
<td>70</td>
<td>2</td>
<td>70</td>
<td>4</td>
<td>This sentence talks about &quot;concentrating efforts&quot; but I am lost as to what &quot;efforts&quot; the sentence refers to? [Neville Nicholls, Australia]</td>
<td>Accepted and rewritten: In addition, concentrating adaptation efforts in locations where climate change might be needed to provide employment for out of work fishers.</td>
</tr>
<tr>
<td>2156</td>
<td>70</td>
<td>7</td>
<td></td>
<td></td>
<td>Are you saying that life on earth will not survive global warming if these &quot;organisms&quot; are lost? I think you will need very strong evidence to suppor that implication. [Neville Nicholls, Australia]</td>
<td>Accepted and rewritten - with overlap significantly reduced.</td>
</tr>
<tr>
<td>13756</td>
<td>70</td>
<td>12</td>
<td>70</td>
<td>14</td>
<td>A discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Accepted: new mention in SLR section</td>
</tr>
<tr>
<td>11744</td>
<td>70</td>
<td>13</td>
<td>70</td>
<td>22</td>
<td>This paragraph fails to mention the multiple interacting impacts that affect fish populations (i.e., they are impacted not only by climate change, but also by fishing, for example), or that these interactions make attribution of climate impacts difficult. It also fails to cite even a single paper. (David Schoeman, South Africa)</td>
<td>Approved: text modified</td>
</tr>
<tr>
<td>2137</td>
<td>70</td>
<td>14</td>
<td>70</td>
<td>18</td>
<td>I think we are trying to say with the sentence beginning &quot;As a result...&quot; but once again the language is so error-laden and convoluted that I am not sure. Please have an editor read your text. [Neville Nicholls, Australia]</td>
<td>Approved: text modified</td>
</tr>
<tr>
<td>16200</td>
<td>70</td>
<td>14</td>
<td>70</td>
<td>22</td>
<td>We would think that the issue of overfishing to have been mentioned right near the start of paragraphs as having the major influence to date, but that climate related changes are becoming more and more important as fishery ranges shift. (Michael MacCracken, United States of America)</td>
<td>Approved: text modified</td>
</tr>
<tr>
<td>4596</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td>A discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Approved and rewritten: point accepted - text modified</td>
</tr>
<tr>
<td>13984</td>
<td>70</td>
<td>17</td>
<td></td>
<td></td>
<td>there are no citations in this section [Elvira Poloczanska, Germany]</td>
<td>Accepted: references added text has been rewritten as well.</td>
</tr>
<tr>
<td>4597</td>
<td>70</td>
<td>17</td>
<td></td>
<td></td>
<td>A discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Accepted and rewritten: point accepted - text modified</td>
</tr>
<tr>
<td>4598</td>
<td>70</td>
<td>18</td>
<td></td>
<td></td>
<td>A discussion of salinzation (particularly for impacts on food livelihoods) as a result of SLR seems appropriate but is not included here or elsewhere. (Byvend Christophersen, Norway)</td>
<td>Accepted and rewritten: point accepted - text modified</td>
</tr>
</tbody>
</table>

Do Not Quote, Cite, or Distribute Page 88 of 152
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

2138 70 19
Just a simple example of how even a quick read through of your text would have resulted in more readability. You start this sentence with “in addition,” and then throw in “also.” You don’t need both. [Nicole Nicholls, Australia]

5612 70 22
If “food production systems” a section of this report? Use its section number as well? [Omer Nouri, Germany]

5473 70 25
Q: delete 3.4.3.2 [Alfyu Baru, Nigeria]

3682 70 57
confusion with use of words avoidable and avoided. I think these paragraphs are about ‘avoidable’ risks and I have commented accordingly. [Sylvia Sander, Monaco]

5472 70 44
this should move to introduction [Alfyu Baru, Nigeria]

5035 70 29
Understanding the avoidable risks [Sylvia Sander, Monaco]

9026 70 70
30. Industrial Period should probably be edited. The term “pre-industrial” is more common. [Bjorg Arnaeas, Norway]

2139 70 70
No. We are NOT talking about warming of 1.5C “above the Industrial Period”. We are talking about 1.5C warming above the pre-industrial period. [Nicole Nicholls, Australia]

3974 70 70
I doubt the responses of ocean biology and biogeochemistry show “a simple linear extension” of current conditions. What about overshoots, adaptation, acclimation, resilience…? [Stephen Henson, United Kingdom (of Great Britain and Northern Ireland)]

16291 70 70
Just a note that I like the idea of the data being increased levels of warming starting at 0.5°C and working up to 1.5°C and that this should not be viewed as a scientifically acceptable new baseline value to allow reduction impacts and help system recover, warming needs to go back below 0.5°C. Michael MacCracken, United States of America

1982 70 70
Justify both margins to match other paragraphs, and throughout [Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland)]

19220 70 70
I suggest to change “impact” by “affect” [Ruben Retuerto, Spain]

11748 70 70
Impacts of hypoxia would impact... Well, of course they would... [David Schoeman, Australia]

2140 70 70
Again you use “significant”. Do you mean “statistically significant”? Or do you mean “substantial”? I guess the latter. In which case, how “substantial”? [Nicole Nicholls, Australia]

3584 70 70
Abrupt changes in avoidable risks [Sylvia Sander, Monaco]

11748 70 70
Throughout this Section (i.e., not only this paragraph) there seems to be a bit of confusion between “continuous” and “linear.” For example, “in other cases, changes are likely to be less continuous and gradual…” Both exponential curves and step functions are continuous...so this sentence makes little sense... [David Schoeman, Australia]

12383 70 70
Section on “abrupt changes in avoided risks” discusses coral bleaching and mortality at 1.5 and 2 degrees, with no reference to Schleussner et al. at. 2016, which found that under 1.5 deg 70% of corals would be at risk of serious degradation. [Bill Hare, Germany]

9323 70 70
There is a missing word “by” in the phrase “recently demonstrated (by) the Great Barrier” [Sir KILIK, Turkey]

13985 70 70
I have read this reference and have added it to the latest SOD version

12383 70 70
Just a simple example of how even a quick read through of your text would have resulted in more readability. You start this sentence with “in addition,” and then throw in “also.” You don’t need both. [Nicole Nicholls, Australia]

13985 70 70
...which will drive average coral cover on these various downward over time It seems to me a weird sentence [Ruben Retuerto, Spain]

3844 70 70
Understanding the avoidable risks [Sylvia Sander, Monaco]

2593 70 70
This analysis seems to be based solely on change in temperature, but at 1.5°C one would likely also have elevated CO2 concentration and perhaps other related changes. Is use of the word “self” without caveat really justified? Perhaps say in certain regions to indicate that large scale distribution will be quite limited compared to today. [Michael MacCracken, United States of America]

19221 70 70
Q: which will drive average coral cover on these various downward over time It seems to me a weird sentence [Ruben Retuerto, Spain]

16292 70 70
Q: which will drive average coral cover on these various downward over time It seems to me a weird sentence [Ruben Retuerto, Spain]

2593 70 70
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7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]

7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]

7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]

7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]

7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]

7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]

7483 70 70
Please check this sub-chapter for overlap with sub-chapter 3.4.5.1.3 [Brinly Christoferson, Norway]
The sentence is suggested to be rewritten as 'Sensitivity to - - - - differs between regions, with fish stocks and fisheries in the tropical and polar... 

I thought this section was about 1.5°C versus 2°C, not about 1.5C-2C versus any other possible warming. 

How "substantial"? 20% higher revenue compared with 2C warming? We need numbers, not just words that can be interpreted in many different ways. 

The tables used to show key risks, impacts, adaptation options and avoided risks does not show the difference between 1.5 and 2°C. This does not sufficiently reflect the content of the chapter. 

The symbol for "Precipitation" (in header) is not used in the table. 

I thought this was the topic of the whole section. Why do you need to repeat it? 

In the Table, in the cell row 1, column 1 (Updated key risk x Changes in ecosys productivity), add the following reference: Chust et al. 2014b 

Tab 3.4 - The symbol for "Precipitation" (in header) is not used in the table. 

The chapter has been rewritten/ restructured around comparison of 1.5°C to 2°C.
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

5156 73 73 4th row and 2nd column (adaptation options) of table: "Evidence for differential resistance and evolutionary adaptation of some species exist." I think this is very interesting and I only know the results of the water flea (http://www.nature.com/nclimate/journal/v5/n7/full/nclimate2628.html). Why no references are given on this in this table cell? Or are the references relating this statement given in the cell to the left (first row)? [Ismael Nurzey-Riboni, Germany]

Accepted: no longer using table


Accepted: no longer using table

6814 73 73 Aspects of this table, particularly related to coastal protection and coastal inundation should be moved to the previous table. I understand that coasts are a part of the ocean, but if a separate section has been created for coastal and low lying areas, these aspects should be addressed there and not as part of the ocean systems. [Carlos Lourenco, United Kingdom (of Great Britain and Northern Ireland)]

Accepted: no longer using table

5174 74 74 4th row and 3rd column of table: "Increased NPP in some systems is likely lead to decreases in oxygen and, in cases, increased anoxia at depth." The sentence is missing a word? Should this be "is likely to lead" or "will likely lead" or something like that? [Ismael Nurzey-Riboni, Germany]

Accepted: no longer using table

5518 74 74 11th row and 3rd column of table: The sentence "These differences will be smaller at 1.5 C persons to decrease healthier for higher" makes no sense. [Ismael Nurzey-Riboni, Germany]

Accepted: no longer using table

12387 74 74 For the 4th row of the table on page 74 (on variability in small pelagic fishes) the 'avoided impacts' box does not make sense: "These differences will be smaller at 1.5 deg persons to decrease healthier for higher" [Bill Hare, Germany]

Accepted: no longer using table

2762 74 23 in some areas of the Mediterranean, total rainfall is reduced, but they occur more temporarily. [Jonathan Gómez Carrion, Spain]

Accepted: no longer using table

5474 75 1 1 Box 3.6 please consider reducing this table and redundant references [Alau Baran, Nigeria]

Accepted: Table no longer part of box

5724 75 75 51 The last in Box 3.6 it should be to the main body as impact on coral is a significant aspect of impact. [Hong Yang, Switzerland]

Accepted: have added reference to cold corals

9494 75 1 76 35 I suggest you consider adding a paragraph about deep water corals to this box. See my earlier comments re Page 42 line 52 and Page 8 line 33). [David Wratt, New Zealand]

Accepted: no longer using table

2352 75 75 51 We believe it is important to highlight given its ramifications for ecosystems, people in poverty - box rewritten to make shorter and to make it discuss relevant issues e.g. Adaptation options etc seala

Accepted: have put in putting sentence explaining that we do not mean coldwater deepwater boreal corals

19026 75 75 35 A map inside this text box will be helpful [JACQUES-ANDRE NDIONE, Senegal]

Accepted: map is at premium - we are over our allocation

7485 75 75 35 Box 3.6: Please insert "tropical" before "coral reefs" throughout this box (and chapter 3) each time the text refers to tropical coral reefs. This is to avoid confusion with cold water corals in boreal waters, which also form huge reef structures with associated biodiversity and ecosystem functions. These corals do not contain symbiotic algae and usually live in deeper waters than tropical corals, and are therefore not subject to coral bleaching. They are however still vulnerable to increasing temperatures, due to their being cold-water adapted, and ocean acidification due to disintegration of the calcified skeletal structures that form the reefs. The some of the worlds largest cold-water coral reefs occur in Norwegian waters. [Styvend Christophersen, Norway]

Accepted: no longer using table

5519 75 3 75 5 Coral reefs ...undergo the livelihoods ...through the support of ...livelihoods? This should be rewritten. [Ismael Nurzey-Riboni, Germany]

Accepted: reworded

1933 75 4 75 5 I would remove the second "livelihoods" to ...undergo the livelihoods of small-scale fisheries, livelihoods, and... [Ruben Retuerto, Spain]

Accepted: reworded

3586 75 5 5 Under the livelihoods of an estimated 500 million people through the support of small-scale fisheries, and income from industries such as fisheries and tourism (Burke et al... [Sylvia Sander, Monaco]

Accepted: reworded

3587 75 9 75 10 The success of reef-building corals is the result of a symbiosis between simple animals (corals) and small algae, like the organisms belonging to the genus Symbiodinium... [Sylvia Sander, Monaco]

Accepted: reworded

11748 75 10 75 10 Vener, not genius [David Schoeman, Australia]

Correct: Modified

3568 75 11 75 15 The energy of the sun, through photosynthesis, and provides food... [Sylvia Sander, Monaco]

Accepted: reworded

3569 75 19 75 19 Least 50% of coral reefs have been lost over the past 30 years with an increasing signature from elevated sea temperature [Sylvia Sander, Monaco]

Most published evidence points to the fact that we do see exceptional rates of warming that are overwhelming the ability of more corals to adapt. Rates of change in temperature are amongst the highest in potentially millions of years.

Accepted: reworded

11750 75 20 75 20 What does "long term" mean in this context? [David Schoeman, Australia]

Accepted: reworded

4942 75 21 75 21 Symbiodinium should be Symbiodinium (in italics) [Alejandro Castrena, Spain]

Accepted

15223 75 21 75 21 Please, italicize "Symbiodinium" [Ruben Retuerto, Spain]

Accepted

5530 75 22 75 22 Perhaps use "in large numbers" instead of "en masse"? [Ismael Nurzey-Riboni, Germany]

Accepted

15224 75 24 75 24 I suggest to change "with" by "to" or by "for" [Ruben Retuerto, Spain]

Accepted

5521 75 32 75 32 Missing missing parenthesis in "Box 18.3." [Ismael Nurzey-Riboni, Germany]

Accepted

2527 75 34 75 36 See Von Euret al. (2017) on the possible resilience of aragonite mineralization by corals to ocean acidification.

Accepted

5522 75 44 75 44 Double period .. at the end [Ismael Nurzey-Riboni, Germany]

Removed

2353 46 46 75 47 Please be specific about which 3 years, this refers to now, when published it will be out of date. This also makes reference to RCP 1.9, which gas not been used before in the is chapter. [David Viner, United Kingdom (of Great Britain and Northern Ireland)]

Accepted: reworded with years listed not '3 years'

Do Not Quote, Cite, or Distribute Page 91 of 152
Comment
11751 75 51 75 52 This paragraph is redundant and only summarizes what has been said before. In my opinion this paragraph can be simply deleted, or must at least be tied up and checked for redundancy of previous paragraphs in the same box. [Sybilla Sander, Monaco]

Response
Accepted - removed and reordered

13988 75 54 75 55 Cisneros et al. post ARI work to be assessed here, which models 1.5 vs 2 or on a RCP 4.5 trajectory. Does this actually reflect the future of coral reefs in relation to temperature? [Elvira Potschin, Germany]

Response
Accepted - Schlesserman now discussed

18019 76 3 76 3 Could this figure be adapted to show bleaching risk at 1.5 and 2°C?? [Elvira Potschin, Germany]

Response
Text re-written (superseded)

3690 76 15 76 25 This paragraph is redundant and only summarizes what has been said before. In my opinion this paragraph can be simply deleted, or must at least be tied up and checked for redundancy of previous paragraphs in the same box. [Sybilla Sander, Monaco]

Response
Accepted - removed and reordered

2528 76 15 76 16 RCP 2.6 and RCP 4.5 have likely temperature increases by 2100 of 1.9-2.3°C and 2.0-3.6°C per AR5. [Robert Kopp, United States of America]

Response
Noted - see main text - we use Bopp et al for changes in ocean temperature for RCP2.6 and RCP 4.5. Temperature lags behind average global temperature of land based areas.

7486 76 16 76 17 It is unclear whether the expected number of bleaching events for the two RCPs are world wide expectations or expectations per region (i.e. 2-4 vs 10 events per decade on a global scale or for each tropical coral region)? This has huge implications for impacts due to the recovery time for coral reefs to a bleaching event. If each tropical coral reef region can expect 2-4 bleaching events per decade, they are basically all doomed also at RCP 2.6. But if it is 2-4 bleaching events per decade globally, then we still have some hope that coral reefs may survive at least in some regions. [Dylvind Christophersen, Norway]

Response
Accepted - have decided to use analysis of Schlesserman et al. instead. See new text.

2146 76 17 The repetition of the 2-4 versus 10 bleaching episodes makes me wonder what this actually means. Do you mean that with 1.50 warming every bit of coral will be bleached 2-4 times per decade. This seems a lot to me. Are you confident that the corals will survive such frequent bleaching? If not, then don't follow that warming of 2C is bleaching 10 times per decade, would not impact on the survival of corals (ie, they would all be gone even with 1.5C warming, so it would matter if we went to 2C warming)? [Navelle Nicholls, Australia]

Response
Accepted - is global average - so some reefs Will have a higher frequency while others will have a lower frequency. You raise important point and I have included this in the discussion.

13990 76 17 76 20 This text does not sound logical, mass mortality presently occurs and RCP 2.6. not yet reached?? [Elvira Potschin, Germany]

Response
It is correct. We have been having devastating bleaching events already and is one of the big issues that all this coming much faster than we originally in the late 90s.

11752 76 19 76 20 Clunky use of words... "were" used three times in quick succession in the same sentence. [David Schoeman, Australia]

Response
Accepted - text modified

11753 76 20 76 20 Can other scenarios really be "higher" than RCP4.5? There must be a clearer way of writing this. [David Schoeman, Australia]

Response
Accepted - text modified

13991 76 27 76 35 Comment on adaptation capacity of corals, associated fauna and human systems would be useful [Elvira Potschin, Germany]

Response
Accepted - text modified

7487 76 27 76 35 Among avoided risks which would result from protecting coral reefs, it would be worse to ignore this in the decreasing levels due to: (a) enhanced heat stress (b) and (c) borтом friction in an environment with healthy coral reef environment] (see e.g. Quatko et al., 2015). The influence of coral reefs and climate change on water-driven flooding of tropical coastlines. (Journal of Geophy, Research?) [Alain Gourisse, Netherlands]

Response
The issue of coastal protection and interaction and sea level is dealt with in this box now as well as in the main text of Chapter 3. The interaction between rising sea levels, increasing storm intensity, flooding, and coastal protection is a very important aspect which we have tried to reflect throughout the box and accompanying text in the main chapter.

7438 76 31 76 35 Please consider including this in the executive summary [Dylvind Christophersen, Norway]

Response
Will do so.

7448 76 31 76 35 Have done so. Have included statement on equity issues associated with coral reefs and the degradation.

2721 76 31 76 35 It's a very good point... can we be made be more precise and explicit in wording? [Penry Unfang, South Africa]

Response
Taked into account. Physical impacts are covered in section 3.3.5.

3634 76 38 81 5 Overall, the current draft of Section 3.4.4 (“Freshwater Resources”) is a good start, but it needs work. I understand that this is a concise summary document, but some additional detail is required, and the detail provided needs to be correct. Length requirements may still be met by omitting a few discussions that aren’t required or productive. I provide more specific ideas in the following review comments. A really good starting point, though, would be to add maps of anticipated changes to streamflow under different climate scenarios, e.g., Asadollahi and Krabner, 2017, Hydrology and Earth System Science Discussions. Global-scale maps like this have some limitations, and they may not correspond to exactly 1.5°C warming, but they’re an excellent communication tool nonetheless. The section as currently written doesn’t provide a clear view of the diversity of hydraulic changes expected across the world, and a graphic like this would communicate that information effectively and succinctly. [Sean Fleming, United States of America]

Response
The literature citations in Section 3.4.4 (“Freshwater Resources”) aren’t quite adequate. I acknowledge that a thorough literature review cannot be provided in a summary document like this, but over-reliance on a few documents can lead to errors and omissions. In particular, Cianversi et al. 2014 is cited repeatedly as the sole source of information for several statements in the freshwater resource section, and several of those assertions are oversimplified. The Cianversi et al. 2014 document isn’t actually listed in the references section at the end of chapter 3, but I presume this is the freshwater chapter from the previous IPCC report. That’s fine up to a point - after all, Cianversi et al. 2014 is an excellent document, if it is what we think it is (again, it’s not actually listed in the references) - but building some summary on the outcomes of another summary is risky, and that single document is relied on a bit too much. This may help explain some of the notable errors and omissions discussed in other comments in this review. [Sean Fleming, United States of America]

Response
Accepted. Text revised. “Cianversi et al. 2014” is cited from WGI AR5 Ch.3 as starting point.

3640 76 38 81 5 The issue of coastal protection and interaction and sea level is dealt with in this box now as well as in the main text of Chapter 3. The interaction between rising sea levels, increasing storm intensity, flooding, and coastal protection is a very important aspect which we have tried to reflect throughout the box and accompanying text in the main chapter.

Response
Taked into account. Physical impacts are covered in sections 3.3.4 and 3.3.5.

11773 76 38 87 53 This whole section is pretty well written, and could do with a thorough revision. The writing improves markedly from p. 88 [David Schoeman, Australia]

Response
Accepted. Text revised.

5475 76 40 please add sentences to make clear link to DC [Atiya Barrin, Nigeria]

Response
Accepted. More sentences to make clear and link to CC are added.

12067 76 42 76 43 Ref (Cianversi et al. 2014) should be, I think, "Cianversi Cianversi et al. as it is listed in the Ref section. If so, this needs changing in several places. [Paul Doyle, Canada]

Response
Noted. This part is cited from WGI AR5 Ch.3 as starting point.

12062 76 49 76 49 CHANGE... earlier breakup of river ice in "northern rivers around the globe". [Paul Doyle, Canada]

Response
Noted. This part is cited from WGI AR5 Ch.3 as starting point.

2063 76 50 76 50 CHANGE... Streamflow is lower in summer, "a decrease in winter snowpacks is exacerbating this problem". [Paul Doyle, Canada]

Response
Noted. This part is cited from WGI AR5 Ch.3 as starting point.

2147 76 52 Progresses? [Navelle Nicholls, Australia]

Response
Taken into account. Physical impacts are covered in sections 3.3.4 and 3.3.5.

2973 76 52 76 56 From "Progresses since the ARI in observed physical changes" to "changes have been increasing since AR5". This part of this paragraph was incomprehensible, to me at least. [Erica Head, Canada]

Response
Taken into account. Physical impacts are covered in sections 3.3.4 and 3.3.5.

12064 76 52 80 6 Able to barely scan this section but can tell there are many grammatical errors and too many numbers to absorb in text form. Multiple tables, figures and close review of text are required to improve these pages. [Paul Doyle, Canada]

Response
Taken into account. Table consolidated with other subsections in 3.4.4 is installed.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>3635</td>
<td>76</td>
<td>52</td>
<td>77</td>
<td>16</td>
<td>The major assertion in Section 3.4.4.1.1 (&quot;Water availability including stream flow&quot;) that climate change-related trends in streamflow cannot be reliably detected in historical observational datasets, due to the confounding effects of watershed-scale land use change and water withdrawals, is incorrect. Granted, it’s true that where these local-scale anthropogenic effects exist, they usually overwhelm the climate signal. The section also provides some good references on separating climatic trends in hydrologic datasets from other factors. However, this section (and in fact the entire document) is missing a large (literally 100s of papers) part of the research literature on using sophisticated statistical analysis of observational streamflow datasets, sourced from reference streamgages on rivers that have experienced little or no upstream alteration, to detect climate change impacts. This is a major oversight, but easily corrected (see for example comment 3 below). [Sean Fleming, United States of America]</td>
<td>Taken into account. Physical impacts are covered in sections 3.3.4 and 3.3.5.</td>
</tr>
<tr>
<td>3636</td>
<td>76</td>
<td>52</td>
<td>77</td>
<td>16</td>
<td>Section 3.4.4.1.1 (&quot;Water availability including stream flow&quot;) needs to do a better job of summarizing and citing the significant body of work on using modern data analytics - in particular, statistical analysis and modeling - of historical observational streamflow datasets for climatic trends. Such studies serve two fundamentally important purposes: that even a short summary needs to acknowledge and provide literature citations for. (1) Unlike GCM-driven process simulation models of future streamflow, which can only incorporate what we know about a system, data science-driven analysis of historical datasets enables discovery of previously unknown effects. The widely cited review paper by Moore et al. (2009, Hydrological Processes, 23: 42-61) provides an intriguing and globally relevant example of how this worked for the unexpectedly complex streamflow impacts of climatically forced glacier change, a key issue given that mountain glaciers and icefields form the core of continental &quot;water towers&quot; like the Himalayas, Alps, Andes, and Northern Rockies. These processes, discovered through data mining of historical databases, have only just begun to be rigorously incorporated into process simulation-based models of hydrologic response to climate change. (2) Statistical analysis of observational water resource data provides an approximate &quot;ground truth&quot; against which the performance of GCM- and hydrologic model-driven projections can be compared. A recent, clear, and timely (given the ongoing federal review of the US-Canada Columbia River Treaty) example is the work of Fleming and Barton (2015, Journal of the American Water Resources Association, 51: 833-841). They performed a variety of trend analyses on observational streamflow indices, and on runoff simulations from an ensemble of CMIP5 historical GCM runs over the same timeframe, over the most water-stressed region in Canada, which is also a major tributary to the international Columbia River. Several key points of agreement were found, providing confidence in these outcomes, and a discrepancy between the two sets of analyses indicated a point of lower confidence that provided direction to future research. These two key examples from the recent literature should be cited and briefly summarized in the report, as they help provide a more accurate view of the large body of science that has been done on historical hydrologic datasets, and the outcomes and broader implications and value of that work for planning and policy purposes, without adding much length to the section. [Sean Fleming, United States of America]</td>
<td>Taken into account. Physical impacts are covered in sections 3.3.4 and 3.3.5.</td>
</tr>
</tbody>
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**Note:** The comments and responses are extracted from the IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3.
Comment No | From Page | From Line | To Page | To Line |
--- | --- | --- | --- | --- |
7729 | 77 | 19 | 77 | 23 |
4734 | 77 | 19 | 77 | 34 |
9704 | 77 | 19 | 77 | 34 |
3679 | 77 | 25 | 77 | 30 |
3637 | 77 | 25 | 77 | 28 |
3638 | 77 | 28 | 77 | 30 |
5478 | 77 | 33 | 77 | 33 |
2148 | 77 | 33 | 77 | 33 |
9869 | 77 | 33 | 77 | 34 |
12389 | 77 | 33 | 77 | 33 |
13904 | 77 | 33 | 77 | 34 |
11755 | 77 | 33 | 77 | 34 |
12796 | 77 | 33 | 77 | 34 |
5891 | 77 | 37 | 77 | 37 |
5725 | 77 | 37 | 77 | 38 |
4735 | 77 | 38 | 77 | 39 |
19236 | 77 | 39 | 77 | 39 |
17274 | 77 | 39 | 77 | 40 |
13449 | 77 | 40 | 77 | 43 |
19227 | 77 | 40 | 77 | 47 |
3641 | 77 | 50 | 77 | 50 |
19028 | 77 | 51 | 77 | 53 |

**IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3**

**Comment**

Being that floods have both a meteorological component and a cultural/infrastructural management component, there should be an explanatory statement to the assertion made here that “there is low confidence, due to limited evidence that anthropogenic climate change has affected the frequency and magnitude of floods at global scale...”, safeguards on the ground may have improved even with more intense instigation by meteorological factors to reduce losses. ([Hilary Inyang, Nigeria](#))

*Noted.* This part is cited from WGII AR5 Ch.3 as starting point.

*Response*

4734 | 77 | 19 | 77 | 34 |

Perhaps torrents should also be mentioned, since torrential flood, that is a type of flood, could be included in this section ([Spyros Schismenos, China](#))

*Taken into account.* Torrential flood is covered in Section 3.4.5 "Coastal and low lying areas (inc. Small islands)."

9704 | 77 | 19 | 77 | 34 |

Please consider referencing the following paper published in August 2017 that shows a clear shift in the timing of European floods. Günter Bloschl et al. Sciences, 11 Aug 2017, Vol 357, issue 6351, pp 588-590 ([Eric Martin, France](#))

*Taken into account.* Physical impacts are covered in section 3.3.5.

3637 | 77 | 25 | 77 | 28 |

Add "land use/land cover change, in particular urbanization" after "hydroclimatic conditions" on line 28. This is a key piece of the puzzle — in fact, possibly the most important one after increased settlement on floodplains. ([Sean Fleming, United States of America](#))

*Noted.*

3638 | 77 | 28 | 77 | 30 |

Actually, I believe the standard view is that flood damages are increasing across much of western Europe and North America, the exact opposite of what is asserted here. Though complex, this trend is primarily felt to be due to a combination of climate change, increased numbers of people living on floodplains, and the loss of rainwater infiltration and storage capacity under the impermeable area increases associated with urbanisation. I don’t think this much is controversial about this. ([Sean Fleming, United States of America](#))

*Noted.*

5478 | 77 | 33 | 77 | 33 |

check specification of the word beginning ([Alvy Bairie, Nigeria](#))

*Editorial - copyedit to be completed prior to publication*

2148 | 77 | 33 | 77 | 33 |

I think the attribution of the Syrian drought to human-induced climate change is contested. I don't think you can just baldly attribute it without caveats. ([Rubén Retuerto, Spain](#))

*Editorial - copyedit to be completed prior to publication*

9869 | 77 | 33 | 77 | 34 |

Although this is a good output, it is very local and specific. It would be better if it could be linked lightly to the rest of text. This can also be analyzed with more details. ([Halatea Tulan Turg, Turkey](#))

*Taken into account.* This part is covered in BOX 3.3

12389 | 77 | 33 | 77 | 33 |

Human-induced climate change contributed to a 3-year drought in Syria since the beginning in the winter of 2006/2007 - can we say how much was due to climate change? ([Kelley et al, 2015](#))

*Taken into account.* This part is covered in BOX 3.3

13904 | 77 | 33 | 77 | 34 |

Further explanation is needed ([Elvira Potoczanska, Germany](#))

*Taken into account.* This part is covered in BOX 3.3

11755 | 77 | 33 | 77 | 34 |

Human-induced climate change contributed to 3-year drought in Syria since the beginning in the winter of 2006/2007 ([Kelley et al, 2015](#)), I have seen several analyses that describe the significance of climate change in the drought and subsequent events. Since this is likely to be a point of contention, it would be pertinent here and elsewhere (i.e., whenever this statement is made) to provide more detail and nuance, as well as a confidence statement. ([David Schoeman, Australia](#))

*Taken into account.* This part is covered in BOX 3.3

12796 | 77 | 33 | 77 | 34 |

The study is based on an analysis of PDSI and precipitation. It fits better in the regional climate section on drought above as it is not an impact attribution study. ([Robert Vautard, France](#))

*Taken into account.* This part is covered in BOX 3.3

5891 | 77 | 37 | 77 | 37 |

This section is too short. Additional studies could be added to this section. Please review these few articles about groundwater in the western Mediterranean basin 1) [Jimenez-Martinez et al. (2015)](#) and 2) [Cisneros et al. (2014)](#). The role of groundwater in highly human-modified hydro-systems: A review of impacts and mitigation options in the Campo de Cartagena-Mer coastal plain (SE Spain). Environmental Reviews 24(4), 377-392 // 2) Candela et al. (2012) Modelling impacts of climate change on water resources in ungauged and data-scarce watersheds. Application to the Surana catchment (NE Spain). Science of the Total Environment 440, 253-260 ([Juan A. Lopez-Bustins, Spain](#))

*Taken into account.* This part is covered in BOX 3.3

5725 | 77 | 37 | 77 | 38 |

Need more elaboration on impact of T°C warming on these items ([Hing Yang, Switzerland](#))

*Noted.*

4735 | 77 | 38 | 77 | 39 |

It would be better if some references were presented to further support this statement. ([Spyros Schismenos, China](#))

*Noted.* This statement is cited from WGII AR5 Ch.3 as starting point.

19236 | 77 | 39 | 77 | 39 |

Cisneros et al. 2014 are not listed in the References ([Rubén Retuerto, Spain](#))

*Editorial - copyedit to be completed prior to publication*

17274 | 77 | 39 | 77 | 40 |

Cisneros et al. 2014 not in the references list ([Maria Jesus Iglesias Briones, Spain](#))

*Editorial - copyedit to be completed prior to publication*

13449 | 77 | 40 | 77 | 43 |

Irrigation also poses a potent threat, with increased need of food and excessive irrigation leads to drying of aquifers. Especially, in agriculture production based countries like Asia, SE Asia, Australia, Mediterranean ([Valerio D'Odorico, Venice, Italy](#))

*Noted.*

19227 | 77 | 40 | 77 | 47 |

What water quality variables affected by climate change has been considered? ([Rubén Retuerto, Spain](#))

*Take into account.* Several indices of water quality are included.

5841 | 77 | 50 | 77 | 50 |

Sure, warmer air temperatures in a warmer climate will tend to produce warmer streams, but we need to provide a brief but important caveat here so that readers don't come away with a grossly oversimplified view of changes in water temperature. For example, land-use/land cover change, such as the removal of riparian vegetation and associated shading, can overwhelm climate signals in streamflow temperature. For example, see (and cite) Arismendi et al. (2012, Geophysical Research Letters, 39, doi:10.1029/2012GL054448). Also note that the air temperature dependency of stream temperature can be highly nonlinear — an obvious example is winter-time stream temperature in cold regions. ([Sean Fleming, United States of America](#))

*Take into account.* Text revised.

19028 | 77 | 51 | 77 | 53 |

It would be good to find more examples over Africa and America ([JACQUES-ANDRE NDONGE, Sarangani](#))

*Noted.*
Comment No | From Page | From Line | To Page | To Line | Comment | Response
--- | --- | --- | --- | --- | --- | ---
3594 | 77 | 52 | 53 | 53 | (10 years)-1: supercritical -1 to two times [Sylvia Sander, Monaco] | Editorial - copyright to be completed prior to publication
1820 | 77 | 52 | 77 | 77 | 10 years)-1 may be replaced by decade-1 [Wilfran Moufouma Okia, France] | Editorial - copyright to be completed prior to publication
4500 | 77 | 52 | 77 | 77 | 90 years)-1 may be replaced by decade-1 [Radim Tlauz, Czech Republic] | Editorial - copyright to be completed prior to publication
11756 | 77 | 54 | 77 | 74 | What is the -1 doing outside the bracket here? [David Schiemen, Australia] | Accepted. Text revised.
3848 | 78 | 2 | 5 | 5 | The sentence sound contradictory: First it says there is little or no observation of soil-erosion altered due to climate change. Then it says climate change impacts on soil erosion have been observed all over the world. [Woomoup Cho, United States of America] | Noted. Line 2-3 is cited from WGI AR5 Ch.3 as starting point and Line 5-8 is updated by additional information.
9604 | 78 | 2 | 78 | 5 | There is little or no observational evidence related to soil-erosion and sediment loads bearing altered significantly due to changing climate. Change impacts have brought the impacts on soil erosion over the past years in some regions, and please add the related contents. [Jingang Wu, China] | Noted. Line 2-3 is cited from WGI AR5 Ch.3 as starting point and Line 5-8 is updated by additional information.
2974 | 78 | 2 | 78 | 6 | Line 2-3: "There is little or no observational evidence yet that soil erosion and sediment loads have been altered significantly due to changing climate * versus Line 9 "Climate change impacts on soil erosion have been observed over the world...". These two sentences seem to be contradictory. [Erica Head, Canada] | Noted. Line 2-3 is cited from WGI AR5 Ch.3 as starting point and Line 5-8 is updated by additional information.
3643 | 78 | 2 | 78 | 8 | Section 3.4.4.1.5 ("Soil erosion and sediment loads") consists of two short paragraphs. These two paragraphs appear to directly contradict each other. Obviously, this needs to be resolved. [Sue Fleming, United States of America] | Noted. Line 2-3 is cited from WGI AR5 Ch.3 as starting point and Line 5-8 is updated by additional information.
12390 | 78 | 2 | 78 | 8 | The two paragraphs give different messages - one that there is little or no observational evidence that soil erosion and sediment loads have been altered significantly due to changing climate and the other that "climate change impacts on soil erosion have been observed all over the world". This is confusing for the reader. [Bill Hare, Germany] | Noted. Line 2-3 is cited from WGI AR5 Ch.3 as starting point and Line 5-8 is updated by additional information.
3595 | 78 | 5 | 8 | 5 | Is this correlation between climate change impact and soil erosion positive or negative? Please add. [Sylvia Sander, Monaco] | Taken into account. Test-revised.
19029 | 78 | 5 | 78 | 5 | The authors mentioned that "...many studies suggest that..." please, quote these main studies! We're writing a report, some researchers would like to go deeper in this issue. [JACQUES-ANDRE NIDONE, Senegal] | Taken into account. Test-revised.
2302 | 78 | 11 | 80 | 45 | A number of factors are included in the section 3.4.4.2. Projected risks and adaptation for a global warming of 1.5ºC and 2ºC above pre-industrial levels. This is not the most of the IPCC-AR5. [Marta Jesus Iglesias Briones, Spain] | Accepted. Test-revised.
5892 | 78 | 18 | 78 | 18 | Is there any difference between GMT in L18P78 and GMST in L43P16? Please specify or homogenize them. [Joan A. Lopez-Bustins, Spain] | Accepted. Test-revised.
11757 | 78 | 19 | 79 | 20 | I don't understand what this part of the sentence means: "...however socioeconomic condition might be greater than variation between GMT rises." [Sylvia Sander, Monaco] | Accepted. Test-revised.
17275 | 78 | 25 | 78 | 25 | New and in many places throughout the text, Schleussner et al. 2016a,b or c? [Maria Jesus Iglesias Briones, Spain] | Editorial - copyright to be completed prior to publication
13965 | 79 | 29 | 79 | 33 | While more specificity would be useful in other sections text from here onward for the rest of 3.4.4. seems overloaded with detail, recommend clear succinct writing. [Eliva Petocz,anska, Germany] | Accepted. Test-revised.
2364 | 79 | 28 | 79 | 31 | The mean global warming levels of between 1.5-5.0ºC (MAGICC6 with 19 GCMs 30 using a pattern-scaling) are projected to expose an additional 4%, 5%, 6%, 11%, 12%, 12%, and 13% would be written as "Mean global warming levels of between 1.5-5.0ºC (MAGICC6 with 19 GCMs 30 using a pattern-scaling) are projected to expose an additional 4%-13% of the world..." [David Viner, United Kingdom (of Great Britain and Northern Ireland)] | Accepted. Test-revised.
16293 | 79 | 28 | 79 | 32 | Do these calculations account for population growth or relate just to amount of water to be stored among whatever the population by 2100, or migration of peoples from drying areas? [Michael MacCracken, United States of America] | Accepted. Test-revised.
9007 | 79 | 29 | 79 | 39 | clearing the effects of 1.5ºC above pre-industrial levels [Jingang Wu, China] | Accepted. Test-revised.
2149 | 79 | 29 | 79 | 43 | Too much detail. Why are you including so many warming levels? This report set about 50 warming impacts. Of 3.1.4 warming. [Neville Nicholls, Australia] | Accepted. Test-revised.
12391 | 79 | 29 | 79 | 43 | The language used to describe results of GCMs on water scarcity is not at all reader friendly. [Bill Hare, Germany] | Accepted. Test-revised.
2975 | 78 | 37 | 78 | 37 | 500 m3 per capita (1,000 m3 per capita). Should these numbers not have units of time, e.g. "500 m3 per capita per year (1,000 m3 per capita per year)?" [Erica Head, Canada] | Noted. Test-revised.
3696 | 79 | 47 | 79 | 47 | Ensembles project... I have no idea what "Ensembles" means here. This entire sentence needs to be looked at as it makes no sense at the moment. [Sylvia Sander, Monaco] | Taken into account. Physical impacts are covered in section 3.3.5.
2150 | 79 | 49 | 79 | 49 | What are Q5 and Q95? [Neville Nicholls, Australia] | Taken into account. Physical impacts are covered in section 3.3.5.
18021 | 79 | 52 | 79 | 52 | the year of reference "(Karnauskas et al.)" [Wilfran Moufouma Okia, France] | Taken into account. Physical impacts are covered in section 3.3.5.
15312 | 78 | 54 | 78 | 54 | In line with the changes at the European precipitation, runoff and low flows show intensified of the water cycle at 20C even for areas where the average state is not considerably affected (Papadimitriou et al., 2016), with remarkable projected decreases of low flows with exception of the Scandinavian Peninsula and some small areas in central Europe. This favors the formation of extreme hydrological events, thus more droughts compared to the current state could be expected in the future due to the warming climate. [Manolis Grilakis, Greece] | Taken into account. Physical impacts are covered in section 3.3.5.
I can see that water demand would be similar under the two warmings. But surely there is some difference between them? What do the projections say about the magnitude of the increases in the two scenarios? [Neilville Nichols, Australia]

This paragraph is hard to follow [Rubén Retuerto, Spain] Accepted. Text revised.

The first paragraph in page 79 is too dense. Perhaps it could be rewritten. [Joan A. Lopez-Bustins, Spain] Accepted. Text revised.

The paragraph is really hard to read. [Woonsup Choi, United States of America] Accepted. Text revised.

The effectiveness of water use efficiency measures, as adaptation to climate change, is largely determined by...' add comma [Sylvia Sander, Monaco] Noted. This part is removed from SOD.

Report/Increase of water demand under 2.0°C GMT rises is projected to be similar to 1.5°C GMT rise." but the information show in the text only discuss the irrigation water demand, for industrial water demand, and domestic water demand in China under changing climate is also increasing, see the paper with attachment "Impacts of climate variability and changes on domestic water use in the Yellow River Basin of China.Modeling domestic water demand in Huaihe River Basin of China under climate change and population dynamics. Adaptation to climate change impacts on water demand. Forecasting industrial water demand in Huaihe River Basin due to environmental changes? all these papers are very important for water demand under climate change, should also be cited in the text. [Kiaxuan WANG, China]

Report/Increase of water demand under 2.0°C GMT rises is projected to be similar to 1.5°C GMT rise," but the information show in the text only discuss the irrigation water demand, for industrial water demand, and domestic water demand in China under changing climate is also increasing, see the paper with attachment "Impacts of climate variability and changes on domestic water use in the Yellow River Basin of China.Modeling domestic water demand in Huaihe River Basin of China under climate change and population dynamics. Adaptation to climate change impacts on water demand. Forecasting industrial water demand in Huaihe River Basin due to environmental changes? all these papers are very important for water demand under climate change, should also be cited in the text. [Kiaxuan WANG, China]

Report/Increase of water demand under 2.0°C GMT rises is projected to be similar to 1.5°C GMT rise," but the information show in the text only discuss the irrigation water demand, for industrial water demand, and domestic water demand in China under changing climate is also increasing, see the paper with attachment "Impacts of climate variability and changes on domestic water use in the Yellow River Basin of China.Modeling domestic water demand in Huaihe River Basin of China under climate change and population dynamics. Adaptation to climate change impacts on water demand. Forecasting industrial water demand in Huaihe River Basin due to environmental changes? all these papers are very important for water demand under climate change, should also be cited in the text. [Kiaxuan WANG, China]

Report/Increase of water demand under 2.0°C GMT rises is projected to be similar to 1.5°C GMT rise," but the information show in the text only discuss the irrigation water demand, for industrial water demand, and domestic water demand in China under changing climate is also increasing, see the paper with attachment "Impacts of climate variability and changes on domestic water use in the Yellow River Basin of China.Modeling domestic water demand in Huaihe River Basin of China under climate change and population dynamics. Adaptation to climate change impacts on water demand. Forecasting industrial water demand in Huaihe River Basin due to environmental changes? all these papers are very important for water demand under climate change, should also be cited in the text. [Kiaxuan WANG, China]

The paragraph is really hard to read. [Woonsup Choi, United States of America] Accepted. Text revised.

The effectiveness of water use efficiency measures, as adaptation to climate change, is largely determined by...' add comma [Sylvia Sander, Monaco] Noted. This part is removed from SOD.

The effectiveness of water use efficiency measures, as adaptation to climate change, is largely determined by...' add comma [Sylvia Sander, Monaco] Noted. This part is removed from SOD.

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The effectiveness of water use efficiency measures, as adaptation to climate change, is largely determined by...' add comma [Sylvia Sander, Monaco] Noted. This part is removed from SOD.

The effectiveness of water use efficiency measures, as adaptation to climate change, is largely determined by...' add comma [Sylvia Sander, Monaco] Noted. This part is removed from SOD.
Comment | Response
--- | ---
11760 | 79 | 33 | 79 | 33 | Suggestive [David Schlenkow, Australia] | Accepted. Text revised.
1435 | 79 | 36 | 79 | 36 | and elsewhere: please write if this is a median (significant change?) or give a range of possible impacts [Philippe Roudier, France] | Noted.
6 | 79 | 36 | 79 | 36 | Please correct the citation to [Affler et al., 2017], instead of 2016. [Lorenzo Affler, Italy] | Accepted. Text revised.
12393 | 79 | 36 | 79 | 40 | It is difficult to understand how all percentage changes in this paragraph relate to each other. E.g. one result suggests an increase in damage from 120% to 170% between 1.5 and 2 degrees, another suggests an insignificant increase in potential economic loss (+0.9%). Can this be explained? [Bill Harn, Germany] | Noted.
11716 | 79 | 39 | 79 | 40 | Define terms. What is a "human loss?" [David Schlenkow, Australia] | Noted. Definition of terms is added after reference is published.
12394 | 79 | 42 | 79 | 42 | monthly population does not have a clear meaning. [Bill Hare, Germany] | Accepted. Text revised.
15030 | 79 | 42 | 79 | 44 | The authors mentioned that "warming is projected to be T14.3 and 195.4 million people." Please, it would be good to be more precise, by giving more details about the continent that would be more affected. [Jacqueline-Andre Ndione, Senegal] | Taken into account. Physical impacts are covered in section 3.3.5.
7730 | 79 | 46 | 79 | 48 | Does the assertion here that changes in flood risk are statistically insignificant take into account the recent trend (at least the past 10 years) of increase in the frequency of floods in West Africa where 25-year floods are now occurring more frequently? [Hassar Binya, Nigeria] | Noted. Adaptation is covered in Chapter 4.
7 | 79 | 48 | 79 | 48 | Please correct the citation to [Affler et al., 2017], instead of 2016. [Lorenzo Affler, Italy] | Taken into account. Physical impacts are covered in section 3.3.5.
8 | 79 | 48 | 79 | 49 | I don’t know the ref by Thibod et al. is it supposed to be Donnaei et al. 2017 here? In any case "differences in river floods" is not informative. One should specify here if the differences refer to flood risk, economic damage, population affected, peak flow corresponding to a specific return period or other. [Lorenzo Affler, Italy] | Taken into account. Physical impacts are covered in section 3.3.5.
5248 | 79 | 49 | 5248 | 49 | The reference "Thibod et al." is missing from the Reference List. [Muhammad Mohsin Obal, Pakistan] | Taken into account. Physical impacts are covered in section 3.3.5.
2076 | 79 | 49 | 79 | 52 | From "A multimodel ensemble of 45 hydrological" to "rivers between 1.5°C and 3°C, respectively (Andreas et al.)." This sentence is way too long, and virtually incomprehensible. [Erica Heald, Canada] | Taken into account. Physical impacts are covered in section 3.3.5.
5894 | 79 | 50 | 79 | 50 | Please review writing. [Juan A. Lopez-Bustins, Spain] | Taken into account. Physical impacts are covered in section 3.3.5.
12395 | 79 | 53 | 79 | 57 | It is not clear where results are referring to (some are for European rivers, but then the last example jumps to China). [Bill Hare, Germany] | Taken into account. Physical impacts are covered in section 3.3.5.
5897 | 79 | 56 | 79 | 56 | Please delete "in the". [Juan A. Lopez-Bustins, Spain] | Taken into account. Physical impacts are covered in section 3.3.5.
15029 | 79 | 56 | 79 | 56 | Remove one “in the” [Ruben Retuerto, Spain] | Taken into account. Physical impacts are covered in section 3.3.5.
3645 | 79 | 57 | 80 | 2 | According to this passage, climate change in the Haihe river basin in China will cause drought to decrease relative to historical levels, and then increase. That seems really odd. Is there a typographical error here? If not, this projected trend reversal requires a little explanation. [Steven Davis, United States of America] | Accepted. Text revised.
3850 | 80 | 1 | 80 | 2 | More details should be provided. It is hard to make sense of different signs of drought impacts between 1.5 and 2 degrees scenarios. [Wonsup Choi, Korea] | Accepted. Text revised.
12095 | 80 | 9 | 132 | Geo-3.12 | Unable to review as time is run out. Hopefully, there are several other reviewers of this Chapter. [Paul Doyle, Canada] | Noted.
5898 | 80 | 9 | 80 | 35 | Why do you mention only some local examples? Please add more studies about bigger regions and local examples from other parts of the world. Please add to [issuer and Ou/Apple River the name of the region or country where are located in brackets: (Netherlands and Canada, respectively). [Juan A. Lopez-Bustins, Spain] | Taken into account. Text revised.
16294 | 80 | 10 | 80 | 11 | It is climate change that causes this directly, or the conditions that climate change induces that lead people there to draw more water out of the ground? I'd suggest giving a bit of an explanation of what is and is not included. [Michael MacCracken, United States of America] | Noted. Adaptation is covered in Chapter 4.
3646 | 80 | 10 | 80 | 21 | Suggested addition here. Affler et al. (2016) evaluated quantitatively the benefits of implementing four different flood adaptation measures in a pan-European flood risk assessment framework. Measures include 1) the rise of flood protections, 2) reduction of the peak flows through water retention, 3) reduction of vulnerability and 4) relocation to safer areas. Their sensitivity is assessed in a confi guration of different settings of adaptation measures. The adaptation efforts for flood risk reduction should favor measures targeted at reducing the impacts of floods (i.e., measures 3 and 4), rather than trying to avoid them (i.e., measures 1 and 2). Adaptation plans only based on rising flood protections have the effect of reducing the frequency of small floods and exposing the society to less frequent but catastrophic floods and potentially long recovery processes. Reference: Affler L., Feyen L. and Di Baldassarre, G. Increasing flood risk under climate change: a pan-European assessment of the benefits of four adaptation strategies. Climatic Change, 1-15, doi:10.1007/s10584-016-1541-1, 2016. [Lorenz Affler, Italy] | Taken into account. Physical impacts are covered in section 3.3.5.
4601 | 80 | 11 | 80 | 11 | Sarcas "robust evidence, high agreement" [Radim Tolasz, Czech Republic] | Taken into account. Physical impacts are covered in section 3.3.5.
19031 | 80 | 11 | 80 | 11 | Instead of writing "robust evidence, high agreement" [ARS WGI Chapter 3], please write "robust evidence, high agreement, ARS WGI Chapter 3" [Jacqueline-Andre Ndione, Senegal] | Taken into account. Physical impacts are covered in section 3.3.5.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>4181</td>
<td>80</td>
<td>13</td>
<td>20</td>
<td>20</td>
<td>The impacts of increased irrigation costs in Bangladesh have had profound socioeconomic impacts. Additionally, most irrigation is powered by diesel, which is both costly and bad for climate. Research has shown that a switch to solar-poweredinverters can help reduce both costs and environmental impacts, highlighting once again the need for low-carbon energy to work in tandem with existing energy sources if we are to improve livelihoods. [<a href="https://www.eniday.com/en/technology/sun-pumping-middle-east/">https://www.eniday.com/en/technology/sun-pumping-middle-east/</a>][Michelle Leslie, Canada]</td>
<td>Noted.</td>
</tr>
<tr>
<td>11762</td>
<td>80</td>
<td>18</td>
<td>80</td>
<td>21</td>
<td>Don’t know whether this is a projection or an observation. [David Schieman, Australia]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>2589</td>
<td>80</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>Salem et al., 2017 noted in the literature list, should be check [Xiaojun WANG, China]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>3599</td>
<td>80</td>
<td>21</td>
<td>80</td>
<td>21</td>
<td>Salem et al., 2017 not cited in the literature list, should be check [Xiaojun WANG, China]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>6249</td>
<td>80</td>
<td>21</td>
<td>80</td>
<td>21</td>
<td>The reference “Salem et al., 2017” is missing from the Reference list. [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>2543</td>
<td>80</td>
<td>21</td>
<td>80</td>
<td>21</td>
<td>Salem et al., 2017 not cited in the literature list, should be check [Xiaojun WANG, China]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>4602</td>
<td>80</td>
<td>21</td>
<td>80</td>
<td>21</td>
<td>Add explanation of “BDY” [Radim Toleza, Czech Republic]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>3647</td>
<td>80</td>
<td>24</td>
<td>80</td>
<td>35</td>
<td>Section 3.4.2.4.2 (“Water quality”) is not adequate. Water quality is a far-reaching and diverse question, or in fact, set of questions, one for each water quality parameter (temperature, pH, turbidity, and each of tremendous many possible contaminants, etc.). I don’t know exactly how this should be addressed in the context of this short summary, but some kind of acknowledgment of how many different issues are really involved here seems necessary. [Sean Fleming, United States of America]</td>
<td>Take into account. Information is added.</td>
</tr>
<tr>
<td>9609</td>
<td>80</td>
<td>24</td>
<td>80</td>
<td>35</td>
<td>the effects of climate change on water quality is obvious in some regions, and there are many aspects, such as water N or P content, or loads in river or lake, or landfill gas break out,please add content by adding new literature [Jianjun Wu, China]</td>
<td>Take into account. Information is added.</td>
</tr>
<tr>
<td>3851</td>
<td>80</td>
<td>25</td>
<td>80</td>
<td>40</td>
<td>Lines 25-25 are identical to lines 39-40. [Woonsup Choi, United States of America] Accepted. Text revised.</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>17277</td>
<td>80</td>
<td>25</td>
<td>80</td>
<td>40</td>
<td>25-26 and 25-40 are repeated. [Mira Jesus Iglesias, Bronco, Spain]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>4603</td>
<td>80</td>
<td>26</td>
<td>80</td>
<td>26</td>
<td>Italics for “medium evidence, high agreement” [Radim Toleza, Czech Republic] Accepted. Text revised.</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>19032</td>
<td>80</td>
<td>26</td>
<td>80</td>
<td>26</td>
<td>Instead of writing “(medium evidence, high agreement) (AR5-WGII Chapter 3).” please write “(medium evidence, high agreement; AR5-WGII Chapter 3).” [Jacquies-Andre NOIDIN, Senegal]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>3601</td>
<td>80</td>
<td>29</td>
<td>80</td>
<td>31</td>
<td>I think it should be said here that the literature is below sea level already and that it has been part of the North sea before it was ‘traded’ artificially. I find it would be much more helpful to cite a paper that looks at a more natural freshwater system. Also there are many other parameters determining water quality as chloride concentrations, which is only one way of saying salinity. What about nutrients, or trace metals as a consequence of climate change. [Sylvia Sander, Monaco]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>2801</td>
<td>80</td>
<td>29</td>
<td>80</td>
<td>40</td>
<td>Delete this sentence because replied [Giacomo Pilati, Italy]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>3600</td>
<td>80</td>
<td>30</td>
<td>80</td>
<td>40</td>
<td>The duration of the exceedance in Lake Ijsselmeer (Netherlands) is slightly increase to the same degree for GMT rises of 1.5ºC (2010) [Sylvia Sander, Monaco]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>4604</td>
<td>80</td>
<td>33</td>
<td>80</td>
<td>34</td>
<td>Add explanation of “DQ” [Radim Toleza, Czech Republic]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>11763</td>
<td>80</td>
<td>33</td>
<td>80</td>
<td>35</td>
<td>Very poorly constructed sentence [Kens Schoiman, Australia]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>3602</td>
<td>80</td>
<td>39</td>
<td>80</td>
<td>40</td>
<td>This sentence is a full repetition of line 25-26 on the same page. [Sylvia Sander, Monaco]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>5899</td>
<td>80</td>
<td>39</td>
<td>80</td>
<td>40</td>
<td>Please delete this sentence. This is copied from 26-26. [Luis A. Lopez-Bustillo, Spain]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>2156</td>
<td>80</td>
<td>39</td>
<td>80</td>
<td>40</td>
<td>This sentence is a full repetition of line 25-26. [Neville Nicholls, Australia]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>1436</td>
<td>80</td>
<td>39</td>
<td>80</td>
<td>40</td>
<td>It is linked with “soil erosion” [Philippe Rouvrier, France]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>2977</td>
<td>80</td>
<td>39</td>
<td>80</td>
<td>40</td>
<td>Climate change is projected to reduce water quality, posing risks to drinking water quality even with conventional treatment (medium evidence, high agreement) (AR5-WGII Chapter 3). This sentence appears in Lines 25-26 of this page, where it belongs. It should not be repeated here. [Erica Head, Canada]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>2156</td>
<td>80</td>
<td>40</td>
<td>80</td>
<td>43</td>
<td>Do you mean that the impacts have been increasing (rather than the number of papers)? [Neville Nicholls, Australia]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>4182</td>
<td>81</td>
<td>1</td>
<td>81</td>
<td>3</td>
<td>The food elements are confusing in Table 3.5 - climate drivers to floods are much more complex than “climate precipitation”, as they also interact with soil moisture (thus drying trends), snow melt (thus warming trends) and sea levels. I am also confused by how there is robust evidence and high agreement that floods will increase, but very limited evidence that they have increased until now. I suspect this is due to over-reliance on climate model projections and the assumptions that climate precipitation maps directly into increases in flooding. As reported, talking about “the number of people exposed annually to a 20th century 100-year flood is projected to be three times greater for very high emissions than for very low emissions” is quite uncertain, and the subsequent statement that “the number of 1.5ºC is projected to significantly reduce global exposure to increased flooding compared to impacts under 2.0ºC...” should not be given robust evidence. I would more confidently say that floods will increase in some places, and decrease in others, depending on the complex intersection of multiple drivers and unique conditions (e.g. climate zones, watershed characteristics) at each location - and that the net global average effect of these factors is still being resolved. [Seth Westra, Australia]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>1157</td>
<td>81</td>
<td>1</td>
<td>81</td>
<td>3</td>
<td>The food elements are confusing in Table 3.5 - climate drivers to floods are much more complex than “climate precipitation”, as they also interact with soil moisture (thus drying trends), snow melt (thus warming trends) and sea levels. I am also confused by how there is robust evidence and high agreement that floods will increase, but very limited evidence that they have increased until now. I suspect this is due to over-reliance on climate model projections and the assumptions that climate precipitation maps directly into increases in flooding. As reported, talking about “the number of people exposed annually to a 20th century 100-year flood is projected to be three times greater for very high emissions than for very low emissions” is quite uncertain, and the subsequent statement that “the number of 1.5ºC is projected to significantly reduce global exposure to increased flooding compared to impacts under 2.0ºC...” should not be given robust evidence. I would more confidently say that floods will increase in some places, and decrease in others, depending on the complex intersection of multiple drivers and unique conditions (e.g. climate zones, watershed characteristics) at each location - and that the net global average effect of these factors is still being resolved. [Seth Westra, Australia]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>11070</td>
<td>81</td>
<td>1</td>
<td>81</td>
<td>6</td>
<td>In relation to changes in glaciers, perhaps add that glaciers help to reduce stream warming during periods of hot, dry weather, in additional to their role in sustaining flow, with implications for habitat suitability for cool- and cold-water aquatic species (e.g., salmon). [Robert Daniel Moore, Canada]</td>
<td>Accepted. Text revised.</td>
</tr>
<tr>
<td>11071</td>
<td>81</td>
<td>1</td>
<td>81</td>
<td>6</td>
<td>An editorial point: this table (3.5) is about freshwater systems, but indicates “key risks to ocean ecosystems” within the table. [Robert Daniel Moore, Canada]</td>
<td>Accepted. Text revised.</td>
</tr>
</tbody>
</table>
### Comment Response

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.5, assessment of renewable surface and groundwater sources (this discussion is limited to supply reductions in dry subtropical regions. What about everywhere else? A key point that’s missing from this table (and the report as a whole) is that the increased proportion of winter precipitation falling as rain instead of snow under higher temperatures is expected to lead to a significant reduction in manageable water supplies, even if total geophysical water availability remains constant or even increases. Northwestern North America is a great example – the water supply infrastructure is built around the assumption that huge seasonal mountain snowpacks provide an additional natural reservoir for supplies in summer, when it’s most needed. But as more winter precipitation falls as rain instead of snow, that natural reservoir is diminished, and thus so is the total manageable water supply. In spite of the fact that total annual runoff will be constant or increase slightly under climate change in this region. In principle, building more reservoir capacity to carry winter rain inputs over to summer could compensate for this effect, but in practice, such additional construction would be costly and exceedingly controversial due to its ecological impacts; in fact, the dominant direction in the US is to disestablish existing dams, not to build additional ones. For details, see (and cite) the exhaustive and excellent US Bureau of Reclamation climate change report: Reclamation, SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water, Report to Congress, 2011. For an example of how these changes to reservoir inflows in western Canada have already been occurring, see (and cite) Fleming and Weber (2012, Journal of Hydrology, 470-471: 36-54). Not only will this be a key shift in water resource availability, ecosystem function, and hydroelectric power generation under climate change for much of the western US and western Canada, similar issues will likely be seen in other snow-dominated basins worldwide, so the effect needs to be at least briefly mentioned here. [Sean Fleming, United States of America]</td>
<td></td>
</tr>
<tr>
<td>3648</td>
<td>81 1 81 5</td>
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<tr>
<td>12396</td>
<td>81 1 81 5</td>
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<td>12397</td>
<td>82 10</td>
</tr>
<tr>
<td>5111</td>
<td>82 10 48</td>
</tr>
</tbody>
</table>

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Table 3.5: assessment of glacier change impacts on streamflow: I'm really happy to see that this effect has been included in the report, because as mentioned in my comment 3 above, it's so important to the continental “water towers” of the Himalayas, Andes, Alps, Northern Rockies, and so forth. However, the assertion that meltwater yields are expected to increase isn’t quite right. Rather, meltwater yields may either increase or decrease, depending on the current state of the particular glacier, which varies on a broad regional basis. For example, warmer temperatures have increased melt generation volume from the giant subarctic glaciers and icefields in the southern Yukon and northwestern British Columbia, producing increasing trends in downstream river flows, whereas the smaller, warmer glaciers in southeastern British Columbia have gradually been producing less meltwater because they have shrunk so much under continued warming trends, leading to negative summer streamflow trends. For a comprehensive review, see (and cite) Moore et al. (2009, Hydrological Processes, 23: 84-101). [Sean Fleming, United States of America] |

Note: Table 3.5 is modified.

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Table 3.5: assessment of glacier change impacts on streamflow: I'm really happy to see that this effect has been included in the report, because as mentioned in my comment 3 above, it's so important to the continental “water towers” of the Himalayas, Andes, Alps, Northern Rockies, and so forth. However, the assertion that meltwater yields are expected to increase isn’t quite right. Rather, meltwater yields may either increase or decrease, depending on the current state of the particular glacier, which varies on a broad regional basis. For example, warmer temperatures have increased melt generation volume from the giant subarctic glaciers and icefields in the southern Yukon and northwestern British Columbia, producing increasing trends in downstream river flows, whereas the smaller, warmer glaciers in southeastern British Columbia have gradually been producing less meltwater because they have shrunk so much under continued warming trends, leading to negative summer streamflow trends. For a comprehensive review, see (and cite) Moore et al. (2009, Hydrological Processes, 23: 84-101). [Sean Fleming, United States of America] |

Note: Table 3.5 is modified.

---

Table 3.5: assessment of glacier change impacts on streamflow: I'm really happy to see that this effect has been included in the report, because as mentioned in my comment 3 above, it's so important to the continental “water towers” of the Himalayas, Andes, Alps, Northern Rockies, and so forth. However, the assertion that meltwater yields are expected to increase isn’t quite right. Rather, meltwater yields may either increase or decrease, depending on the current state of the particular glacier, which varies on a broad regional basis. For example, warmer temperatures have increased melt generation volume from the giant subarctic glaciers and icefields in the southern Yukon and northwestern British Columbia, producing increasing trends in downstream river flows, whereas the smaller, warmer glaciers in southeastern British Columbia have gradually been producing less meltwater because they have shrunk so much under continued warming trends, leading to negative summer streamflow trends. For a comprehensive review, see (and cite) Moore et al. (2009, Hydrological Processes, 23: 84-101). [Sean Fleming, United States of America] |

Note: Table 3.5 is modified.

---

Row 17: Food security is very important subject in this manner. Lobell’s study has a very important contribution to the literature but it would be important to discuss in order to highlight impacts on nutrition. [Tonya Rawe, United States of America] |

---

Row 27: Climate change impacts on crop production and crop yield are globally crucial particularly in some part of the world. This section generally has more studies to include. For example, the section should be more comprehensive and should also include agricultural crops/fruits that are important for some countries. [Nazan AN, Turkey] |

---

The section has been improved.

---

Consider adding a paragraph on energy crops in 3.4.5.1.1 with a reference to 3.7.2.1.1 [Iulain Florin VLADU, Germany] The paragraph is mainly focused on agriculture for food (i.e. livestock, crops, fisheries). It would be better to describe impact of climate change on energy crops in paragraphs related to land use change or energy. |

---

I don't think this is extremely difficult. I demonstrated how to do this, using year-to-year differences, back in the mid-1990s. Studies such as Lobell et al have continued to apply this technique. In many ways, it is easier to estimate climate change impacts on food production than on many other sectors. [Nãoelia Nichols, Australia] |

---

Replaced with “can be”.

---

Don't know what you mean by “compensation” here [Nãoelia Nichols, Australia] |

---


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The section has been rewritten and the references have been added.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>16296</td>
<td>82</td>
<td>14</td>
<td>82</td>
<td>14</td>
<td>An aspect that deserves mention here is that only a relatively few nations (8 or so?) generate something like 90% of the essential grains, etc. that are available on the global market, and that failure in such regions can have important effects on food prices around the world. With the main storm tracking moving south of Australia’s main growing region, with the favorable climate shifting poleward to less adequate soils in the Great Plains of North America, with warming likely to reduce winter snow that is the source of vital soil moisture for grain growing regions of Russia/Ukraine, a growing share of the major grain growing nations seem to be facing increased threats on their major growing areas as climate extremes tend to increase. This is really a quite nonlinear threat to the world system, especially with world grain stocks being held at quite low levels due to demand and no entity really in charge of maintaining the system so as business practices to be optimally efficient. I'd suggest that this section simply does not paint the increasingly vulnerable situation the world faces, and this needs to be done. There is really much more to all of this than changes in time averaged per hectare yield, especially with population growth occurring in the importing nations. The Arab Spring and all at least some of situation in Syria arose because tightness in the grain markets elevated the cost of food. While what this section covers is valid—it seems to be missing the real significance of what is occurring and could occur. [Michael MacCracken, United States of America]</td>
<td>This is a good consideration. However, only direct data were reported</td>
</tr>
<tr>
<td>11764</td>
<td>82</td>
<td>14</td>
<td>82</td>
<td>16</td>
<td>Very poorly constructed sentence [David Schoeman, Australia]</td>
<td>Rewritten</td>
</tr>
<tr>
<td>2823</td>
<td>82</td>
<td>14</td>
<td>82</td>
<td>30</td>
<td>We have to back the effect on local livelihoods. [John Shaw, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Linked added</td>
</tr>
<tr>
<td>6250</td>
<td>82</td>
<td>16</td>
<td>82</td>
<td>16</td>
<td>The word ‘suggested’ is to be deleted. [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Done</td>
</tr>
<tr>
<td>2852</td>
<td>82</td>
<td>18</td>
<td>82</td>
<td>18</td>
<td>A citation referring to Europe is needed [Giacomo Pits, Italy]</td>
<td>Citation added</td>
</tr>
<tr>
<td>7596</td>
<td>82</td>
<td>21</td>
<td>82</td>
<td>21</td>
<td>For this section, it is not clear what emission scenarios these analyses are for. [Euan Mitchell, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Done</td>
</tr>
<tr>
<td>12483</td>
<td>82</td>
<td>21</td>
<td>82</td>
<td>24</td>
<td>References on climate and its impacts on rice production must be addressed here. [Jinkyu Hong, Republic of Korea]</td>
<td>Citation added</td>
</tr>
<tr>
<td>16203</td>
<td>82</td>
<td>24</td>
<td>82</td>
<td>24</td>
<td>Add “few” after “high quality”. [Rubén Retuerto, Spain]</td>
<td>Done</td>
</tr>
<tr>
<td>15422</td>
<td>82</td>
<td>24</td>
<td>82</td>
<td>24</td>
<td>Crop productivity enhance under a warmer climate, especially at northern regions as shown in Dalaléu et al. (2017).</td>
<td>Reference added</td>
</tr>
<tr>
<td>11785</td>
<td>82</td>
<td>24</td>
<td>82</td>
<td>24</td>
<td>The sentence is incomplete [David Schoeman, Australia]</td>
<td>Rewritten</td>
</tr>
<tr>
<td>6251</td>
<td>82</td>
<td>27</td>
<td>82</td>
<td>27</td>
<td>The word ‘suggested’ may be replaced with ‘reported’. [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>None</td>
</tr>
<tr>
<td>6252</td>
<td>82</td>
<td>30</td>
<td>82</td>
<td>30</td>
<td>associated with (not associated to). [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Done</td>
</tr>
<tr>
<td>15422</td>
<td>82</td>
<td>36</td>
<td>82</td>
<td>36</td>
<td>’73* after ‘case of 2016’ and after ‘damage’ [Rubén Retuerto, Spain]</td>
<td>Done</td>
</tr>
<tr>
<td>7597</td>
<td>82</td>
<td>39</td>
<td>82</td>
<td>39</td>
<td>It is important to link this to the argument about what we need to emit to get to 1.5°C. The emission pathways is uncertain, which means this section is also a large uncertainty. [Euan Mitchell, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Despite the models uncertainties, the results here reported are strongly consistent and mainly based on the higher level of confidence.</td>
</tr>
<tr>
<td>20992</td>
<td>82</td>
<td>39</td>
<td>82</td>
<td>42</td>
<td>Some key recent references, as the works by Mankin (2020), Durand et al. at the AGMIP projects are worth to be cited. [KELVIN DELUSICA, Haiti]</td>
<td>Reference added</td>
</tr>
<tr>
<td>20993</td>
<td>82</td>
<td>39</td>
<td>82</td>
<td>48</td>
<td>See also: (1) McGrath and Lobell, 2013, Environ. Res. Lett. 8 (3) (2013) 014054 (9pp); (2) Rosenzweig et al., 2014, Plant Science 226 (2014) 138–146; (3) Sakara et al., Scientific Reports 4, Article number: 4978 (2014). It may also be worth considering the impact of elevated CO2 on grain yield and human nutrition (e.g. <a href="https://sites.scripps.edu/organic2045">https://sites.scripps.edu/organic2045</a>), although of course this impact would be much smaller for pathways consistent with 1.5°C warming compared to x2 CO2 scenarios. [Aaron Glenn, Canada]</td>
<td>Reference added</td>
</tr>
<tr>
<td>1437</td>
<td>82</td>
<td>40</td>
<td>82</td>
<td>40</td>
<td>CO2 effect: depends on the type of crop. [Philippe Roudier, France]</td>
<td>Added in the text</td>
</tr>
<tr>
<td>12398</td>
<td>82</td>
<td>40</td>
<td>82</td>
<td>41</td>
<td>Can the effect of rising CO2 be expanded upon / quantified? A more detailed discussion of what we know about CO2 fertilization and critical uncertainties should be included in this section. [Bill Hare, Germany]</td>
<td>Done</td>
</tr>
<tr>
<td>4359</td>
<td>82</td>
<td>41</td>
<td>82</td>
<td>42</td>
<td>More references. [Gabriel de Oliveira, Brazil]</td>
<td>References added</td>
</tr>
<tr>
<td>13967</td>
<td>82</td>
<td>51</td>
<td>82</td>
<td>51</td>
<td>needs a thorough treatment of heat exposure and thermal limits on relation to geography, merge with sections below [Ehris Polczeranska, Germany]</td>
<td>We thank the reviewer for the suggestion</td>
</tr>
<tr>
<td>12705</td>
<td>82</td>
<td>51</td>
<td>82</td>
<td>55</td>
<td>Both this section and 3.4.5.2 need expansion. ‘Runaway’ means referring to the run, not to runnant species of livestock. ‘Biotourism’ is not a disease of the rumen, and in any case, the closely-related African Horse Sickness has also been studied, and is not a disease of ruminants. The reference to zoosporozous and spread of ticks need citations. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Reference added</td>
</tr>
<tr>
<td>16296</td>
<td>82</td>
<td>51</td>
<td>82</td>
<td>55</td>
<td>And what about the issue of livestock being allocated grain for growth, tighten up the grain markets. That is a trend that will exacerbate overall food production issues. Already there are large amounts of livestock being sold off during dry periods and droughts, so flooding markets at one point and then later very much tightening them. It all is going on. [Michael MacCracken, United States of America]</td>
<td>Reference added</td>
</tr>
<tr>
<td>6253</td>
<td>82</td>
<td>52</td>
<td>82</td>
<td>53</td>
<td>- less skilled than the food systems’ (instead of ‘- the previous food systems noted.’ [Muhammad Mohsin IQBAL, Pakistan]</td>
<td>Corrected as suggested</td>
</tr>
<tr>
<td>15033</td>
<td>82</td>
<td>52</td>
<td>82</td>
<td>55</td>
<td>More information can be found in the Special issue Rev. sci. tech. Off. int. Epiz., 27 (2); 2008 [JACQUES-ANDRE NDIONE, Senegal]</td>
<td>More information have been added to the section</td>
</tr>
<tr>
<td>19322</td>
<td>82</td>
<td>53</td>
<td>82</td>
<td>53</td>
<td>Add “*” after “virus” [Rubén Retuerto, Spain]</td>
<td>Done</td>
</tr>
</tbody>
</table>
There should be some brief description about the section above. [Lubna Alam, Bangladesh] The section has been rewritten and improved

17666 83 17 83 22 Food security may not only be food supply, but also includes distribution and access to food, this causes difficulty as discussed in p.86 line 20-23. Also food diversification may need to be considered. [Pernadian Perindan, Indonesia]

990 83 17 83 22 This is a very important part and it should be enriched with more references [Mustafa Tunfor Turp, Turkey]

9249 83 17 83 22 In section 3.4.5.4 Food security, it might be interesting to add a mention about food security in the Arctic, particularly among indigenous populations who at least partially rely for food on specific traditional animal and plant species, which are mentioned in section 3.4.1. Terrestrial and wetland ecosystems, are experiencing important phenological changes and changes in abundance and range (e.g. declining caribou/reindeer populations). These changes in addition to changes in weather and environmental conditions are causing and are expected to cause difficulties in the procurement of traditional food sources and thus have an impact on food security. [Marie-Jeanne S. Royer, Canada]

5110 83 17 83 22 While quantification of observed impacts on other aspects of food security may not be possible, a discussion of the pathways through which observed climate impacts may then impact other aspects of food security could be useful. i.e. water scarcity and declines in water quality can increase enteropathic disease/illness, reduced utilization of food (and increasing malnutrition), decreases in food production can result in food price rises (this is mentioned briefly) - negatively impacting access & stability of food supplies; and seen through socio-economic dynamics, these changes in food security can impact certain populations (notably women and children) more heavily. Women are often the last to eat in their households, due to social norms, and children are at greater risk of permanent effects of malnutrition (e.g. stunting) when malnourished at a young age. Alternatively, this discussion may be more appropriate in the section on project impacts on food security. [Tonya Rawe, United States of America]

16297 83 18 83 18 This simply is not the case–those previous paragraphs talk about effects on yield, but not at all about cumulative production and changes in demand, much less the resources to pay for food that is needed. This section is wholly inadequate. [Michael MacCracken, United States of America]

12399 83 18 83 22 The food security section is currently very short. Needs to be expanded considerably and updated in particular given the recent reports of climate related events on crop production such as in 2010. Effects of global trade should be discussed in much greater detail. E.g. Bren d’Amor, C., L. Wanz, M. Kalluri, J. Christoph Steckel, and F. Creutzig (2016), Teleconnected food supply shocks, Environ. Res. Lett., 11(3), 035007, doi:10.1088/1748-9326/11/035007. [Bill Hare, Germany]

9140 83 18 83 22 We refer to the section on food security should also include impacts on fisheries, as these are very important for countries that rely on fish as an important source of protein and nutrients. Food trade should also be considered here (including disruptions from extreme events) - this is particularly important for small islands / countries that import food. [Susanna De Beauville-Scott, Saint Lucia]

12706 83 19 83 19 Paving is added “to imply quantified effects” [John Morton, United Kingdom of Great Britain and Northern Ireland]

19233 83 20 83 20 Add “*” after “Among these” [Ruben Roestber, Spain]

8837 83 25 83 25 There should be some brief description about the section above. [Junia Alam, Bangladesh]

13758 83 25 85 47 As this chapter aims to describe risks and adaptations, “adaptation” should also be discussed. [Elvira Poloczanska, Germany]

References added

12400 83 27 Several key references are missing from this section, including on Effects of temperature increases: Liu, B. et al. (2016). Similar estimates of temperature impacts on global wheat yield by three independent methods, Nat. Clim. Chang., 6(12), 1130–1136, doi:10.1038/nclimate3115.


Furthermore, other anthropogenic impacts relevant in the context of 1.5°C such as the impacts of air pollution on crop yields should be included: Tai, A. P. K., M. V. Martin, and C. L. Heal (2014). Threat to future global food security from climate change and ozone air pollution, Nat. Clim. Chang., 4(September), 817–821, doi:10.1038/nclimate2317.

Insaar, G. (2014), Reductions in India’s crop yield due to ozone, , (October 2013), 799–804, doi:10.1002/2013GL058854.Received. [Bill Hare, Germany]

References added
There are not many published studies on the projected risks and adaptation for a global warming of 1.5 and 2.0 degrees C above pre-industrial levels related to crop production. Most papers cited in this section are not associated with the magnitudes of local temperature changes, thus not necessarily relevant to the 1.5 and 2.0 degree climate targets. New publications should be used in this section when they become available in coming months. [Budong Qian, Canada]

Studies on rice production must be addressed because rice is one of important crops for food security. [Jinkyu Hong, Republic of Korea]

The chapters of the TDTH2 and TDTH3 reports have also been updated and published as peer-reviewed papers in Regional Environmental Change.

Lots of material is repeated here [David Schoeman, Australia]

The identical text with p. 82, line 27-30. [Radim Tolasz, Czech Republic]

83 28 83 47

Please add the word 'are' between 'but significantly'. [Muhammad Mohsin IQBAL, Pakistan]

Do Not Quote, Cite, or Distribute Page 102 of 152
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>19304</td>
<td>83</td>
<td>49</td>
<td>84</td>
<td>2</td>
<td>Regarding Sub-saharan Africa, specially West Africa, please Authors can visit papers leaded by Benjamin Sillan (JACQUES-ANDRE NDIONE, Senegal)</td>
<td>Reference added</td>
</tr>
<tr>
<td>19234</td>
<td>83</td>
<td>52</td>
<td>83</td>
<td>52</td>
<td>Change &quot;of/clear&quot; by &quot;in further&quot; (Ruben Retuerto, Spain)</td>
<td>Done</td>
</tr>
<tr>
<td>6257</td>
<td>83</td>
<td>53</td>
<td>83</td>
<td>53</td>
<td>The word &quot;results in a - - -&quot; is suggested to be changed to &quot;will result in - - -&quot; (Muhammad Mohsin IQBAL, Pakistan)</td>
<td>Done</td>
</tr>
<tr>
<td>623</td>
<td>83</td>
<td>55</td>
<td>83</td>
<td>55</td>
<td>Please consider using consistent wording, synonym or say (Toshiki Kakei, Japan)</td>
<td>Corrected and rewritten</td>
</tr>
<tr>
<td>12403</td>
<td>83</td>
<td>55</td>
<td>83</td>
<td>56</td>
<td>This is not correct. Schlesser et al. (2016) emphasize the uncertainty related to CO2 fertilization effects thereby showing results for fertilization and non-fertilization side by side. This should be reflected here. (Bill Hare, Germany)</td>
<td>Corrected and rewritten</td>
</tr>
<tr>
<td>5473</td>
<td>84</td>
<td>6</td>
<td>84</td>
<td>9</td>
<td>Please check language and reduce the paragraphs (Alu Baru, Nigeria)</td>
<td>Done</td>
</tr>
<tr>
<td>12204</td>
<td>84</td>
<td>6</td>
<td>84</td>
<td>25</td>
<td>The paragraphs on livestock are lacking a mention of 1.5 or 2. or different levels of warming. (Bill Hare, Germany)</td>
<td>Few studies have been reported on the different level of warming</td>
</tr>
<tr>
<td>12707</td>
<td>84</td>
<td>6</td>
<td>84</td>
<td>25</td>
<td>A useful additional reference for this section would be Rivero/Ferre, M. G., et al. &quot;Reframing the climate change debate in the livestock sector: mitigation and adaptation options.&quot; Wiley Interdisciplinary Review: Climate Change 7.6 (2016): 869-892, which makes the point that impacts will take place within livestock systems, which show major variations. The first sentence of the section is taken verbatim from AR5 WG2 Ch. 7 - the authors should check their citation practices. An issue not covered here, or to my knowledge in academic writing on climate change, is the risk of damage to industrial livestock production by tropical storms. If one accepts that storms will increase in intensity it is reasonable to project that this risk will increase. An example is pig production in North Carolina, which has been severely affected by hurricanes Fran (1996) Floyd (1999) and Matthew (2003). <a href="http://grist.org/flooding/the-hack-are-these-pig-farms-in-the-path-of-hurricane-is-a-journalistic-account">http://grist.org/flooding/the-hack-are-these-pig-farms-in-the-path-of-hurricane-is-a-journalistic-account</a>. The 90s hurricanes are covered very much in passing by Brad Weiss, Real Pigs, Duke, John Morton, United Kingdom (of Great Britain and Northern Ireland)</td>
<td>Section has been rewritten</td>
</tr>
<tr>
<td>14001</td>
<td>84</td>
<td>9</td>
<td>84</td>
<td>9</td>
<td>for which regions?? (Elvira Poloczanska, Germany)</td>
<td>Added in the text</td>
</tr>
<tr>
<td>14002</td>
<td>84</td>
<td>11</td>
<td>84</td>
<td>12</td>
<td>This is hold everywhere or just in some regions? (Elvira Poloczanska, Germany)</td>
<td>Added in the text</td>
</tr>
<tr>
<td>14003</td>
<td>84</td>
<td>15</td>
<td>84</td>
<td>15</td>
<td>give examples of regions (Elvira Poloczanska, Germany)</td>
<td>Added in the text</td>
</tr>
<tr>
<td>14004</td>
<td>84</td>
<td>18</td>
<td>84</td>
<td>20</td>
<td>Life to freshwater resources section here (Elvira Poloczanska, Germany)</td>
<td>Done</td>
</tr>
<tr>
<td>9104</td>
<td>84</td>
<td>28</td>
<td>84</td>
<td>56</td>
<td>clearing the effects of 1.5°C above pre-industrial levels (Liang Guo, Wu, China)</td>
<td>Done</td>
</tr>
<tr>
<td>7488</td>
<td>84</td>
<td>28</td>
<td>84</td>
<td>16</td>
<td>This sub-chapter should preferably focus on food production and food security issues of the marine environment, while ecosystem aspects fit better in 3.4.3. Where necessary references to 3.4.3 could be made here. Also check these two sub-chapters for unnessary overlap/repition (Svend Christophersen, Norway)</td>
<td>We thank the reviewer for the suggestion. Some references have been shifted</td>
</tr>
<tr>
<td>19238</td>
<td>83</td>
<td>33</td>
<td>84</td>
<td>33</td>
<td>Insert space before &quot;At&quot; (Ruben Retuerto, Spain)</td>
<td>Done</td>
</tr>
<tr>
<td>19303</td>
<td>84</td>
<td>33</td>
<td>84</td>
<td>33</td>
<td>replaced of writing &quot;Hollowed et al. 2015; King et al. (2015) At the global scale, projections suggested that climate change could...&quot; please write &quot;Hollowed et al. 2015; King et al. 2015. At the global scale, projections suggested that climate change could&quot;, (JACQUES-ANDRE NDIONE, Senegal)</td>
<td>Done</td>
</tr>
<tr>
<td>9026</td>
<td>84</td>
<td>35</td>
<td>84</td>
<td>35</td>
<td>The word &quot;of&quot; should be inserted between &quot;lead&quot; and &quot;significant&quot; in &quot;could lead significant&quot; (Sir RULKIS, Turkey)</td>
<td>Added in the text</td>
</tr>
<tr>
<td>4608</td>
<td>84</td>
<td>37</td>
<td>84</td>
<td>40</td>
<td>Change &quot;Vietnam&quot; by &quot;Viet Nam&quot; - see <a href="https://www.un.org/depts/dhl/unms/vietnam.shtml">https://www.un.org/depts/dhl/unms/vietnam.shtml</a> (Radim Tolasz, Czech Republic)</td>
<td>Done</td>
</tr>
<tr>
<td>14005</td>
<td>84</td>
<td>37</td>
<td>84</td>
<td>37</td>
<td>couldn't these sections be merged? (Elvira Poloczanska, Germany)</td>
<td>No</td>
</tr>
<tr>
<td>14006</td>
<td>84</td>
<td>44</td>
<td>84</td>
<td>45</td>
<td>Check Deutsch et al. 2015. Science on temperature oxygen interactions on stocks (Elvira Poloczanska, Germany)</td>
<td>Reference added</td>
</tr>
<tr>
<td>2159</td>
<td>84</td>
<td>48</td>
<td>84</td>
<td>48</td>
<td>Poor English. (Neville Nicholls, Australia)</td>
<td>Rewritten</td>
</tr>
<tr>
<td>15237</td>
<td>84</td>
<td>48</td>
<td>84</td>
<td>48</td>
<td>sentence unclear (Ruben Retuerto, Spain)</td>
<td>Done</td>
</tr>
<tr>
<td>9327</td>
<td>84</td>
<td>48</td>
<td>84</td>
<td>48</td>
<td>There is a missing word &quot;that&quot; in the phrase &quot;Other projected risks include risks are large in the case&quot; (Sir KLKIS, Turkey)</td>
<td>Done</td>
</tr>
<tr>
<td>5024</td>
<td>84</td>
<td>48</td>
<td>84</td>
<td>48</td>
<td>Other projected risks include risks are large... makes no sense. (Ismail Nunez-Riboni, Germany)</td>
<td>Rewritten</td>
</tr>
<tr>
<td>14007</td>
<td>84</td>
<td>48</td>
<td>84</td>
<td>48</td>
<td>sentence unclear (Ruben Retuerto, Spain)</td>
<td>Rewritten</td>
</tr>
<tr>
<td>11768</td>
<td>84</td>
<td>48</td>
<td>84</td>
<td>48</td>
<td>atype in the opening words of the sentence (Vlad Schoeman, Australia)</td>
<td>Done</td>
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<tr>
<td>12405</td>
<td>84</td>
<td>51</td>
<td>84</td>
<td>52</td>
<td>long-term should be defined (Bill Hare, Germany)</td>
<td>Replaced by &quot;Over time&quot;</td>
</tr>
<tr>
<td>19233</td>
<td>84</td>
<td>54</td>
<td>84</td>
<td>54</td>
<td>Change &quot;general&quot; by &quot;general&quot; (Ruben Retuerto, Spain)</td>
<td>Done</td>
</tr>
<tr>
<td>14008</td>
<td>84</td>
<td>55</td>
<td>84</td>
<td>56</td>
<td>present or future, provide clarity (Elvira Poloczanska, Germany)</td>
<td>Deleted</td>
</tr>
<tr>
<td>2160</td>
<td>85</td>
<td>1</td>
<td>85</td>
<td>1</td>
<td>the word &quot;things&quot; does not depend on whether the increases are sudden or gradual. it is the risks themselves that depend on this. (Neville Nicholls, Australia)</td>
<td>We thank the reviewer for the suggestion</td>
</tr>
<tr>
<td>14009</td>
<td>85</td>
<td>4</td>
<td>85</td>
<td>4</td>
<td>do you mean extreme temperature events?? (Elvira Poloczanska, Germany)</td>
<td>Rewritten</td>
</tr>
<tr>
<td>7489</td>
<td>85</td>
<td>8</td>
<td>85</td>
<td>16</td>
<td>Please consider including this in the executive summary (Svend Christophersen, Norway)</td>
<td>We thank the reviewer for the suggestion</td>
</tr>
<tr>
<td>2161</td>
<td>85</td>
<td>8</td>
<td>85</td>
<td>16</td>
<td>the way this paragraph is expressed, as &quot;avoided risks between 1.5 and 2C&quot; will confuse most readers. it sounds like the risks are reduced if we have more warming (2C). Surely there is a better way to phrase and answer this question? (Neville Nicholls, Australia)</td>
<td>Rewritten</td>
</tr>
<tr>
<td>12406</td>
<td>85</td>
<td>8</td>
<td>85</td>
<td>16</td>
<td>is there any quantification of the reduced impacts for fisheries? (Bill Hare, Germany)</td>
<td>Done</td>
</tr>
<tr>
<td>21238</td>
<td>85</td>
<td>14</td>
<td>84</td>
<td>15</td>
<td>Change of &quot;from&quot; by &quot;to&quot; (Ruben Retuerto, Spain)</td>
<td>Done</td>
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<tr>
<td>7598</td>
<td>85</td>
<td>19</td>
<td>85</td>
<td>19</td>
<td>Consider rephrasing the title of this section. &quot;Food security&quot; is also the title of section 3.4.5.1.4 (Dam Mitchell, United Kingdom (of Great Britain and Northern Ireland))</td>
<td>Noted</td>
</tr>
<tr>
<td>14010</td>
<td>85</td>
<td>19</td>
<td>85</td>
<td>19</td>
<td>Aspects of food security are dealt with in chps 4 and 5. Also, shouldn't this section be under section 3.5 human systems????? (Elvira Poloczanska, Germany)</td>
<td>Section has been restructured</td>
</tr>
<tr>
<td>1387</td>
<td>85</td>
<td>19</td>
<td>85</td>
<td>47</td>
<td>makes a mention related to cascading climate impacts, e.g. great fires in Russia created a ban on exports for a white, which caused major impacts in international food commodity markets. (Roger Cremades, Germany)</td>
<td>In this section it is really hard to do considerations on the several impacts which involve other context than agriculture (i.e. environment, market, socio-economic, etc.). This part is more focused on CC impacts on agriculture. Obviously this would lead to related issues which, however, cannot be addressed in this paragraph.</td>
</tr>
<tr>
<td>Comment No</td>
<td>From Page</td>
<td>From Line</td>
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<td>Comment</td>
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<td>5113</td>
<td>85</td>
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<td>85</td>
<td>47</td>
<td>This section could consider how climate change impacts will ripple through food systems and value chains (from production, sale, processing, purchase, and consumption) to have impacts on food security. Several studies and articles may be useful here.</td>
<td></td>
</tr>
<tr>
<td>12407</td>
<td>85</td>
<td>20</td>
<td>85</td>
<td>23</td>
<td>Repetitive from earlier food security section, can these be consolidated? [Bill Hare, Germany]</td>
<td></td>
</tr>
<tr>
<td>2093</td>
<td>85</td>
<td>21</td>
<td>85</td>
<td>23</td>
<td>Review wording, when talking about food security components, it's common to consider: availability, accessibility, utilization, and stability. As stated, it's difficult to understand. [KENEL DELUSCA, Haiti]</td>
<td></td>
</tr>
<tr>
<td>1384</td>
<td>85</td>
<td>22</td>
<td>85</td>
<td>22</td>
<td>I would suggest to change &quot;availability&quot; to &quot;is availability, to&quot; for improving readability. [Roger Cremades, Germany]</td>
<td></td>
</tr>
<tr>
<td>1669</td>
<td>85</td>
<td>25</td>
<td>85</td>
<td>27</td>
<td>Changes in dietary patterns will make Asian and African food security and self-sufficiency more dependent on international trade in the future which could further be exacerbated due to climate change. Please see Pradhan et al. 2014 ES&amp;T. [Pradhan Prapal, Germany]</td>
<td></td>
</tr>
<tr>
<td>12708</td>
<td>85</td>
<td>25</td>
<td>85</td>
<td>27</td>
<td>This sentence concerns a 4°C rise. [John Morton, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td></td>
</tr>
<tr>
<td>9129</td>
<td>85</td>
<td>25</td>
<td>85</td>
<td>27</td>
<td>The African Sahel is one of the most vulnerable areas in the world to food insecurity. Climate change could make that worse. Please add text that reads something like &quot;Projected substantial decreases in crop yields in the African Sahel, a region where many rural people are subsistence farmers, with warming of 2°C or greater (Sultan and Gaetani 2016) could greatly increase the risk of food shortages and low nutrition.&quot; Sultan, B. and M. Gaetani. 2016. Agriculture in West Africa in the Twenty-First Century: Climate change and impacts scenarios, and potential for adaptation. Frontiers in Plant Science 7: 1262. doi: 10.3389/fpls.2016.01262. [Patrick Gonzalez, United States of America]</td>
<td></td>
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<tr>
<td>14011</td>
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<td>25</td>
<td>85</td>
<td>27</td>
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<tr>
<td>9611</td>
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<td>25</td>
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<td>47</td>
<td>The African Sahel is one of the most vulnerable areas in the world to food insecurity. Climate change could make that worse. Please add text that reads something like &quot;Projected substantial decreases in crop yields in the African Sahel, a region where many rural people are subsistence farmers, with warming of 2°C or greater (Sultan and Gaetani 2016) could greatly increase the risk of food shortages and low nutrition.&quot; Sultan, B. and M. Gaetani. 2016. Agriculture in West Africa in the Twenty-First Century: Climate change and impacts scenarios, and potential for adaptation. Frontiers in Plant Science 7: 1262. doi: 10.3389/fpls.2016.01262. [Patrick Gonzalez, United States of America]</td>
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<tr>
<td>3878</td>
<td>85</td>
<td>27</td>
<td>85</td>
<td>27</td>
<td>The African Sahel is one of the most vulnerable areas in the world to food insecurity. Climate change could make that worse. Please add text that reads something like &quot;Projected substantial decreases in crop yields in the African Sahel, a region where many rural people are subsistence farmers, with warming of 2°C or greater (Sultan and Gaetani 2016) could greatly increase the risk of food shortages and low nutrition.&quot; Sultan, B. and M. Gaetani. 2016. Agriculture in West Africa in the Twenty-First Century: Climate change and impacts scenarios, and potential for adaptation. Frontiers in Plant Science 7: 1262. doi: 10.3389/fpls.2016.01262. [Patrick Gonzalez, United States of America]</td>
<td></td>
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<tr>
<td>6258</td>
<td>85</td>
<td>29</td>
<td>85</td>
<td>29</td>
<td>Annual rate of change of - - - (instead of 'annual rates of changes of - - -'). [Muhammad Mohsin IQBAL, Pakistan]</td>
<td></td>
</tr>
<tr>
<td>19036</td>
<td>85</td>
<td>29</td>
<td>85</td>
<td>29</td>
<td>Reference has been added</td>
<td></td>
</tr>
<tr>
<td>3852</td>
<td>85</td>
<td>22</td>
<td>85</td>
<td>23</td>
<td>It is difficult to figure out exactly what is due to what. [Woonsup Choi, United States of America]</td>
<td></td>
</tr>
<tr>
<td>2162</td>
<td>85</td>
<td>25</td>
<td>85</td>
<td>27</td>
<td>Why are you talking about 4°C warming? [Neville Nicholas, Australia]</td>
<td></td>
</tr>
<tr>
<td>1669</td>
<td>85</td>
<td>25</td>
<td>85</td>
<td>27</td>
<td>The section has been rewritten and improved</td>
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</tr>
<tr>
<td>5113</td>
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<td>85</td>
<td>47</td>
<td>This section could consider how climate change impacts will ripple through food systems and value chains (from production, sale, processing, purchase, and consumption) to have impacts on food security. Several studies and articles may be useful here.</td>
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</tr>
<tr>
<td>5113</td>
<td>85</td>
<td>19</td>
<td>85</td>
<td>47</td>
<td>We thank the reviewer for the suggestion that would be look in consideration</td>
<td></td>
</tr>
</tbody>
</table>

Do Not Quote, Cite, or Distribute Page 104 of 152
Comment No | From Page | From Line | To Page | To Line | Comment | Response
--- | --- | --- | --- | --- | --- | ---
6260 | 85 | 31 |  |  | The phrase as differences in the price effect of - - - is suggested to be changed to that differences in price impacts of - - -. [Muhammad Mohsin Qurban, Pakistan] | Done
4609 | 85 | 32 |  |  | Leave out "?" [Radim Tolcans, Czech Republic] | Done
1440 | 85 | 32 |  |  | price change in the future depends completely on if you take CO2 fertilization effect into account or not (as underlined in the AR5). The results that are quoted in this report are for no CF effect. [Philippe Rouxler, France] | The section has been rewritten and improved
2164 | 85 | 35 |  |  | Why are you discussing the impacts of demand for bioenergy on food prices? Surely that text a result of warming of 1.5 or 2°C? [Neville Nicholls, Australia] | Deleted
1385 | 85 | 35 | 85 | 37 | In my opinion, a comparison of percentages of prices and yields in the same sentence might give false impressions. Instead, it could be more informative to compare prices with yields, and yields with yields, and when possible based on the same scenarios. [Roger Cremaades, Germany] | Several scientific studies reported a correlation between yield and prices. It is really hard to report prices to yields if this has not been reported by the studies included into these studies. If IPCC authors would try to turn price to food or vice versa using an approach dissimilar to that reported by authors of these studies, some mistakes would be possible (i.e. erroneous data).
1441 | 85 | 36 |  |  | Lotze-Campen et al. (2014) by comparing five agro-economic models suggested that the overall 35 impacts of high demand for second-generation bioenergy on global food prices are rather modest... = please be careful with such statements. As this paper underlines "however, potential future scarcities of water and nutrients, policy-induced restrictions on agricultural land expansion, as well as potential welfare losses have not been specifically looked at in this exercise." Moreover they do not include speculation on futures market. And as demonstrated by lagi et al (2011) (The Food Crisis: A quantitative model of food prices including speculators and ethanol conversion) for the 2008 food crisis ethanol conversion and speculative investment are the main drivers of the price shocks. [Philippe Rouxler, France] | The section has been rewritten and improved
14012 | 85 | 37 | 85 | 37 | Unclear what the 25% stand for [Elvira Poloczanska, Germany] | Deleted
5479 | 85 | 39 | west Africa and not Africans [Aliyu Barau, Nigeria] | Deleted
1386 | 85 | 39 | 85 | 47 | A mention to climate-smart agriculture, increasing yields in the context on co-benefical adaptation and mitigation practices. [Roger Cremaades, Germany] | Deleted
12709 | 85 | 39 | 85 | 47 | This paragraph is rather clumsily written, not very specific to a 1.5°C rise, and strays rather unystematically into adaptation. If agricultural adaptation is to be discussed here, this is hardly a full account of the literature. [John Morton, United Kingdom (of Great Britain and Northern Ireland)] | Corrected and rewritten
1670 | 85 | 40 | 85 | 44 | Location specific inputs and management strategies is required to improve the crop yields beyond application of fertilizer and irrigation water. Please see Pradhan et al. 2015, PLoS One. [Pradhan Prajapol, Germany] | The paragraph has been completely rewritten
2166 | 85 | 41 | 85 | 41 | Do you have evidence that in Africa climate change will “unequivocally hurt agriculture”? The use of the word “unequivocally” does not sit well with the word “appears”, which you use in the same sentence. For “unequivocally” you need a lot of evidence. [Neville Nicholls, Australia] | Rewritten
11769 | 85 | 42 | 85 | 44 | This sounds very “top-down” [David Schoeman, Australia] | Deleted
1442 | 85 | 42 | 85 | 45 | I don’t really see the link with the 1.5°C target? [Philippe Rouxler, France] | Added in the text
13248 | 86 | 1 | 86 | 5 | Tables 3.8. There should be a row in the table for food security [Nick Hare, Germany] | Tables are being revised in final draft
5480 | 86 | 8 | better use MENA - Middle East and North Africa as title of box 3.7 please consider reducing the box word count [Aliyu Barau, Nigeria] | Replaced - not all the MENA is concerned by the box
9991 | 86 | 15 | 86 | 15 | Change “... the Mediterranean basin” with “the Mediterranean Basin” [Mustafa Tufan Turp, Turkey] | Editorial
5900 | 87 | 25 | 87 | 32 | A very interesting paper by a Syrian researcher on recent Syrian droughts and current conflict in the country is coming to light soon in Atmospheric Research: Mathbout et al. (in press). Spatial and temporal analysis of drought variability at several time scales in Syria during 1961-2012 Atmospheric Research [Joan A. Lopez-Bustins, Spain] | Taken into account: reference added at end of §4
3388 | 87 | 25 | 87 | 53 | Since this is subject to major controversy, I would be careful, and avoid expressions and terms like “it cannot be denied” and “significant” (in science this word is reserved for statistical evidence supporting facts). [Roger Cremaades, Germany] | Accepted - Replaced by “relationship, drought played an important role...” Accepted - Replaced by “relationship, drought played an important role...”
20295 | 87 | 26 |  |  | Delete extra period at end of sentence [Karen Glenn, Canada] | Editorial
15239 | 87 | 26 | 87 | 26 | Remove one “.” [Rubén Retuerto, Spain] | Editorial
15088 | 87 | 26 | 87 | 26 | There is a point too much at the end of this sentence. [Wim Thiery, Switzerland] | Accepted - it is both the longest and the most intense
11770 | 87 | 26 | 87 | 26 | Two full stops [David Schoeman, Australia] | Accepted - it is both the longest and the most intense
2167 | 87 | 31 |  |  | I do not see that the fact that the drought was the longest in 900 years necessarily means it had a “significant role in triggering the crisis”. I have no doubt that it did play a role, but not just because it was a severe drought - you need to explain the linkages better. [Neville Nicholls, Australia] | Replaced - it is both the longest and the most intense
11771 | 87 | 34 | 87 | 35 | The comparison of the situation to the fall of civilizations in the Bronze Age could be viewed as a little insulting. [David Schoeman, Australia] | Taken into account: but I do not understand why
1389 | 87 | 34 | 87 | 43 | Very interesting, still some additional mentions of dates in the timeline would help the less informed reader in these sentences: "Most of the coastal cities of Eastern Mediterranean were destroyed, burned, and often left unoccupied thereafter, putting an end to the elaborate network of international trade that had ensured prosperity in the Aegean and the eastern Mediterranean. The rural settlements that emerged mainly persisted through adapted agro-pastoral activities and limited long-distance trade (Kaniewski et al. 2015b). Drought may have hastened the fall of the Old World by sparking famines, invasions and conflicts, leading to the political, economic and cultural chaos referred to as the ‘Late Bronze Age crisis’. “ [Roger Cremaades, Germany] | Taken into account: text has been slightly modified
19204 | 87 | 46 | 87 | 46 | Change “period” by “periods” [Rubén Retuerto, Spain] | Editorial
6281 | 87 | 47 |  |  | "-10m-decrease in the water level -1 - 5m-decrease in the river level - - - / [Muhammad Mohsin Qurban, Pakistan] | Editorial
1390 | 87 | 48 | | | Impact on wheat and barley production was maximum in Iraq and Syria, good, still I would suggest to mention a date. [Roger Cremaades, Germany] | Accepted - I propose to write ...was the highest in Iraq and Syria in 2008
1391 | 87 | 48 | | | Beware Euphrates is written with a minor typo without s. [Roger Cremaades, Germany] | Editorial
15241 | 87 | 48 | 87 | 48 | Change "Euphrates" by "Euphrates" [Rubén Retuerto, Spain] | Editorial
11772 | 87 | 48 | 87 | 48 | "Greatest", not "maximum" [David Schoeman, Australia] | Taken into account - see comment 1390

IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3
Comment

13759 88 3 This whole section is totally reftd on just one publication [Elna Potoczanska, Germany]

The section is a summary of the baseline for the subsequent assessment.

514 88 5 88 7 The human systems assessed in AR5 are not exactly the ones assessed here (e.g. rural areas). Please rephrase. [David Docquier, Belgium]

Changed.

13760 88 5 88 7 Where is assessment of rural areas, and what/where are the subsections 3.5.6 and 3.5.7? [Elvira Poloczanska, Germany]

There is no literature on the risks to rural areas at warming of +1.5 and 2°C. A statement was rewrite this sentences, hard to make sense of [Elvira Poloczanska, Germany] Sentence edited.

12710 88 1 Observed impacts and projected risks ON human systems replace with ON [Aliyu Barau, Nigeria]

Sections 4 and 5 were combined and reorganized

13761 88 7 88 8 It is necessary to make sense to [Elna Potoczanska, Germany]

The sentence is clear, as is the overall theme.

8876 88 11 88 28 under this bulleted list of impacts on human systems, I would like to see included some mention of mental health: threats to mental health associated with extreme weather events as well as with migration. I don't know if it fits best in this chapter but I would also like to see some reference to impacts on social relations, such as increases in conflict and inequality. Finally, it may not belong in this list but there is no mention of threats to health from decreases in air quality and expanded disease vectors. [Susan Clayton, United States of America]

Agricole, United States of America]

Agree that mental health is an important health risk in a changing climate. However, Cramer et al. did not include mental health as a key message.

16298 88 11 88 28 Where is mention of disruption of cultural communities, indigenous communities and cultures, heritage sites, the need for relocation of coastal communities and cities, etc.? Staying alive is important, but so are social connections and linkages. [Michael MacCracken, United States of America]

Cramer et al. did not include a key message on these issues.

13762 88 11 88 28 AR5 WGI report also refers to: psychological/emotional distress, stigmatization, mental suffering including post traumatic stress disorder, heat related violence. These are not mentioned here, why not? [Elna Potoczanska, Germany]

These were mentioned within the AR report but Cramer et al. did not include any key messages on these issues.

2764 88 17 88 22 It would be important to add "a problem for security and international relations" (water, food, wars...) [Jonathan Gonzalez Cantor, Spain]

This was not included in the key messages from Cramer et al. 2014

2303 88 29 88 29 A new risk of increase of mental health effects due to urban pollution and changes in the atmospheric dynamics and chemistry should be added. [Regina ARTINANO, Spain]

This was not included in the key messages from Cramer et al. 2014


This was not included in the key messages from Cramer et al. 2014

14014 88 41 The climatic discussion on urban areas in 3.3.3 (eg UHI, sea-level rise) needs to be linked to text here or sections merged [Elna Potoczanska, Germany]

The whole section is very discursive and has few headlines. There are various ways this could be improved: (1) Adaptation cost-benefit estimates are addressed in Chapter 4 (2) buildings, and urban design and green urban areas as adaptation options are addressed in Chapter 4 (3.4.3)

8812 88 44 88 55 give some examples related to observed changes in flood in city or heat island effects in some regions. [Jianqiang Xu, China]

Example of New York City coastal flooding during Hurricane Sandy added.

2343 88 49 88 49 Heat island effects [Tyeopoe Logayne, Ukraine]

This is not an extreme weather and climate event, and the consequences are captured later in the sentence.

15043 88 49 88 49 cowt. ? + "after "quality" [Ruben Rebetaro, Spain]

Mention of soil composition added.

7569 88 51 88 51 I propose to include clay soils issues that have strong impact on urbanized areas? These can be compounded by geo-hydrological hazards, such as solubility, expansion and retraction of clay soils and saltwater intrusion [Julie Hodigos, France]

Taken into account - revised text. Page 3-27 line 25 to page 3-28 line 15, moved to 3.5.2.2 Projected risks at 3.5.2.2 Projected risks at 1.9°C versus 2°C and adaptive capacity

2168 88 89 88 89 How was Fig 3.20 derived (or is it 3.21, since the figure numbers in the captions are often different to the ones you use in the text)? [Neville Nicholls, Australia]

Taken into account and corrected figure numbers included.
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>19083</td>
<td>Resolution of figure 3.20 page 3-89 ([Alfie Elbothy, Egypt]) Editorial - higher resolution graphic replaced and graphic design to be updated with copyedit prior to publication</td>
</tr>
<tr>
<td>20674</td>
<td>Fig. 3-20 is too blurry, needs better quality ([Delora Ley, Guatemala]) Editorial - higher resolution graphic replaced and graphic design to be updated with copyedit prior to publication</td>
</tr>
<tr>
<td>2165</td>
<td>The population is getting older, there is more vulnerability. During waves of extreme heat, the supermortality rises 55% ([Jonathan Gómez Cantero, Spain]) Taken into account - combined with 2272</td>
</tr>
<tr>
<td>2166</td>
<td>The quality of the Figure 3.20 should be improved. Please, clip the original title, it's no need to keep it. ([JACQUES-ANDRE NDIONE, Senegal]) Reference added.</td>
</tr>
<tr>
<td>7067</td>
<td>11 One could explain methodological uncertainties in downscaling results from GCM using ROM (cf. NAKHM, Hypothermal simulations of buildings concerning uncertainties of the future climate (2012).) Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>11774</td>
<td>Should it be Figure 3.20, not Figure 3.21? ([GREGORY INSAROV, Russian Federation]) Corrected (Editorial - additional copy edit to be completed prior publication)</td>
</tr>
<tr>
<td>1373</td>
<td>14 Should it be Figure 3.20, not Figure 3.21? ([GREGORY INSAROV, Russian Federation]) Corrected (Editorial - additional copy edit to be completed prior publication)</td>
</tr>
<tr>
<td>2197</td>
<td>24 Expand section on SRL risks. Cite Bader et al., 2018 ([Cynthia Rosenzweig, United States of America]) Accepted to observed impacts</td>
</tr>
<tr>
<td>9059</td>
<td>20 Cite sources in Figure 3.20 ([Cynthia Rosenzweig, United States of America]) Editorial - higher resolution graphic replaced and graphic design to be updated with copyedit prior to publication</td>
</tr>
<tr>
<td>19037</td>
<td>25 The quality of the Figure 3.20 should be improved. Please, clip the original title. It is no need to keep it. ([JACQUES-ANDRE NDIONE, Senegal]) Accepted (Editorial - additional copy edit to be completed prior publication)</td>
</tr>
<tr>
<td>9088</td>
<td>28 The figure showing direct urban risk of ‘annual water availability percentage’ may be more appropriate if expressed in water availability per capita, which should be particularly critical for urban areas of developing nations. ([Buchandra Barthan, India]) Taken into account - covered in human health section 3.5.4, for example p 3-94, lines 34-35</td>
</tr>
<tr>
<td>10022</td>
<td>90 Row 33: Energy is very important subject in this manner. This section should be supported with more references. ([Nazan AN, Turkey]) Thank you for your comment, more references were included</td>
</tr>
<tr>
<td>6832</td>
<td>90 A more comprehensive assessment is needed since more studies are available now in the literature on the future heat stress for future development of cities with different climate background around the world. The upcoming book: Climate Change and Cities Second Assessment Report of the Urban Climate Change Research Network. Edited by Cynthia Rosenzweig, William D. Solecki, Patricia Romero-Lankao, Shagun Mehrotra, Shobhakar Dhakal, Sumeyya Al Ibrahim, (2017). ISBN: 9781316603338. ([Rafiq Hamdi, Belgium]) Thank you for your comment. The tourism section was revised based on a more comprehensive assessment. It is not possible to cite a book without a copy.</td>
</tr>
<tr>
<td>2169</td>
<td>90 I don't see the logic. Cities already suffer from the urban heat island effect. So adding 1.5°C warming regionally will just add 1.5°C warming in the city and outside the city. Unless you reckon that global warming will enhance the UHI effect? If so, you need to explain how this will happen. ([Neville Nichols, Australia]) Figure source is cited on page 3-89 in text line 13 and line 28</td>
</tr>
<tr>
<td>9366</td>
<td>90 Cite Bader et al., 2018 in Press ([Cynthia Rosenzweig, United States of America]) Figure source is cited on page 3-89 in text line 13 and line 28</td>
</tr>
<tr>
<td>2624</td>
<td>90 Mention specific hot spots/cities ([Afra Shaawo, United Kingdom (of Great Britain and Northern Ireland)] Accepted and text revised to include reference to specific megacities (also in response to comment 272?)</td>
</tr>
<tr>
<td>12410</td>
<td>90 The paragraph does not follow a logical flow and mixes different issues (land-use effects, heat island effects and other factors affecting warming) without introducing the purpose of the paragraph or why these factors are related. ([Bill Hare, Germany]) Taken into account - text revised to cluster UHI followed by other factors such as urban morphology and land use.</td>
</tr>
<tr>
<td>9328</td>
<td>90 The statement, ‘There is growing evidence that cities are likely to experience greater heat stress than the regional warming under 1.5°C and 2°C scenarios because of urban heat island effects’ may be supported by additional references, including the study by Tapias et al. (2017) An indicator-based vulnerability assessment for European cities, Ecological Indicators, Vol. 75, pp. 180-180. [Sia KLKAS, Turkey] Taken into account - test revised to include references to additional UHI impact studies. Tapias et al. specific to 1.5 versus 2.</td>
</tr>
<tr>
<td>11778</td>
<td>90 Over what time period is this projection (i.e., when do we expect to see this effect?) ([David Schoeman, Australia]) Taken into account - text revised to add mid-century</td>
</tr>
<tr>
<td>5145</td>
<td>8 YU and ZHAI is missing the year of reference ([Kenneth Chow, Singapore]) Taken into account - reference to Nick (2012) and Yu, Zhai, and Lu (2017) added in SOD. FOD Section 3.2.2, page 3-11-15 addresses methods in detail, including downscaling (e.g. CORDEX, Giorgi and Gutowski 2015; Jacob et al. 2014a; Ochs et al. 2013; Erfanian et al. 2019; Barlow et al. 2016; Kendon et al. 2014; Ban et al. 2014; Preni et al. 2015).</td>
</tr>
<tr>
<td>2304</td>
<td>90 Air quality decreases in big metropolitan areas. ([Begoña ARTUÑANO, Spain]) Taken into account - reference to Nick (2012) and Yu, Zhai, and Lu (2017) added in SOD. FOD Section 3.2.2, page 3-11-15 addresses methods in detail, including downscaling (e.g. CORDEX, Giorgi and Gutowski 2015; Jacob et al. 2014a; Ochs et al. 2013; Erfanian et al. 2019; Barlow et al. 2016; Kendon et al. 2014; Ban et al. 2014; Preni et al. 2015).</td>
</tr>
</tbody>
</table>
It's unclear whether the urban sector and services should be described here or in the urban section above. 


4098 90 14 26

Two further concepts of climate change that are relevant to include are: 1) change management will affect the integrity of both natural and cultural heritage, which in turn will affect its pull and capacity to support tourism; relevant reference is: Martin, A., Osorio, E., Laffont, S., and Caldeira, A. (2016), World Heritage and Tourism in a Changing Climate. United Nations Environment Programme, Nairobi, Kenya and United Nations Educational, Scientific and Cultural Organization, Paris, France, and 2) changing temperatures are likely to affect overall quantity and seasonality of visits to parks and protected areas, such as this study conducted for the US National Park Service; relevant reference: Fischl, A., Schurman, G.R., Monahan, W.B., Ziesler P.S. (2015) Protected Area Tourism in a Changing Climate: Will Variation at US National Parks Warm Up or Overheat? PLoS ONE 10(5): e0125262. doi:10.1371/journal.pone.0125262. [Marcy Rockman, United States of America]

4026 90 16 90 36

Important point, needs further discussion and substantiation. [Penny Urquhart, South Africa] Deleted

4103 90 20 90 20

Instead of writing "et al. (2014) (AR5) concluded", please write "et al. (2014) concluded" [JACQUES-ANDRE NDIONE, Senegal] Changed

1392 90 20 90 25

Overall, the impacts of climate change will be small relative to other drivers of economic sectors and services. I am not convinced by this sentence, Do you have justification for this sentence? [Elvira Poloczanska, Germany] Deleted

2349 90 20 90 26

The statement that climate change will be small relative to other drivers needs to be supported with at least one reference. The statement may be correct, but needs validation. Otherwise, the issues addressed with climate change impacts on tourism may be overlooked by policymakers. [David Viner, United Kingdom (of Great Britain and Northern Ireland)] Deleted

2722 90 20 90 36

Do you have justification for this sentence?7 [Elvira Poloczanska, Germany] Deleted

14610 90 20 90 36

Do you have justification for this sentence?7 [Elvira Poloczanska, Germany] Deleted

12486 90 33 90 38


4124 90 34 90 38

Water availability could directly impact the operations of nuclear, hydro and fossil energy systems directly and have indirect impacts on solar and wind energy as water is required in the production of these energy sources and extreme weather raises further questions on grid resilience. A 2013 U.S. Department of Energy study indicated that water shortages threaten to extreme events costs upwards of 33 billion (2003-2012). https://energy.gov/sites/prod/files/2013/08/SOF%20Resilience%20Report_FINAL.pdf [Michelle Leslie, Canada]

4184 90 34 38

Water availability could directly impact the operations of nuclear, hydro and fossil energy systems directly and have indirect impacts on solar and wind energy as water is required in the production of these energy sources and extreme weather raises further questions on grid resilience. A 2013 U.S. Department of Energy study indicated that water shortages threaten to extreme events costs upwards of 33 billion (2003-2012). https://energy.gov/sites/prod/files/2013/08/SOF%20Resilience%20Report_FINAL.pdf [Michelle Leslie, Canada]

6095 90 34 38


12797 90 34 38

A few examples of weather-energy links are mentioned, but several important are missing. I think in this introductory section, the quasi-full list should be mentioned, removing "e.g.". Temperature affects above all heating and also air conditioning (please mention heating). I would replace "water stress" by "river flow and temperature" (hydropower and powerplant cooling), solar radiation (solar power), wind and storms (wind and energy network infrastructure risk), and all weather variables linked to agriculture and forestry for biofuel production. Finally it could be interesting to mention that this combination of all weather variables together is important for balancing electricity load in transmission network. One can cite the U.N. GCFCs exemplar for the energy sector http://www.wmo.int/gcfs/sites/default/files/Priority-Areas/Energy/GCFS_Energy%20Exemplar_R1%7453.pdf [Robert Vautard, France]

15039 90 36 90 36

Instead of writing "et al. (2014) (AR5) concluded", please write "et al. (2014) concluded" [JACQUES-ANDRE NDIONE, Senegal] Changed

1393 90 36 90 39

It would be good to include more references if available, sorry besides Arent et al. (2014) [Roger Crumades, Germany]

2344 90 38 38

Extremely high temperatures and adverse weather conditions negatively affect gas pipelines integrity and operation. [Trypolska Galyna, Ukraine] There was limited literature on the impacts on gas pipelines at 1.5 and 2C.
### Comment Response Table

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
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<tbody>
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<td>16299</td>
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**IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3**
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
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<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>2723</td>
<td>91</td>
<td>15</td>
<td>91</td>
<td>17</td>
<td>Insufficient detail, needs more references added. Could be at climate change related sea-level rise impacts leading to coastal erosion and damage to coastal tourism resorts e.g. in The Gambia and Senegal, must be many studies of SIDS [Penny Urquhart, South Africa]</td>
<td>The tourism section was substantially increased to reflect the scope of impacts work in this sector. The only tourism-specific SLR study for SIDS (from the Caribbean region) is now included. A new book is coming out in early 2018 on SLR and tourism that may have additional new empirical work on SLR risks in other destinations, but it was not yet available. New work is also expected to quantify impacts on major tourism beaches in Hawaii and California in early 2018. These will be added as available.</td>
</tr>
<tr>
<td>13764</td>
<td>91</td>
<td>15</td>
<td>91</td>
<td>17</td>
<td>section 3.5.3.2.1 needs some more details [Elvira Plozczanska, Germany]</td>
<td>The tourism section was substantially increased to reflect the scope of impacts work in this sector.</td>
</tr>
<tr>
<td>4927</td>
<td>91</td>
<td>15</td>
<td>91</td>
<td>32</td>
<td>Re-stating comment above regarding references and concepts for climate change and tourism, as they should/could also be incorporated here: 1.) climate change will affect the integrity of both natural and cultural heritage, which in turn will affect its pull and capacity to support tourism; relevant reference is: Markham, A., Osipova, E., Luhder, Samuela, K. and Caldas, A. (2016). World Heritage and Tourism in a Changing Climate. United Nations Environment Programme, Nairobi, Kenya and United Nations Educational, Scientific and Cultural Organization, Paris, France., and 2.) changing temperatures are likely to directly affect overall quantity and seasonality of visitors to parks and protected areas, such as this study conducted for the US National Park Service; relevant reference: Fischhelt NA, Schuurman GW, Monahan WB, Zwieter PS (2015) Protected Area Tourism in a Changing Climate: Will Visitation at US National Parks Warm Up or Overheat? PLoS ONE 10(6): e0128226. doi:10.1371/journal.pone.0128226. (Marcy Roskam, United States of America)</td>
<td>The UNESCO and UNEP report and the peer-reviewed work it draws on are included in the much expanded section. The US parks study is also included. Both build on previous work, but as these are pre-AR5 these studies are not included.</td>
</tr>
<tr>
<td>19249</td>
<td>91</td>
<td>16</td>
<td>91</td>
<td>16</td>
<td>Remove &quot;demand&quot; [Rubén Retuerto, Spain]</td>
<td>Deleted</td>
</tr>
<tr>
<td>2170</td>
<td>91</td>
<td>16</td>
<td>91</td>
<td>17</td>
<td>The ship is pretty obvious - I don't think you need to rely on a citation to support such an obvious statement. [Neville Nicholls, Australia]</td>
<td>Thank you.</td>
</tr>
<tr>
<td>4165</td>
<td>91</td>
<td>16</td>
<td>91</td>
<td>17</td>
<td>As reported by The Globe and Mail, the tourism industry in Florida and the Caribbean is a major economic driver; times could have devastating consequences (like other extreme events) directly to tourism and more widely to other industries as the losses will have ripple effects. [<a href="https://beta.theglobeandmail.com/report-on-business/international-business/latin-american-business/caribbean-islands-lying-prim-to-tourism-season-in-wake-of-hurricane-irma/article36222141/?ref=http://www.theglobeandmail.com">https://beta.theglobeandmail.com/report-on-business/international-business/latin-american-business/caribbean-islands-lying-prim-to-tourism-season-in-wake-of-hurricane-irma/article36222141/?ref=http://www.theglobeandmail.com</a></td>
<td>There are limited analyses of the impact of the two category 5 hurricanes on tourism the Caribbean (or Florida, Texas). Further information may develop in 2018. The early estimate of the Caribbean Tourism Organization is included. These impacts are representative of impacts anticipated to happen more frequently under warming</td>
</tr>
<tr>
<td>14017</td>
<td>91</td>
<td>20</td>
<td></td>
<td></td>
<td>Tourism and coral reef ecosystems not included here [Elvira Plozczanska, Germany]</td>
<td>Most work on the impact of bleaching/coral decline on tourism is pre-AR5 and ineligible (see Scott et al. 2012 sector review in WRI-climate change). Reef closures resulting from recent bleaching events are included in the observed impacts section.</td>
</tr>
<tr>
<td>993</td>
<td>91</td>
<td>20</td>
<td>91</td>
<td>20</td>
<td>In the heading of &quot;Projected risks at 1.5 vs 2°C, 0 should be omitted and °C should be added. &quot;Projected risks at 1.5°C vs 2°C&quot; [Mustafa Yuluc Tur, Turkey]]</td>
<td>Changed</td>
</tr>
<tr>
<td>11778</td>
<td>91</td>
<td>21</td>
<td>91</td>
<td>32</td>
<td>There might also be impacts on tourism resulting from the impacts on beaches of sea-level rise and coastal armouring...after all, a significant proportion of coastal Mediterranean tourism is associated with coastal leisure activities...[David Schoeman, Australia]</td>
<td>SLR impacts on coastal tourism is a major impact for tourism, but one that remains poorly quantified. Discussion was added, but see previous comment on availability of post-AR5 studies.</td>
</tr>
<tr>
<td>12411</td>
<td>91</td>
<td>21</td>
<td>91</td>
<td>32</td>
<td>There is much focus on the US and Europe, with no mention of other parts of the world that rely heavily on tourism (e.g. small islands, parts of Asia, Latin America...) [Bill Hare, Germany]</td>
<td>Work on specific impacts from around the world are included in the expanded text. In addition, newly available work that uses an index approach to examine the relative risk and adaptive capacity of the tourism sector in 181 countries provides a global perspective on the geography of impacts in this sector.</td>
</tr>
<tr>
<td>2172</td>
<td>91</td>
<td>21</td>
<td>91</td>
<td>37</td>
<td>This seems to suggest that warming is bad for tourism everywhere and at all times. Is this credible? Surely tourism will increase in some areas? [Neville Nicholls, Australia]</td>
<td>There are risks and opportunities associated with climate altered competitiveness of destinations (including uncertainties associated with transnational impacts in this highly integrated global sector). This is discussed in the post-AR5 work review paper (Scott et al. 2015) and also so it pertains to changing climate resources in temperate regions and within each regional ski tourism market.</td>
</tr>
<tr>
<td>2171</td>
<td>91</td>
<td>23</td>
<td>91</td>
<td>24</td>
<td>How does the warming &quot;impact&quot; tourism? Does it increase it or decrease it? By how much? Is this credible? [Neville Nicholls, Australia]</td>
<td>The impact on tourism, like all sectors, is complex. There is no single answer that warming increases or decreases tourism globally, as the impacts are diverse at the region and destination scale and even differ at the sub-sector/market scale at a single destination (e.g. ski tourism vs ‘green season’ impacts in mountain regions). The complexity of impacts and some comparative impacts (as examined through vulnerability indices) are discussed in the expanded section.</td>
</tr>
<tr>
<td>15311</td>
<td>91</td>
<td>24</td>
<td>91</td>
<td>24</td>
<td>The results of Grillakis et al., 2016 are supported in a deeper analysis in the following publication. Please add it to the [Grillakis et al. 2016; Damm et al. 2016].</td>
<td>Darrin et al. was added as has a broader discussion of the use (and limitations) of climate index work. See also previous comments on climate as a driver of spatial and temporal tourism patterns.</td>
</tr>
<tr>
<td>2768</td>
<td>91</td>
<td>25</td>
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<td>The weather extremes will affect infrastructures as well as sea level rise[Iberian peninsula] [Jonathan Gómez Canton, Spain]</td>
<td>Weather extremes, in combination with SLR, will indeed increase impacts on coastal tourism infrastructure and more immediately and widespread on beach assets. As indicated in previous comments, there is limited post-AR5 (and pre-AR5) work that quantifies the extent of this potential impact in major tourism regions of the world (including Spain).</td>
</tr>
</tbody>
</table>
The number of snowfalls has been reduced and the number of days that ski can be reduced (Iberian peninsula) [Jonathan Gómez Cantero, Spain]

The review work of Steiger et al (2017) on impacts to ski tourism is included in the expanded section. The work on Pons et al. in the Pyrenees is also cited.

In my humble opinion, it could more informative to include two separate sub-sections for floods and droughts, instead of a section for “Water”. [Roger Cremades, Germany]


What magnitude of temperature increase is this referring to (impacts on weight restrictions for aircraft takeoff)? [Bill Hare, Germany]

The magnitude of temperature increase was added in the section.

Do you consider water as human system? Do you mean water infrastructure? [Aliyu Barau, Nigeria]

Sections 3.4 and 3.5 were merged and reorganized.

What about benefits associated with an ice-free, or nearly ice-free Arctic. Of course, this in itself will have impacts, but it IS a benefit...at least in some such as should be “such as” [Ken’ichi Matsumoto, Japan]

The expression of temperature rise in percent is very unusual. [Radim Tolasz, Czech Republic]

Add water transport: “Road, air, rail, water and pipeline...” [Radim Tolasz, Czech Republic]

Added

Do you consider water as human system? Do you mean water infrastructure? [Aliyu Barau, Nigeria]

Paragraph on air quality added.

The geography of changing climate resources for tourism is broadly discussed in the expanded section. See also previous comments on climate resources as a driver of spatial and temporal patterns of tourism. The impacts (++) for all regions cannot be discussed with limited space, but can be found in the multiple citations added to the section.

North Sea Route was added in this section.

The AR5 addresses the ice-free and nearly ice-free Arctic and the increase in shipping in the North Sea Route was added in this section.

Add explanation or definition of “climate comfort days”. [Radim Tolasz, Czech Republic]

This was removed from the section as it is not a concept / indicator used in the literature beyond a single study. Studies that used a common ‘tourism climate index’ are compared, and the critique of this approach touched on.

The impact of freeze-thaw cycles was included in the AR5 and referenced in this section.

I was one of the reviewers for the Yamashew paper and it is a valuable addition to the literature. However I feel that the Melia et al 2016 paper is more appropriate for the questions being asked here.

Ben Hare, Germany

The topic on human health comes in this page. More detail would be important on the impact of climate change on tropical diseases. I came across the work of Mark Booth (Newcastle University), that targets this in detail in a paper entitled: Climate Change and the Neglected Tropical Diseases (accepted for publication). In this paper Mark reviews current evidence on how climate change may affect future transmission of NTDs. In this paper he includes 30 infections (WHO NTD list & WHO blueprint list of priority diseases). Would be important to look into this paper in order to further substantiate the claims made in this report on this specific issue. [Vera Barbosa Araujo Soares Sniehotta, United Kingdom (of Great Britain and Northern Ireland)]

Paper will be added once it is available.

Paragraph on air quality added.

Do you consider water as human system? Do you consider water infrastructure? [Aliyu Barau, Nigeria]

Changed

In my humble opinion, it could more informative to include two separate sub-sections for floods and droughts, instead of a section for “Water”. [Roger Cremades, Germany]

Sections 3.4 and 3.5 were merged and reorganized

How does this differ from the flood and drought sections in 3.3 and water resources sections in 3.4.4?? Is this specifically water infrastructure, and supply??? However projected sections only considers flood risks [Elvira Piotrowska, Germany]

Sections 3.4 and 3.5 were merged and reorganized

The impact of changing climate and weather on tourism is very important and must be considered in this chapter. In my humble opinion, it could more informative to include two separate sub-sections for floods and droughts, instead of a section for “Water” [Roger Cremades, Germany]

The expression of temperature rise in percent is very unusual. [Radim Tolasz, Czech Republic]
The discussion of water focuses on extreme events rather than changes in the hydrological cycle and how that will impact on human systems – as water becomes more scarce or too abundant, meaning either women in developing countries have to walk farther to fetch water or that access to clean water is more difficult (leading to negative health and nutrition impacts). A discussion of the impact of climate change human systems would appear to include notions of social dynamics that are part and parcel of that system and are the pathways through which climate change impacts individuals. [Tonya Rawe, United States of America]

How are examples chosen? There seems to be a strong focus on Europe. [Bill Hare, Germany]

This is the first section with results about runoff change (although I think this section is about the costs). Please try to avoid such repetitions. It makes it difficult to understand the general structure of the draft. [Philippe Roulier, France]

The examples are from the published literature on the risks of 1.5 and 2C.

In Ukraine, small river floods in Western Ukraine are going to be observed more often, while in Dnipro river water quality deteriorates, and the river itself turns into a cascade of cascades due to flow limitations. [Typoshka Choi, United States of America]

A reference focusing on the impact of flooding in Ukraine at 1.5 and 2C was not found.

The previous section on observed impacts was a summary of key findings from the AR5. This is an important point that will be included in the AR6. There was limited literature on changes in the geographic range of vectors at warming of 1.5 and 2C.

Good point, but there is no literature on the changes in mental health and other indicators of wellbeing at warming of 1.5 and 2C.

The sections include climate sensitive health outcomes for which there is literature on the potential consequences of warming of 1.5 and 2C.

The previous section on conclusions from AR5 includes nothing on vector-borne diseases. [Bill Hare, Germany]

Surprisingly, the AR5 key messages did not include anything on vector-borne diseases.

The sections are important points that will be included in the AR6. No literature on these issues was identified at warming of 1.5 and 2C

The section is on new literature.

The previous section on observed impacts was a summary of key messages from the AR5.

These are important points that will be included in the AR6. No literature on these issues was identified on the potential risks of warming of 1.5 and 2C.

Note: This is the first section with results about runoff change (although I think this section is about the costs). Please try to avoid such repetitions. It makes it difficult to understand the general structure of the draft. [Philippe Roulier, France]

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Surprisingly, the AR5 key messages did not include anything on vector-borne diseases.

The sections are important points that will be included in the AR6. No literature on these issues was identified at warming of 1.5 and 2C.

Paragraph on air quality added


Paragraph on air quality added

The earlier paragraph focused on detection and attribution of observed impacts, not on projected risks. This paragraph cites the published literature on the risks associated with warming of 1.5 and 2°C. The earlier paragraph focused on detection and attribution of observed impacts, not on projected risks.

Some References on the impact of climate change on air quality:

- The earlier paragraph focused on detection and attribution of observed impacts, not on projected risks.
- This paragraph cites the published literature on the risks associated with warming of 1.5 and 2°C.
- The earlier paragraph focused on detection and attribution of observed impacts, not on projected risks.

This is an important point that will be included in the health chapter of the AR6. This report focuses on the health risks of warming of 1.5 and 2°C, no literature was identified on these topics within this context.

We identified no published literature on the health risks of warming of 1.5 and 2°C on these topics.

Paragraph on air quality added

This is an important point that will be included in the health chapter of the AR6. This report focuses on the health risks of warming of 1.5 and 2°C, no literature was identified on these topics within this context.

We identified no published literature on the health risks of warming of 1.5 and 2°C on these topics.

Paragraph on air quality added

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We identified no published literature on the health risks of warming of 1.5 and 2°C on these topics.
Recent projections for areas close to thermal limits in some regions (e.g. Arabian peninsula, Pat and Etalher, NCC 2016) and globally (Mora et al., NCC 2017) need to be included in the assessment. ([Elvira Poloczanska, Germany] Added)

Can you give order of magnitude? [Elvira Poloczanska, Germany]

Instead of writing "WILLIAMS et al. 2016", please write "Williams et al. 2016" [JACQUES-ANDRE NDIONE, Senegal]

Changed 1000 billion yuan/yr in 2011 is presumably an error - should be a later year? [Bill Hare, Germany] Thank you; that should be 2100. Change made.

If the relationship is non-linear, then would "disproportionate" not be a better word than "greater"? [David Schoeman, Australia] Change made

Also cite the article by Hanna and Tait (2015): Limitations to Thermoregulation and Acclimatization Challenge Human Adaptation to Global Warming. [Elvira Poloczanska, Germany] Added

It is unclear from the test what the studies cited assume for their temperature projections (i.e. what is the global temperature increase) [Bill Hare, Germany]

Assumptions of additional adaptation reduce the projected magnitude of risks under different warming scenarios - this should be expanded upon [Bill Hare, Germany]

Use "yuan yr-1" instead of "yuan/year". [Radim Tolasz, Czech Republic] Changed

The diversity of underlying exposure-response relationships precludes an overall estimate of the order of magnitude.

average temperatures (e.g. risks are higher in regions with cooler average temperatures) The meaning of the phrase in brackets is not clear. [Erica Read, Canada]

Heat-related mortality risks are higher in regions with average cooler temperatures.

Can you give order of magnitude? [Elvira Poloczanska, Germany] The diversity of underlying exposure-response relationships precludes an overall estimate of the order of magnitude.

There are plenty of statements of change here, but it is not clear whether these are for warming of 1.5ºC, 2.0ºC, or some other degree of warming [Bill Hare, Germany]

This topic is covered in Chapter 4

There are plenty of statements of change here, but it is not clear whether these are for warming of 1.5ºC, 2.0ºC, or some other degree of warming [Bill Hare, Germany] Added

There is limited information on the limits to adaptation. Adaptation methods will be covered in the AR6.

Current impacts are stated in the section; the rest of the section focuses on the health risks of 1.5 and 2C warming.

It is difficult to convert WBDT to ambient temperature change because of the number of factors included in the metric and the interactions across factors.

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It is unclear from the text what the studies cited assume for their temperature projections (i.e. what is the global temperature increase) [Bill Hare, Germany]

This is included in the section on key economic sectors.

Oversight is presently being affected—there are all sorts of outdoor construction that has to be stopped now on very hot days (humidity/heat index may be really what to be talking about). I would also note that it can be too hot for customers to go out to various businesses, children to go to school, etc., so just referring to occupational aspects is a bit limiting. [Michael MacCracken, United States of America]

Occupational health is already being affected—there are all sorts of outdoor construction that has to be stopped now on very hot days (humidity/heat index may be really what to be talking about). I would also note that it can be too hot for customers to go out to various businesses, children to go to school, etc., so just referring to occupational aspects is a bit limiting. [Michael MacCracken, United States of America] Added

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<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>2725</td>
<td>95</td>
<td>50</td>
<td>95</td>
<td>52</td>
<td>Is this because studies have only been done in Tanzania, and not elsewhere in Africa? Need to clarify why only one country in Africa is being mentioned here, when many countries are affected by these diseases - and presumably would also be affected by expansion of the range of Aedes. [Penny Ungracht, South Africa]</td>
</tr>
<tr>
<td>10024</td>
<td>96</td>
<td>96</td>
<td></td>
<td></td>
<td>Correction; the only study was done in Tanzania.</td>
</tr>
<tr>
<td>4725</td>
<td>96</td>
<td>3</td>
<td>96</td>
<td>7</td>
<td>Climate change may increase the season of risk of Lyme disease in most of its range, but only northerly range expansion in North America and Europe would be expected to be caused by climate change. Range expansion in other directions is occurring but this is probably not associated with climate change. [Nicholas Ogden, Canada]</td>
</tr>
<tr>
<td>15046</td>
<td>96</td>
<td>9</td>
<td>96</td>
<td>13</td>
<td>Instead of writing &quot;Other vectorborne diseases&quot;, please write &quot;Other vector borne diseases&quot; [JACQUES-ANDRE NDIONE, Senegal]</td>
</tr>
<tr>
<td>19045</td>
<td>96</td>
<td>9</td>
<td>96</td>
<td>13</td>
<td>Please regarding &quot;Other vectorborne diseases&quot;, Authors can include in their analysis what's expected with Rift Valley Fever (RVF), taking into account economic losses and implication when an outbreak occur. West Africa, East Africa and Southern Africa would be greatly affected by recent outbreaks. [JACQUES-ANDRE NDIONE, Senegal]</td>
</tr>
<tr>
<td>12802</td>
<td>96</td>
<td>14</td>
<td>96</td>
<td>14</td>
<td>Impacts of climate change on air pollution with health effects could be mentioned; there are a number of studies, global and regional on this topic. Currently it is only mentioned in urban area section but should be mentioned. [Michael MacCracken, United States of America]</td>
</tr>
<tr>
<td>5483</td>
<td>96</td>
<td>16</td>
<td></td>
<td></td>
<td>Conflicts: a mixing and better use forced population displacement and conflicts arising from climate change/as subheading. Please try to explain the climate change indices and increases natural disasters and flirt that to displacement of people [Alky Barau, Nigeria]</td>
</tr>
<tr>
<td>13603</td>
<td>96</td>
<td>18</td>
<td>96</td>
<td>18</td>
<td>This section is too general and not directly related to 1.5C warming. Also the text in many sub-sections is too brief. More information and elaboration is needed. [Hong Yang, Germany]</td>
</tr>
<tr>
<td>5726</td>
<td>96</td>
<td>102</td>
<td>96</td>
<td>3</td>
<td>This section is too general and not directly related to 1.5C warming. Also the text in many sub-sections is too brief. More information and elaboration is needed. [Hong Yang, Germany]</td>
</tr>
<tr>
<td>1198</td>
<td>96</td>
<td>102</td>
<td>96</td>
<td>3</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>4726</td>
<td>96</td>
<td>16</td>
<td>96</td>
<td>99</td>
<td>There is no mention of the potential importance of migration on the spread of infectious diseases in this section and I think it should be included here, or somewhere else in (for example) cascading effects sections. [Nicholas Ogden, Canada]</td>
</tr>
<tr>
<td>16303</td>
<td>96</td>
<td>18</td>
<td>96</td>
<td>18</td>
<td>If there is a section on how extreme weather and storms are requiring relocation, etc.? Just consider the recent severe tropical cyclones that have devastated whole island nations. [Michael MacCracken, United States of America]</td>
</tr>
<tr>
<td>13769</td>
<td>96</td>
<td>22</td>
<td></td>
<td></td>
<td>But the paragraphs below do NOT summarise the findings for each of the 5 issues. Where is the assessment of literature on impacts on cultures? Where is state integrity &amp; geopolitical rivalry? [Elvira Poloczanska, Poland]</td>
</tr>
<tr>
<td>9874</td>
<td>96</td>
<td>25</td>
<td>96</td>
<td>32</td>
<td>The chapters of TDTH2 and TDTH3 reports have also been updated and published as peer-reviewed papers in Regional Environmental Change (Volume 17 Issue 6). They provide detailed assessments of the effects of climate change impacts on natural and human systems and the implications for development, livelihoods and poverty. [Christopher Rayer, Germany]</td>
</tr>
<tr>
<td>2625</td>
<td>96</td>
<td>26</td>
<td>96</td>
<td>32</td>
<td>Mention in particular the disproportionate impact on ethnic minorities. [Elsa Shawes, United Kingdom (of Great Britain and Northern Ireland)]</td>
</tr>
<tr>
<td>13770</td>
<td>96</td>
<td>29</td>
<td>96</td>
<td>32</td>
<td>This does less of sense place affect wellbeing? Loss of actual places, yes. Sense of place is about identity, and probably better discussed in terms of wellbeing and community connectedness under the issue of cultures [Elvira Poloczanska, Poland]</td>
</tr>
<tr>
<td>7324</td>
<td>96</td>
<td>35</td>
<td>107</td>
<td>39</td>
<td>Delete section 3.5.5.1.2 &quot;Human security&quot; and the text; Cranmer et al. (2014) assessed the literature on the connection between climate change and human security, focusing on conflict and involuntary migration. Each is multi-causal, with multiple drivers and embedded social processes. Overall, evidence of a climate change signal was limited, with more evidence of impacts of climate change on the places where indigenous peoples live and on traditional ecological knowledge. [Elvira Poloczanska, Germany]</td>
</tr>
<tr>
<td>13771</td>
<td>96</td>
<td>35</td>
<td>96</td>
<td>39</td>
<td>Why is this a sub-subsection when human security is the metatheme? This is very confusing - this whole section 3.5.5 needs rethinking and rewriting [Elvira Poloczanska, Poland]</td>
</tr>
<tr>
<td>1519</td>
<td>96</td>
<td>35</td>
<td>96</td>
<td>39</td>
<td>Definition of &quot;human security&quot; is not clear here. This term has various meaning. But it is nice to have the definition in this report. [Kenichi Matsumoto, Japan]</td>
</tr>
<tr>
<td>13772</td>
<td>96</td>
<td>36</td>
<td></td>
<td></td>
<td>There is also more up to date literature on the topic of human security [Elvira Poloczanska, Poland]</td>
</tr>
<tr>
<td>9878</td>
<td>96</td>
<td>42</td>
<td></td>
<td></td>
<td>This section understates the impact on migration. This may be inadvertent, since the section on page 98 line 28 il emphasize migration as an issue. [S. Susan Clayton, United States of America]</td>
</tr>
<tr>
<td>9113</td>
<td>96</td>
<td>42</td>
<td>96</td>
<td>45</td>
<td>This entire section is muddled and needs reorganization. Migration is certainly an aspect of Human Mobility but Conflict is only sometimes related to mobility. By classifying them together under Mobility and mentioning them together early in this section, the section leaves the impression that these two are inevitably related. Furthermore, the writing is poor (for example, see lines 48-53). New migration literature relevant to this report is rather large and additional citations could help round out the presentation which is rather sparse at this point. [Michael Oppenheimer, United States of America]</td>
</tr>
</tbody>
</table>
IPCC WGI SR15 First Order Draft Review Comments and Responses - Chapter 3

<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
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<th>To Page</th>
<th>To Line</th>
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<th>Response</th>
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<tbody>
<tr>
<td>11452</td>
<td>96</td>
<td>42</td>
<td>98</td>
<td>45</td>
<td>Sections 3.5.5.1.3 Human Mobility and 3.5.5.1.5 Migration could be integrated. [Stellaire, Locke, Australia]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>20783</td>
<td>96</td>
<td>43</td>
<td>97</td>
<td>1</td>
<td>Human mobility may lead to change in the map of the diseases and the needs for special adaptation measures such as certain types of vaccines or treatments, ... on. [Amal Hussein, Egypt]</td>
<td>This is an excellent point for which there isn’t literature comparing the risks at warming of 1.5 and 2°C.</td>
</tr>
<tr>
<td>13773</td>
<td>96</td>
<td>45</td>
<td>96</td>
<td>45</td>
<td>This is written in past tense, is this conclusion still valid? [Elina Poloczanska, Germany]</td>
<td>Changed</td>
</tr>
<tr>
<td>1448</td>
<td>96</td>
<td>49</td>
<td>97</td>
<td>1</td>
<td>Conflicts: I guess this section is more about &quot;mobility&quot;. Maybe put this sentence before this section. [Philippe Roulier, France]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>7326</td>
<td>96</td>
<td>53</td>
<td>96</td>
<td>56</td>
<td>Delete the text “some studies even against the evidence of climate change” towards looking extensive evidence or climate change directly with human security issues in general [Selby 2014; Raleigh et al. 2014]. A study by Gleditch and Nordika (2014) suggested that the IPCC’s previous Assessment Reports are found to express unclear and... [Elina Kadli, Austria]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>1729</td>
<td>96</td>
<td>55</td>
<td>97</td>
<td>1</td>
<td>(do not think this sentence is relevant to what it is exposed here. [Matteo Jesus Iglesias Brioso, Spain]</td>
<td>Deleted</td>
</tr>
<tr>
<td>7327</td>
<td>97</td>
<td>1</td>
<td>97</td>
<td>1</td>
<td>Delete the text “sometimes conflicting messages on the relationship between climate change and human security in general.” [Elina Kadli, Austria]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>5484</td>
<td>97</td>
<td>4</td>
<td>8</td>
<td>26</td>
<td>Conflicts [Alyko Baru, Nigeria]</td>
<td>Deleted</td>
</tr>
<tr>
<td>13774</td>
<td>97</td>
<td>4</td>
<td>97</td>
<td>38</td>
<td>Heat related violence should be covered in this subsection [Elina Poloczanska, Germany]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>9879</td>
<td>97</td>
<td>4</td>
<td>97</td>
<td>38</td>
<td>The discussion on conflict appears to be limited to intergroup and even internal conflict. There is evidence for an impact on interpersonal aggression and violence, which should be included in some... [Susan Clayton, United States of America]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>16304</td>
<td>97</td>
<td>5</td>
<td>97</td>
<td>7</td>
<td>Sentence seems to be backwards—i’d urge putting the conclusion up front so it is more visible. [Michael MacCracken, United States of America]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>4630</td>
<td>97</td>
<td>7</td>
<td>97</td>
<td>26</td>
<td>Changes for consistency, [Rubén Retuerto, Czech Republic]</td>
<td>Changed</td>
</tr>
<tr>
<td>1446</td>
<td>97</td>
<td>14</td>
<td>97</td>
<td>26</td>
<td>“Two words” that you write previously that overall there is no agreement about the link between weather shocks and conflicts and this section aims typically to demonstrate the opposite. Or maybe I did not get something. [Philippe Roulier, France]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>1447</td>
<td>97</td>
<td>15</td>
<td>97</td>
<td>26</td>
<td>Is there any reason to “consider”? Because finding a great correlation does not mean that there is a causal link [Philippe Roulier, France]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>1447</td>
<td>97</td>
<td>20</td>
<td></td>
<td></td>
<td>Could you explain what a coincidence rate is? Again coincidence and causal effect are different things. Right now, I am reviewing the IPCC report and the sun is shining, this is a coincidence but I don’t think there is a causal link... [Philippe Roulier, France]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>19248</td>
<td>97</td>
<td>25</td>
<td>97</td>
<td>35</td>
<td>Change “find” by “finds” [Rubén Retuerto, Spain]</td>
<td>Changed</td>
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<tr>
<td>19249</td>
<td>97</td>
<td>34</td>
<td>97</td>
<td>34</td>
<td>Change “vulnerability” by “vulnerabilities” [Rubén Retuerto, Spain]</td>
<td>Changed</td>
</tr>
<tr>
<td>9029</td>
<td>97</td>
<td>34</td>
<td>97</td>
<td>34</td>
<td>The phrase “in turn lead to people become vulnerable” should read, “in turn lead to people becoming vulnerable” [Siri KLUS, Turkey]</td>
<td>Changed</td>
</tr>
<tr>
<td>4631</td>
<td>97</td>
<td>35</td>
<td></td>
<td></td>
<td>Use “and/or” instead of “and or”, [Rubén Retuerto, Czech Republic]</td>
<td>Changed</td>
</tr>
<tr>
<td>7328</td>
<td>97</td>
<td>36</td>
<td>97</td>
<td>37</td>
<td>Delete the text “strong institutions reduce violent conflict and improve human and social security, and last,” [Elina Kadli, Austria]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>13775</td>
<td>97</td>
<td>40</td>
<td></td>
<td></td>
<td>Why focus on Africa, Mediterranean, South Asia – what is rationale for just these parts of the world and not others? [Elina Poloczanska, Germany]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>4632</td>
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<td>Change “Sudan” by “Sudan” [Rubén Retuerto, Czech Republic]</td>
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<tr>
<td>11765</td>
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<td>47</td>
<td>Word sentence, also change “provide” by “provided” [Rubén Retuerto, Spain]</td>
<td>Changed</td>
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<tr>
<td>15205</td>
<td>97</td>
<td>46</td>
<td>97</td>
<td>47</td>
<td>“There are two Buhaug et al(2015) references in your bibliography. Please indicate the good one.” [Philippe Roulier, France]</td>
<td>Changed</td>
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<tr>
<td>1450</td>
<td>97</td>
<td>51</td>
<td>97</td>
<td>63</td>
<td>Really do not understand this sentence, and I am wondering where you found this result. DON’T you say exactly this opposite in the previous sentence with the same references? [Philippe Roulier, France]</td>
<td>Changed</td>
</tr>
<tr>
<td>2980</td>
<td>97</td>
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<td>97</td>
<td>55</td>
<td>Lastly hunger can trigger migration which can in turn lead to non-state conflict. What is “non-state conflict” in this context? [Erica Head, Canada]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>15251</td>
<td>97</td>
<td>56</td>
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<td>1</td>
<td>Please, rephrase [Rubén Retuerto, Spain]</td>
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<tr>
<td>15252</td>
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<td>98</td>
<td>2</td>
<td>Change “period” by “period” [Rubén Retuerto, Spain]</td>
<td>Changed</td>
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<tr>
<td>1451</td>
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<td>3</td>
<td></td>
<td></td>
<td>There is a lack of a look at a recent paper: selby et al (2017) Climate Change and the Syrian Civil War Revisited [Philippe Roulier, France]</td>
<td>Referenced used</td>
</tr>
<tr>
<td>2178</td>
<td>98</td>
<td>8</td>
<td>98</td>
<td>13</td>
<td>The possible link between climate change and the Syrian conflict is also discussed elsewhere in this draft chapter, in two separate places. I suggest that the various discussions should reach similar conclusions. They do not do this, at the moment. The CLAs need to decide what the story is regarding Syrian conflict and climate change. [Neville Nicholls, Australia]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
<tr>
<td>19253</td>
<td>98</td>
<td>9</td>
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<td>9</td>
<td>Report before “A” [Rubén Retuerto, Spain]</td>
<td>Changed</td>
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<tr>
<td>4327</td>
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<td>9</td>
<td>98</td>
<td>9</td>
<td>Space between “2°C” and “°C” [teodoro georgiadis, Italy]</td>
<td>Changed</td>
</tr>
<tr>
<td>12084</td>
<td>98</td>
<td>12</td>
<td>98</td>
<td>13</td>
<td>The claim that “the conflict in Syria is 2 to 3 times more likely” is not what Kellet al et al demonstrated, so the full sentence is wrong. They showed that the drought is 2-3 times more likely. There are many other factors involved in the conflict itself than the drought [Robert Vautard, France]</td>
<td>The section was reorganized and revised to incorporate comments from the reviewers.</td>
</tr>
</tbody>
</table>
The section was reorganized and revised to incorporate comments from the reviewers.

Wonder what role humidity plays here? Temperature cannot be the only indicator? [Elvira Poloczanska, Germany]

"Trajectories" is misspelled [David Schoeman, Australia]

Italics for "Alexandria catenella" [Radim Tolasz, Czech Republic]

Change "newr" by "new" [Rubén Retuerto, Spain]

Opportunities to expand Arctic cruise shipping sit uncomfortably in a section on risks from 1.5 and 2 degrees of warming. They are not, themselves, a reference is needed [Teodoro Georgiadis, Italy]

The use of % to show increase is rather dubious, the figures here are so small that the % rise can be seen overtly large when the original baseline is low. [Rubén Retuerto, Spain]

..., toxic blooms of Pseudochattonella marina resulted ... should be: "... toxic blooms of the dinoflagellate Pseudochattonella marina resulted ..." in 25 degree C or 25 degrees Celcius or 25°C [Teodoro Georgiadis, Italy]

Italics for "Pseudochattonella marina" [Rubén Retuerto, Spain]

The writing in this box is unclear and full of jargon, please write in common language. [Elvira Poloczanska, Germany]

This box is not very reader-friendly, and does not discuss any of the limitations or uncertainties around estimating climate damages. Who is the work by? [Bill Hare, Germany]

The section was reorganized and revised to incorporate comments from the reviewers.

Italics for "Alexandria catenella" [Radim Tolasz, Czech Republic]

delete the text italics [Elvira Poloczanska, Germany]

Box could benefit from introductory statements to locate this within the chapter. [Penny Urquhart, South Africa]

This is an example. [Elvira Poloczanska, Germany]

The writing in this box is unclear and full of jargon, please write in common language. [Elvira Poloczanska, Germany]

Changed

The summary of research in Box 3.10 is extremely poorly written. [Stewart Lockie, Australia]

Dead

The section was reorganized and revised to incorporate comments from the reviewers.

The writing in this box is unclear and full of jargon, please write in common language. [Elvira Poloczanska, Germany]

Box has been further develop in SOD

This is a particularly well described example that illustrates the principles, page length precludes others. Change made on species names.

This section was reorganized and revised to incorporate comments from the reviewers.

This box is not very reader-friendly, and does not discuss any of the limitations or uncertainties around estimating climate damages. Who is the work by? [Bill Hare, Germany]

The topic of this box is unclear. The first issue, is why should a box be on US only avoided climate damages. Assuming this is relevant, why are the first 30 lines devoted to the issues of emissions pathways and their cost (a whole chapter deals with mitigation pathways). The discussion that follows is unclear and unfocused. [Valentina Bosetti, Italy]

Box has been further develop in SOD

This box is not very reader-friendly, and does not discuss any of the limitations or uncertainties around estimating climate damages. Who is the work by? [Bill Hare, Germany]

The section was reorganized and revised to incorporate comments from the reviewers.

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Box has been further develop in SOD

This important box will be unintelligible to nearly all readers. It needs to be simplified. At least restrict the trajectories to the median-median one (and make a comment about uncertainty in trajectories causing uncertainty in the results. The spelling and grammar also need to be improved; to make it readable. [Neville Nicholls, Australia]

Box has been further develop in SOD

This is an example. [Elvira Poloczanska, Germany]

The writing in this box is unclear and full of jargon, please write in common language. [Elvira Poloczanska, Germany]

Box has been further develop in SOD

This important box will be unintelligible to nearly all readers. It needs to be simplified. At least restrict the trajectories to the median-median one (and make a comment about uncertainty in trajectories causing uncertainty in the results. The spelling and grammar also need to be improved; to make it readable. [Neville Nicholls, Australia]

Box has been further develop in SOD

The writing in this box is unclear and full of jargon, please write in common language. [Elvira Poloczanska, Germany]

Box has been further develop in SOD
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
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<tbody>
<tr>
<td>12271</td>
<td>102</td>
<td>41</td>
<td>102</td>
<td>52</td>
<td>This text should, in my view, be reworded to make it more accessible to the readers (who come from different backgrounds)</td>
<td>Noted. Boxed will be revised in next draft.</td>
</tr>
<tr>
<td>1566</td>
<td>100</td>
<td>14</td>
<td>100</td>
<td>16</td>
<td>Uncertainties should be discussed, as damage from crossing tipping points are very difficult to estimate, and might lead to underestimation of economic losses (Neil Lecoq, Belgium)</td>
<td>This is a good point, but other comments requested simplification</td>
</tr>
<tr>
<td>15061</td>
<td>100</td>
<td>27</td>
<td>100</td>
<td>27</td>
<td>Rephrase (Ruben Ruetters, Spain)</td>
<td>Noted. Boxed will be revised in next draft.</td>
</tr>
<tr>
<td>1488</td>
<td>102</td>
<td>6</td>
<td>109</td>
<td>26</td>
<td>In updating the reasons for concern discussion to address warming of 1.5 deg C the authors should also include specific discussion of their findings to the degree of scientific understanding available. In other words, if the conclusions are drawn upon very recent and limited numbers of studies, it should be noted that this may effect the robustness of the authors claims. If expert judgement is used to determine levels of risk, that should be noted in the opinions of the particular experts and not represented as a broad scientific consensus. Finally, in such cases the authors include information on the sensitivity of their findings to the underlying uncertainty regarding the emission pathway, transient climate response, and the impact modeling (Farhan Alkait; United States of America)</td>
<td>Such a discussion has been added. It should also be noted that the discussion of the reasons of concern strongly relies on the foundation provided by AR5, with the new insights around impacts at 1.5 degrees C and 2 degrees C relying largely on a new body of peer-reviewed research.</td>
</tr>
<tr>
<td>11456</td>
<td>102</td>
<td>10</td>
<td>102</td>
<td>17</td>
<td>This text should be re-written so that it makes sense without cross-referencing another report (AR5). Given this is an introduction, it would be useful if it more clearly established the aims, or problem, addressed in what is to folloew (Steward Lockie, Australia)</td>
<td>The text has been rewritten so that the RFC discussion is now self-consistent and does not rely referring back to AR5 for the key definitions.</td>
</tr>
<tr>
<td>15777</td>
<td>102</td>
<td>11</td>
<td>102</td>
<td>11</td>
<td>Do Not Quote, Cite, or Distribute Page 118 of 152</td>
<td></td>
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<tr>
<td>15503</td>
<td>102</td>
<td>21</td>
<td>102</td>
<td>25</td>
<td>143032 102 46 102 47 Unreef warming (Enrico Poloczanska, Germany)</td>
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</tbody>
</table>
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3

<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
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<tbody>
<tr>
<td>16307</td>
<td>103</td>
<td>37</td>
<td>103</td>
<td>37</td>
<td>When one says “about 10 bleaching events per decade” is this not every year? Does “bleaching event” refer to a global scale event or a regional one?</td>
<td>The relevant statistics are now discussed in Box 3.6 of SOD, and care has been taken to avoid confusion between global and regional statistics of bleaching. The FOD text has largely been rewritten and the new section 3.5.2 now focused only on the avoided risks for bleaching at 1.5 vs 2 degrees C of global warming.</td>
</tr>
<tr>
<td>14035</td>
<td>103</td>
<td>37</td>
<td>103</td>
<td>37</td>
<td>a broader reference base is needed</td>
<td>The section has been significantly extended and now also has a stronger reference base.</td>
</tr>
<tr>
<td>14036</td>
<td>103</td>
<td>39</td>
<td>103</td>
<td>40</td>
<td>avoid repeating text from earlier and avoid describing the colours of the RFC figure rather than discussing the risks</td>
<td>Noted. The text has been considerably revised and now focuses strongly on avoided risks under 1.5 degrees C of warming.</td>
</tr>
<tr>
<td>1621</td>
<td>104</td>
<td>9</td>
<td>104</td>
<td>21</td>
<td>How about saying “prevent the total global loss of coral reefs”?</td>
<td>Some of the socio-economic impacts of warming in the Arctic is now discussed in Section 3.4 of the SOD, with a focus on livelihoods, food systems including fisheries and trade. At the time of finalizing the SOD there was still relatively little information available on differential impacts at 1.5 vs 2 degrees C of global warming.</td>
</tr>
<tr>
<td>16309</td>
<td>104</td>
<td>10</td>
<td>104</td>
<td>11</td>
<td>When this says “neary ice-free Arctic Ocean”, is this for the whole year, or just the summer. Clarification is needed.</td>
<td>This refers only to the summer period, and this is now stated in the text more clearly.</td>
</tr>
<tr>
<td>15262</td>
<td>104</td>
<td>12</td>
<td>104</td>
<td>12</td>
<td>removing “after with” [Ruben Rabaterto, Spain]</td>
<td>Correction made</td>
</tr>
<tr>
<td>16025</td>
<td>104</td>
<td>12</td>
<td>104</td>
<td>12</td>
<td>with the sea ice – with the sea ice [Wilfried Molfouma Ofok, France]</td>
<td>Correction made</td>
</tr>
<tr>
<td>16310</td>
<td>104</td>
<td>12</td>
<td>104</td>
<td>13</td>
<td>What does “sea ice persisting throughout the year for global warming less than 1.5 C mean”? Presumably that one has not gotten to any month with sea ice less than 1 km2. First, I think it highly questionable that this will be the case given trends of thinning and retreat. However, to seemingly suggest that not reaching the minimum is somehow reassuring seems overly off-base—there are large effects going on as further affecting marine species, indigenous harvesting and marine-dependent communities. The need to indicate how far we can expect to exist will be the case at 1.5 C—the region will be very different, losing glacial mass, the Greenlan ice sheet likely headed toward destruction. This statement 1.5 C conditions is just too positive—going below 1M km2 has been suggested as some transition, but the real albedo transformation is in the surface of the ice sea goes from unmetted to melted—once this happens the surface albedo is way down and the region is on track to melting, etc... I just think the framing here impacts is wrong—all reductions in sea ice are having ecological and social consequences.</td>
<td>Many thanks for the valid concerns raised. Firstly, indeed with sea-ice persisting throughout the year is meant that there is not a single month that becomes ice-free. The discussions has been significantly extended to make it clear that the risks of an ice-free Arctic is substantially higher at 2 degrees C of warming compared to 1.5 degrees C of warming. We have taken note of the point that there will nevertheless been negative impacts related to reduced sea-ice extent at 1.5 degrees C of warming, and these are discussed across sections 3.4 and 3.5.</td>
</tr>
<tr>
<td>7492</td>
<td>104</td>
<td>14</td>
<td>104</td>
<td>16</td>
<td>Does this mean that less flowering of perennial is expected at 2 degrees warming compared to 1.5 degrees warming?</td>
<td>Yes, correct. The entire section has been rewritten and benefits in maintaining perennial at 1.5 degrees C vs 2 degrees C of global warming is now more clearly. The authors expect that more detail on the differential impacts at 1.5 vs 2 degrees C of warming will become available towards the next draft and that this section will be extended.</td>
</tr>
<tr>
<td>12420</td>
<td>104</td>
<td>16</td>
<td>104</td>
<td>17</td>
<td>Reduced flowering of perennial would be expected to occur at 2 deg vs 1.5 deg - should this be “at 1.5 vs 2 deg”?</td>
<td>Yes, correct—many thanks for pointing out this oversight.</td>
</tr>
<tr>
<td>4737</td>
<td>104</td>
<td>24</td>
<td>104</td>
<td>33</td>
<td>Climate change may result in appearing new ecosystem type or change the distribution of biome, and climate change in future may increase the risk of extinction of rare or dangerous species in addition, climate change may increase the alien species invasion.</td>
<td>Agreed. Risks for extinction is discussed in some detail in section 3.4.</td>
</tr>
<tr>
<td>9613</td>
<td>104</td>
<td>24</td>
<td>104</td>
<td>33</td>
<td>New unqiue ecosystems involve unique populations of living organisms. Here the impact on “biosphere” could be further explained as well [Byron Schlenker, China]</td>
<td>The authors have made a note to monitor the peer-reviewed literature of further publications in this field, including synoptic as a further aspect to consider in terms of vulnerable ecosystems.</td>
</tr>
<tr>
<td>1374</td>
<td>104</td>
<td>25</td>
<td>104</td>
<td>30</td>
<td>Repetition from section 3.1.2.4. See comments to p. 58 line 11 on “Iberian ecosystems” [GREGORY INSAROV, Russian Federation]</td>
<td>The section 3.5.2 has been revised to avoid these repetitions.</td>
</tr>
<tr>
<td>4636</td>
<td>104</td>
<td>32</td>
<td></td>
<td></td>
<td>“Change ‘N America’ by ‘North America’ or ‘N America’ to be consistent in whole report” [Radko Tolar, Czech Republic]</td>
<td>Noted. This change will be implemented in the next draft.</td>
</tr>
<tr>
<td>12421</td>
<td>104</td>
<td>40</td>
<td>104</td>
<td>44</td>
<td>SDS and RFC – will the analysis include consideration of limits to adaptation [Bill Hare, Germany]</td>
<td>Yes. We do expect that more literature will be available beyond the SOD to discuss to some extent the limits to adaptation.</td>
</tr>
<tr>
<td>9142</td>
<td>104</td>
<td>40</td>
<td>104</td>
<td>44</td>
<td>This section on small islands in the “reasons for concern” is very brief and misses a lot of important detail. In particular, it should include consideration of adaptation limits and residual impacts [Susanna De Beauville-Scott, Saint Lucia]</td>
<td>The section has been developed further in the SOD.</td>
</tr>
<tr>
<td>11457</td>
<td>104</td>
<td>41</td>
<td>104</td>
<td>44</td>
<td>Avoid confusing the cultural diversity of small island states (which is valuable in its own right) with biodiversity. While they are certainly interdependent it should be clear that people are not being treated as mega-fauna.</td>
<td>Point taken. We have carefully further developed the discussion around small island states.</td>
</tr>
<tr>
<td>11437</td>
<td>104</td>
<td>5</td>
<td></td>
<td></td>
<td>Please ensure a focus on ecosystems and human systems in this section [Elvira Poloczanska, Germany]</td>
<td>The section has been further developed within the context of reducing impacts on ecosystems in particular.</td>
</tr>
<tr>
<td>12422</td>
<td>105</td>
<td>1</td>
<td>105</td>
<td>106</td>
<td>Not all extreme events are covered, e.g. tropical cyclones, ocean heat waves, storm surges [Bill Hare, Germany]</td>
<td>The section has been extended considerably to include the mentioned extreme events. It should be noted that at the time of preparing the SOD there was no peer-reviewed outputs available on the avoided risks for the case of ocean heat waves, at 1.5 vs 2 degrees of global warming.</td>
</tr>
<tr>
<td>9141</td>
<td>105</td>
<td>1</td>
<td>105</td>
<td>26</td>
<td>The section on extreme events is limited to a small number of extreme events, and thus needs to be expanded. Tropical cyclones, storm surges and ocean heat waves are not included [Susanna De Beauville-Scott, Saint Lucia]</td>
<td>The section has indeed been considerably extended to include, amongst others, a discussion on avoided risks for the extreme event case of tropical cyclones, storm surges and heat waves.</td>
</tr>
<tr>
<td>14038</td>
<td>105</td>
<td>10</td>
<td>105</td>
<td>11</td>
<td>nature of risk, e.g. for ecosystems or humans unclear [Elvira Poloczanska, Germany]</td>
<td>The section has been extended and now offers a more elaborate description of risks.</td>
</tr>
<tr>
<td>2774</td>
<td>105</td>
<td>17</td>
<td></td>
<td></td>
<td>it the southern part of Europe, rainfall associated with storms has increased. Heavy rain with hail. [Jonathan Gomez Cantero, Spain]</td>
<td>The peer-reviewed literature is indicative of generally drier conditions in southern Europe under global warming, with heavy precipitation increasing across the continent, except over southern Europe in summer.</td>
</tr>
<tr>
<td>14039</td>
<td>105</td>
<td>19</td>
<td></td>
<td></td>
<td>This comes back to initial problem in the chapter that climate information is not directly linked to the discussion of impacts and adopts too much space [Elvira Poloczanska, Germany]</td>
<td>Chapter 3 has been largely revised and changes in the physical climate system are now linked more clearly to impacts.</td>
</tr>
</tbody>
</table>
Comment Response

12487 105 19 105 32 In addition to El Niñolike events, urbanization increases air temperature significantly and their impact can exceed such El Niño events. [Jinkyu Hong, Republic of Korea]

Urban heat island effects are discussed in some detail in section 3.4, but little peer-reviewed evidence is available to distinguish between impacts at 1.5 degrees C vs 2 degrees C of global warming. This reference is now being used in section 3.4.


This reference has been mentioned above.

8839 105 27 105 29 Figure 3.3.2 is not exist. [Lutina Alem, Bangladesh]

Figures have been renumbered and updated in the SOD, and in this latest version the relevant figure is 3.4 - which exists.

7005 105 34 105 45 To balance the view, there should be a discussion on the decrease of mortality due to reduction of extremely cold events. [Sao Ming Lee, China]

At the time of preparing the SOD, peer-reviewed guidance on reduced mortality at 0.5 degrees C vs 1.5 degrees C within the context of extreme cold events did not exist. This issue will be monitored towards the preparation of the next draft.

3856 105 35 39 The same content (mortality in Stockholm) appeared before (page 93) [Woonsoop Choi, United States of America]

The revised section 3.5 now only summarizes the main text in section 3.4 relevant to heat and mortality in Stockholm.

13263 105 38 105 38 onset "w" after "Swedish" [Rubin Retzuki, Spain]

The text has been reworded.

14040 105 48 Incremental impacts and risks incker. [Elvira Polczarkn, Germany]

Even at the time of the SOD there are many sectors for which the past-reviewed literature do not clearly distinguish between differential risks at 1.5 vs 2 degrees C of global warming. Yet, some advanced were made since the FOD, and further improvements will be made towards the next draft.

2179 105 48 105 1 Although climate projections suggest an intensification of extreme precipitation events, the magnitude of this intensification, even over the 21st century, is quite small. The magnitude of the projected change in extreme precipitation for the 1.5C and 2.0C warming needs to be discussed. Because a small increase in high rains occurring over a century need not justify strong mitigation action. [Neville Nicholls, Australia]

These aspects are now discussed in more detail. Towards preparation of the SOD new peer-reviewed evidence has emerged of reduced risks for extreme precipitation under 2 degrees C vs 1.5 degrees C for certain regions of the world, and these have been clearly described.

10025 106 106 106 Row 21 This is the part that should be given the most place in the report. In particular, extreme weather events need to be assessed in detail in the context of global economic risks in terms of their costs for developing and developing countries. [Nasian AN, Turkey]

Agreed - this is a key aspect of the report. Please see the revised section 3.5.3 which discussed economic impacts in more detail.

2696 106 4 106 11 Insufficient number of references [Mustafa Yatkin, Turkey]

The reader is referred to the more extensive discussion in section 3.3.4.

2160 106 4 106 11 The link between droughts and global warming is contested. Therefore, I do not see how you can so confidently claim that the effects of 2C warming on droughts, relative to 1.5C warming, would "substantially reduce the risk of experiencing extreme reductions in regional water availability". You need to be more circumspect when the subject (droughts) is so complex. [Neville Nicholls, Australia]

See section 3.3.4. There is substantial evidence of a direct link between global warming and drought in the subtropics (Southern Hemisphere) and Mediterranean, and some evidence of reduced risks at 1.5 vs 3 degrees C of global warming.

5901 106 7 106 10 The year of Greve et al. is missing. I suppose that this is submitted. It could be written as follows. "Greve et al. submitted." [Joan A. Lopez-Bustins, Spain]

Year (2017) added.

13778 106 7 106 10 add publication year to Greve et al. [Elvira Polczarkn, Germany]

Year (2017) added.

2181 106 14 106 26 This is a confusing paragraph. I'm not sure it addresses the question appropriately. [Neville Nicholls, Australia]

The paragraph has been rephrased.

5460 106 16 106 Change "North America" by "N America" or "N. America" to be consistent in whole Report [Radim Tolasz, Czech Republic]

This change will be implemented in the next draft.

2771 106 26 106 prolonged droughts help to make the fires much larger. [Jonathan Gómez Cantero, Spain]

Agreed, but the purpose of this section is to report on differential impacts of fires under 1.5 vs 2 degrees C of global warming.

2772 106 27 106 Fires affect much more surface area [Jonathan Gómez Cantero, Spain]

This is noted in the revised section 3.2.2.4.

17687 106 36 106 11 Additional information on the climate change impacts of extreme events can be found in a report by the Royal Society [Jonathan Gómez Cantero, Spain]

Agreed. However, at the time of completing the SOD little information was available on the differential impacts across age groups, under 1.5 degrees C vs 2 degrees C of global warming.

4641 106 53 106 54 In the sentence "400 million people could be living in 23 coastal megacities, 370 million in Asia, Africa and South America" the 30 million people is missing. [Radim Tolasz, Czech Republic]

The sentence indicates that the 400 million people in 23 coastal megacities, 370 million will be living in Asia, Africa and South America.

16311 106 53 106 54 This is a very strange sentence-it sounds as if sea level has to rise by this amount for this many people to be in these cities. I presume the intent is to say that by 2030, these will be the populations in these areas living within 0.3 m of SL and potentially displaced by sea level rise. In any case, sentence needs rewriting [Michael MacCracken, United States of America]

Thank you for pointing out this point of potential confusion.

5902 106 55 106 55 The first sentence of this line must be amended. What does "sublevance" mean in this sentence? Please specify it. [Joan A. Lopez-Bustins, Spain]

It means to the lowering of the coastline in the presence of erosion, as is now described more clearly in the text.

16313 106 55 106 56 This sentence is very misleading. First, it is all related to baseline sea level, so by 2000 we have already had 15-20 cm of rise and this is suggesting that we will only have 70% greater than 0.2 m by the time we get to 2 C well.. maybe some areas are low, but a significant fraction will be experiencing much, much more. I just do not understand why the framing is as done here unless it is scientists just wanting to give the very, very low bound so they won't possibly be wrong; but what decision makers need is a realistic estimate of what is plausible-and travel will continue in the future. Indeed, what also needs to be presented here is an estimate of the plausible upper bounds that can be used in risk analyses and the type of due-diligence studies that businesses are supposed to be doing. Thus, the results presented in this sentence (and the next) are just not what needs to be conveyed. [Michael MacCracken, United States of America]

Agreed that estimates of sea-level rise should have as much resolution as possible to be of value to decision making, rather than mere lower boundaries of projected change. The authors have decided to carefully revise these aspects, and the latest peer-reviewed evidence in the next and final draft of the Chapter.

16312 106 56 106 57 This sentence must be wrong--by the time we get to 4 C warming in a high-emission scenario, global sea level rise could be of order 2 m and rising rapidly--perhaps 20% of coastallines will have less than 0.6 m, but the rest is likely to be much higher and committed to far, far higher in the ensuing decades. This sentence just seems to greatly underestimate the situation that is facing--going into the 21st century, even the 20% less than 0.6 m will be much, much higher. I just think this is a very misleading sentence. [Michael MacCracken, United States of America]

Agreed that estimates of sea-level rise should have as much resolution as possible to be of value to decision making, rather than mere lower boundaries of projected change. The authors have decided to carefully revise these aspects, and the latest peer-reviewed evidence in the next and final draft of the Chapter.
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<tr>
<td>16315</td>
<td>107</td>
<td>23</td>
<td>107</td>
<td>23</td>
<td>To suggest that the changes to be expected at 1.6°C are only moderate seems to me to be a serious understatement. Given, for example, the Hansen et al. analysis of impacts above 0.5°C, including likely triggering very significant mass loss from the Greenland and Antarctic ice sheets and reaching sea level rise, it is very hard to understand how these changes can be viewed as moderate, except perhaps compared to what is projected for 4°C. The way the results are stated here, it sounds as if global warming of 1.5°C is a new acceptable level, and that simply should not be indicated—that level was chosen for reasons of political convenience, not be scientists and there is no way this report should be indicating that the level will not have many very serious consequences. [Michael MacCracken, United States of America]</td>
<td>Accepted, the text will be revised as more literature appears and this content will be emphasised.</td>
</tr>
<tr>
<td>16316</td>
<td>107</td>
<td>23</td>
<td>107</td>
<td>27</td>
<td>It is really suggesting that negative economic consequences are not occurring now or that there is not a commitment to negative consequences now as a result of loss of ice sheet area and sea level rise. This whole paragraph about a single region study seems inappropriate for a chapter where broader conclusions are being drawn (after all, the chapter is about global economic impacts). Also, just comparing 2°C to 1.5°C impacts needs context by explaining what 1.5°C impacts are—and the implication of 1.5°C warming as time plays out (so, for example, sea level rise). [Michael MacCracken, United States of America]</td>
<td>The problem is that the economic literature that underpins these studies does not reflect the issues which you mention. It is for this reason that in AR5, aggregate impacts on biodiversity were included in this ember for the first time, because it is very clear that they are excluded from economic analyses. We agree that this issue of what is excluded from the economic analyses needs to be emphasized more in the final draft.</td>
</tr>
<tr>
<td>16327</td>
<td>107</td>
<td>29</td>
<td>107</td>
<td>30</td>
<td>This statement needs to be substantiated with relevant literature references [Willian Mourouma Okia, France]</td>
<td>To be completed in final draft</td>
</tr>
<tr>
<td>12423</td>
<td>107</td>
<td>35</td>
<td>107</td>
<td>35</td>
<td>What is the source? [Bill Hare, Germany]</td>
<td>To be completed for the final draft.</td>
</tr>
<tr>
<td>12564</td>
<td>107</td>
<td>31</td>
<td>107</td>
<td>31</td>
<td>Change &quot;xx&quot; by the actual temperature value [Ruben Rietbroek, Spain]</td>
<td>Editorial – copystyle to be completed prior to publication</td>
</tr>
<tr>
<td>9331</td>
<td>107</td>
<td>31</td>
<td>107</td>
<td>31</td>
<td>The numerical values may be inserted in the phrase &quot;Further, the avoided risks compared to a ‘no policy’ baseline in which temperatures reach xx are greater,&quot; [Sir Kenjiro Hatanaka]</td>
<td>Editorial – copystyle to be completed prior to publication</td>
</tr>
<tr>
<td>13780</td>
<td>107</td>
<td>40</td>
<td>107</td>
<td>43</td>
<td>The cut-off date for literature for AR5 was 2012/2013, so why is a reference of 2006 being used to support this statement? [Enrica Potočar, Slovenia]</td>
<td>This section will be revised for the final draft, emphasizing the limitations of these kinds of studies and including newly emergent literature. We agree that a full description of the issues associated with the global economic impacts literature, in terms of its consistency with what is now known about climate change impacts, deserves coverage here. This text reflects only the very limited literature reporting economic calculations, and we agree that it would be good to emphasize more its limitations.</td>
</tr>
<tr>
<td>13962</td>
<td>107</td>
<td>43</td>
<td>107</td>
<td>43</td>
<td>Agree to add “...by 2050...” [Ruben Rietbroek, Spain]</td>
<td>To be completed for the final draft.</td>
</tr>
<tr>
<td>13963</td>
<td>107</td>
<td>43</td>
<td>107</td>
<td>43</td>
<td>Add “...by 2050...” [Ruben Rietbroek, Spain]</td>
<td>To be completed for the final draft.</td>
</tr>
<tr>
<td>13964</td>
<td>107</td>
<td>45</td>
<td>107</td>
<td>45</td>
<td>Insert &quot;which&quot; before &quot;is in line...&quot; [Ruben Rietbroek, Spain]</td>
<td>To be completed for the final draft.</td>
</tr>
<tr>
<td>2535</td>
<td>107</td>
<td>46</td>
<td>107</td>
<td>52</td>
<td>Are the dollar values here entirely driven by modeling assumptions? [Robert Kopp, United States of America]</td>
<td>Accepted, the text will be revised for the final draft, emphasizing the limitations of these kinds of studies and including newly emergent literature.</td>
</tr>
<tr>
<td>4642</td>
<td>107</td>
<td>49</td>
<td>107</td>
<td>49</td>
<td>Change &quot;$15/CO2&quot; by &quot;US$ 15 CO2-1&quot; and &quot;$16/CO2-1&quot; by &quot;US$ 16 CO2-1&quot; [Radom Tolz, Czech Republic]</td>
<td>Editorial – copystyle to be completed prior to publication</td>
</tr>
<tr>
<td>16319</td>
<td>107</td>
<td>49</td>
<td>107</td>
<td>52</td>
<td>This is a really meaningless statement—obvious on its face with no quantifiable content of any kind. [Michael MacCracken, United States of America]</td>
<td>This section will be revised for the final draft, emphasizing the limitations of these kinds of studies and including newly emergent literature.</td>
</tr>
<tr>
<td>16318</td>
<td>107</td>
<td>50</td>
<td>107</td>
<td>50</td>
<td>This notion that 1.5°C is a level that will somehow be acceptable seems to be a real reach—for how long will this be the case? In the equilibrium sea level sensitivity to warming based on Earth’s climatic history is likely something like 10-15 m per degree warming (and there is now 75 m of sea level tied up in land that is unlikely to have been anywhere near this high the last time the global average temperature was 4°C above present), we have 1.5°C equilibration over a period that might never even be reached. It is clear that the current 1.5°C-equivalent scenario is not as low as 2°C-equivalent scenarios (perhaps over a millennium or two) in m or cm, so quite possibly a meter or two or more per century, disrupting many of the world’s coastal cities, etc. This is unacceptable unless one uses a discount rate in a situation where there is very serious disagreement that this is appropriate (does it really matter that your great-grandchild will be displaced instead of your child?)? It is really important to be explaining the impacts at 1.5°C and implications (biodiversity as well) and there should be no scientific acceptance that 1.5°C is acceptable—it is not scientists’ role to do so—we need to be explaining impacts and their significance. Just because negotiators focus on this level does not mean that science should help them justify this value. [Michael MacCracken, United States of America]</td>
<td>This section will be revised for the final draft, emphasizing the limitations of these kinds of studies and including newly emergent literature. This section does not, as far as I can see, state anywhere that 1.5°C warming is acceptable. Please note that this section and the one following, were combined together in the AR5 into a single ember to provide global aggregate impacts (on the economy and biodiversity, please see O'Neill et al. 2017).</td>
</tr>
<tr>
<td>5903</td>
<td>107</td>
<td>55</td>
<td>107</td>
<td>55</td>
<td>Please substitute &quot;risk&quot; with &quot;risk&quot;. [Juan A. Lopez-Bustins, Spain]</td>
<td>Editorial – copystyle to be completed prior to publication</td>
</tr>
<tr>
<td>1375</td>
<td>107</td>
<td>55</td>
<td>107</td>
<td>55</td>
<td>Sub-section &quot;biodiversity shifts, risks of species extinction and ecosystem functioning and services&quot;. Check sub-section 3.4.1.2.1 for repititions. [Gregory Insarov, Russian Federation]</td>
<td>Editorial – copystyle to be completed prior to publication</td>
</tr>
</tbody>
</table>
This seems a rather obvious statement—I would think that concluding statements have to be a good bit more substantive making clear that 1.5 C Change (Fischlin et al. 2007) by "Fischlin et al (2007)" [Rubén Retuerto, Spain] Editorial - copyedit to be completed prior to publication

Add Amazon dieback in the list in 3.2.6.5? [Ana Bastos, France] Forest dieback is discussed in the tipping points section. Please check for unnecessary overlap and repetition compared to previous sections on species range shifts and extinction [Øyvind Christophersen, Norway] revise position of parentheses [Elvira Poloczanska, Germany] Editorial - copyedit to be completed prior to publication

See comment on p.108, line 48-50 [Michael Oppenheimer, United States of America] The section has been largely rewritten.

Warszawski et al was using only the five ISIMIP GCMs. [Christopher Reyer, Germany] Agree, this section will be revised for the final draft

Please consider including such a clear summary for all topics [Øyvind Christophersen, Norway] Thank you, we will

This is repetitive of information already presented [David Schoeman, Australia] Agree, this section will be revised for the final draft

Please, provide year for Smith et al. [Rubén Retuerto, Spain] Done

Change "(Warszawski et al. 2013)" by "Warszawski et al. (2013)" [Rubén Retuerto, Spain] Editorial - copyedit to be completed prior to publication

Add publication year to Smith et al. [Elvira Poloczanska, Germany] Done


Warszawski et al at was using only the five ISIMIP GCMs. [Christopher Rayer, Germany] Agree, this section will be revised for the final draft

This is repetitive of information already presented [David Schoeman, Australia] Editorial - copyedit to be completed prior to publication

Is this in reference of information already provided [David Schoeman, Australia] Essay - no copyedit is required prior to publication

Does the discussion in this paragraph include marine species? [Elvira Poloczanska, Germany] Agree, this section will be revised for the final draft

Please consider including in the executive summary [Øyvind Christophersen, Norway] Essay - no copyedit is required prior to publication

Please consider including the term "all" rather than "any" such a clear summary for this topic [Elvira Poloczanska, Norway] Essay - no copyedit is required prior to publication

This section will be revised for the final draft, thank you for the additional citations.

This section will be revised for the final draft, thank you for the additional citations.

This section will be revised for the final draft, thank you for the additional citations.

This section will be revised for the final draft, thank you for the additional citations.
<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
<th>From Line</th>
<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>7496</td>
<td>109</td>
<td>54</td>
<td>109</td>
<td>9</td>
<td>Does this text refer only to the Greenland ice sheet or also to West Antarctic ice sheets as indicated in the title of the subchapter? What is this text identical to the text on page 40 line 23 to 34? Please consider avoiding overlap. [Eline Poloczanska, Germany]</td>
<td>The discussion has been extended to the WAIS, but note that at the time of finalising the SOD, little evidence was available in terms of reduced risks for the West Antarctic ice sheet under 1.5 degrees C vs 2 degrees C of global warming.</td>
</tr>
<tr>
<td>12424</td>
<td>108</td>
<td>54</td>
<td>109</td>
<td>9</td>
<td>Should this section include recent research that shows that parts of the West Antarctic Ice Sheet may have already passed a tipping point [Feldmann and Levermann, 2015] [Bill Hare, Germany]</td>
<td>This study will be considered in the final version of the chapter.</td>
</tr>
<tr>
<td>8117</td>
<td>109</td>
<td>1</td>
<td>109</td>
<td>9</td>
<td>see comment on p.108, line 46-50 [Michael Oppenheimer, United States of America]</td>
<td>This section has been rewritten for the SOD.</td>
</tr>
<tr>
<td>2730</td>
<td>109</td>
<td>3</td>
<td>109</td>
<td>7</td>
<td>Consider bringing in recent work by Rigoni, suggesting that the loss of Greenland ice sheet could be more rapid. [Penny Umurhat, South Africa]</td>
<td>The section has been rewritten for the final version of the chapter.</td>
</tr>
<tr>
<td>16332</td>
<td>109</td>
<td>3</td>
<td>109</td>
<td>9</td>
<td>These values would seem to be associated with Antarctica rather than also Greenland. This needs to be clarified. [Elvira Poloczanska, Germany]</td>
<td>This section has been largely rewritten for the SOD pending the latest research on impacts at 1.5 vs 2 degrees C of global warming.</td>
</tr>
<tr>
<td>7497</td>
<td>109</td>
<td>12</td>
<td>109</td>
<td>20</td>
<td>Please check for unnecessary overlap and repetition between this subchapter and earlier sections on thermohaline circulation. This is the exact same text as previously in the chapter (page 37 lines 13-21) [Eline Poloczanska, Norway]</td>
<td>This text has been rewritten to avoid repetitions.</td>
</tr>
<tr>
<td>11791</td>
<td>109</td>
<td>13</td>
<td>109</td>
<td>20</td>
<td>Parts of this text seem to have been cut and paste from material presented previously. This seems to be a feature of the last 50 pages or so of this chapter [David Schwenman, Australia]</td>
<td>This text has been rewritten to ensure clarity of presentation and avoid repetition.</td>
</tr>
<tr>
<td>3976</td>
<td>109</td>
<td>13</td>
<td>109</td>
<td>20</td>
<td>Repeated from Box 3.5 [Stephanie Henson, United Kingdom [of Great Britain and Northern Ireland]]</td>
<td>The text has been rewritten to summarise the risks avoided under 1.5 degrees C vs 2 degrees C of global warming.</td>
</tr>
<tr>
<td>16323</td>
<td>109</td>
<td>13</td>
<td>109</td>
<td>20</td>
<td>There is no mention of why anyone should care that these changes are happening–the &quot;So What?&quot; question has simply not been mentioned–what would such changes mean and why should I care at all? At least some discussion of meaning just has to be included. [Michael MacCracken, United States of America]</td>
<td>This text has been rewritten to avoid repetition and to include a discussion of the implications of these changes.</td>
</tr>
<tr>
<td>7006</td>
<td>109</td>
<td>22</td>
<td>109</td>
<td>22</td>
<td>As ENSO is a major source of climate variability over many parts of the world, a session on the current state of science should be included here. [Sai]</td>
<td>The text has been rewritten to ensure clarity of presentation and avoid repetition.</td>
</tr>
<tr>
<td>1816</td>
<td>109</td>
<td>23</td>
<td>109</td>
<td>25</td>
<td>Again, the significance of this sink needs to be described. [Michael MacCracken, United States of America]</td>
<td>Noted - this will be done in the next draft.</td>
</tr>
<tr>
<td>12488</td>
<td>109</td>
<td>23</td>
<td>109</td>
<td>29</td>
<td>Global warming may be able to reduce cold wave related mortality and energy consumption during winter [Jinhyo Hong, Republic of Korea]</td>
<td>Agreed. The sections on reducing cold wave-related mortality and energy consumption during winter have been included.</td>
</tr>
<tr>
<td>25</td>
<td>109</td>
<td>23</td>
<td>109</td>
<td>39</td>
<td>I agree that the net physical CO2 sink may reduce under global warming as written is the present version. However, in a warmer nutrient-rich Southern Ocean, diatoms (which play a major role in this region as the export of carbon to depth) might increase their growth-rates in response to rising temperatures and iron availability (e.g. Boyd et al., 2016). Consequently, an increase in diatom abundance (Dufour et al., 2015), in primary production and very likely in carbon export to depth can be expected. Thus, in a warmer Southern Ocean, there will be a decrease in the CO2 physical pump but likely an increase of the biological pump. What will be the net result remains an open question. [Paul Treguer, France]</td>
<td>These aspects will receive careful consideration in the final version of the report.</td>
</tr>
<tr>
<td>19271</td>
<td>109</td>
<td>24</td>
<td>109</td>
<td>9</td>
<td>Change &quot;may reduce&quot; by &quot;may be reduced&quot; [Ruben Retuerto, Spain]</td>
<td>Noted:</td>
</tr>
<tr>
<td>14044</td>
<td>109</td>
<td>31</td>
<td>109</td>
<td>31</td>
<td>is this the correct wording for title, I cannot see discussion of cost-benefit analysis [Eline Poloczanska, Germany]</td>
<td>Regional economic benefits of restricting global warming to 1.5 degrees C are listed, but a full cost-benefit analysis is not undertaken.</td>
</tr>
<tr>
<td>2183</td>
<td>109</td>
<td>31</td>
<td>109</td>
<td>42</td>
<td>This section does not include much evidence of decreased risks associated with 1.5C relative to 2C, and misses words such as significantly without justification. For instance, 3.6.3.2 says that the increased numbers of intense storms with the higher sea levels, will cause significantly higher inundation and storm damage. There is no evidence of this presented here. Yes, there is evidence available suggesting an increase in the most intense hurricanes, and extra warming will lead to higher sea levels. But before you conclude that this means significantly worse conditions you need to calculate the numbers on this. [Neil Nichols, Australia]</td>
<td>The section has been largely rewritten using new peer reviewed output available for the SOD.</td>
</tr>
<tr>
<td>1522</td>
<td>109</td>
<td>33</td>
<td>109</td>
<td>16</td>
<td>Literature to support these paragraphs are missing. [Kertik Masutomo, Japan]</td>
<td>The section has been largely rewritten.</td>
</tr>
<tr>
<td>16325</td>
<td>109</td>
<td>35</td>
<td>109</td>
<td>36</td>
<td>That section really does not do well at all in describing the global economic impacts--would be nice if it did. [Michael MacCracken, United States of America]</td>
<td>The section has been largely rewritten for the SOD.</td>
</tr>
<tr>
<td>14045</td>
<td>109</td>
<td>38</td>
<td></td>
<td></td>
<td>This section repeats earlier sections -- and has no economic analysis. [Eline Poloczanska, Germany]</td>
<td>The section has been largely rewritten for the SOD.</td>
</tr>
<tr>
<td>16332</td>
<td>109</td>
<td>39</td>
<td></td>
<td></td>
<td>Achieving an increase sounds to me as if this is a level that one is working up to rather than something like &quot;Keeping the increase below 1.5 C&quot;. In this paragraph, probably should change &quot;will&quot; to &quot;would&quot; as this is speculative. [Michael MacCracken, United States of America]</td>
<td>The section has been largely rewritten.</td>
</tr>
<tr>
<td>4331</td>
<td>109</td>
<td>110</td>
<td>16</td>
<td></td>
<td>a do not see any kind of references. Too many processes without references [Ivett C. Giorgi, Italy]</td>
<td>The section has been largely rewritten for the SOD.</td>
</tr>
<tr>
<td>4643</td>
<td>109</td>
<td>40</td>
<td></td>
<td></td>
<td>Italics for &quot;medium evidence to high certainty&quot; [Radam Tolazay, Czech Republic]</td>
<td>Thank you for the suggestion.</td>
</tr>
<tr>
<td>13785</td>
<td>109</td>
<td>43</td>
<td>109</td>
<td>43</td>
<td>italic [&quot;high certainty&quot;] Guess you mean &quot;agreement&quot; or &quot;confidence&quot; [Eline Poloczanska, Germany]</td>
<td>This was a mistake in confidence, yes, but notice that the section has been largely rewritten.</td>
</tr>
<tr>
<td>7498</td>
<td>109</td>
<td>45</td>
<td>109</td>
<td>66</td>
<td>Please check for unnecessary overlap and repetition between this subchapter and earlier sections on fisheries. This is subchapter should preferably focus on the economic benefits of the 1.5 degree goal compared to the 2-degrees goal [Eline Poloczanska, Norway]</td>
<td>Noted - this section has been rewritten to avoid repetition and to focus entirely on listing benefits at 1.5 vs 2 degrees C of global warming.</td>
</tr>
<tr>
<td>4644</td>
<td>109</td>
<td>49</td>
<td></td>
<td></td>
<td>Italics for &quot;low confidence&quot; [Radam Tolazay, Czech Republic]</td>
<td>Noted.</td>
</tr>
</tbody>
</table>
Comment No | From Page | From Line | To Page | To Line | Comment | Response
--- | --- | --- | --- | --- | --- | ---
16377 | 110 | 51 | 109 | 56 | It seems to me that the paragraph needs to be indicating what the impacts of 1.5 C would be as well as the change from 1.5 to 2 C—the way it is, somehow 1.5 C portrayed as somehow not harmful when this is just not the case. [Michael MacCracken, United States of America] | Point taken. Note however that the section has been largely rewritten for the SOD.
17430 | 110 | 1 | 110 | 7 | For context, the paragraph needs to be indicating what the impacts will be at 1.5 C, not just the change from 1.5 to 2 C. [Michael MacCracken, United States of America] | These points will be considered for the final draft of the chapter.
16339 | 110 | 1 | 110 | 7 | For context, the paragraph needs to be indicating what the impacts will be at 1.5 C, not just the change from 1.5 to 2 C. [Michael MacCracken, United States of America] | 
16328 | 110 | 2 | 110 | 7 | There is really only one global average CO2 concentration—so plural is not appropriate. [Michael MacCracken, United States of America] | Noted.
6402 | 110 | 4 | 110 | 6 | The section has been largely rewritten and will be further revised towards the final draft. | The authors will explore the existence for peer-reviewed evidence for this statement towards the final draft of the chapter.
2536 | 110 | 4 | 110 | 7 | See Von Ercolani et al. (2017) on the possible resilience of aragonite mineralization by corals to ocean acidification. | Noted - will be considered for the final draft of the chapter.
11792 | 110 | 18 | 110 | 18 | “Impacts of hypoxia would impact”, revise wording [David Schoeman, Australia] | The section has been largely rewritten.
7007 | 110 | 25 | 110 | 28 | It is unclear whether “intense storms” here refers to mid-latitude cyclones or tropical cyclones. Please also make reference to a scientific paper how the conclusion (medium confidence) is drawn. [Sze Ming Lee, China] | The section has been largely rewritten and this point has been addressed.
6815 | 110 | 25 | 110 | 28 | This section requires more than a reiteration that storms and impacts in coastal areas are likely to be higher in a 2C compared to 1C. Recent literature on the costs of coastal protection, economic impacts of extreme storm events should be presented to properly highlight the magnitude of the economic impacts, as this is the focus of this section. [Carlos Correa, United Kingdom; [Great Britain and Northern Ireland]] | The authors will consider the latest body of peer-reviewed evidence in this context towards the final draft of the chapter.
15061 | 110 | 27 | 110 | 27 | The word “should” be pre-industrial to be similar in all chapters [Heba Elbasiouny, Egypt] | Noted.
14061 | 110 | 31 | 110 | 31 | what about loss of human habitat from a temperature perspective? I.e. when areas become too hot for human habitation [Elvira Poloczanska, Germany] | These aspects are discussed in section 3.4, but little information is available on differential impacts at 1.5 degrees C vs 2 degrees C of global warming.
13786 | 110 | 31 | 110 | 39 | Same issue as previously noted: focus is all on mortality and morbidity with no mention of psychological health [Elvira Poloczanska, Germany] | At the time of the SOD, little peer-reviewed evidence was available on differential impacts on psychological health at 1.5 vs 2 degrees C of global warming.
9880 | 110 | 31 | 110 | 43 | Perhaps the fact that heat disproportionately affects some groups (children, the elderly, the poor) should be included. [Susan Clayton, United States of America] | Point taken, but this section reports on differential impacts at 1.5 degrees C vs 2 degrees C of global warming. At the time of preparing the SOD, peer-reviewed literature on differential impacts across age groups was not available.
12425 | 110 | 32 | 110 | 42 | RCP4.5 is implied to be consistent with the “Paris targets”, which is not an interpretation that everyone would share [Bill Hare, Germany] | Low mitigation is qualitatively equivalent to higher emissions.
16330 | 110 | 45 | 110 | 45 | Rather strange phrasing for title—why not say “opposed to higher emission futures” or something similar that is clearer in indicating what is being talked about. [Michael MacCracken, United States of America] | Point taken, the revised text is not creating this impression.
16332 | 110 | 45 | 110 | 49 | I think we have a section covering this important. However, it also needs to be paired with a section comparing 0.5 C warming with 1.5 with 2 C warming. While it may not be possible to get down to 0.5 C by just mitigation, both CDR and SRM offer the potential to do so (and perhaps this is covered later). What bothers me is the implicit endorsement being given that a 1.5 C world would not be a world with significant adverse impacts. [Michael MacCracken, United States of America] | Point taken, but also considering in detail avoided risks at 0.5 degrees C of warming is beyond the scope of SOD.
2154 | 110 | 51 | 110 | 72 | This summary relies on Arnell et al in preparation which seems to claim it can identify what change in risk there would be between warming of 1.8C and 2C. This seems difficult to believe. I guess this study will be published before the next draft of this chapter. It will be interesting to see the methodology used in this study. [Neil Nicholls, Australia] | The authors will carefully consider the final version of the paper by Arnell et al. and related literature on the costs of coastal protection, economic impacts of extreme storm events should be presented to properly highlight the magnitude of the economic impacts, as this is the focus of this section. [Carlos Correa, United Kingdom; [Great Britain and Northern Ireland]] | The authors will consider the latest body of peer-reviewed evidence in this context towards the final draft of the chapter.
18028 | 110 | 52 | 110 | 52 | Need more details in corresponding bibliographic entry (e.g. Mis [Witham Mountfumo Okia, France] | Noted.
2532 | 110 | 52 | 110 | 54 | Its a shame to lose and quantify vagueness [Robert Koppu, United States of America] | The section has been reworded and will be further revised towards the final draft.
16331 | 110 | 52 | 110 | 54 | It's not clear what the percentages are referring to--are these based on some economic analysis of all types of impacts or is there some other metric. Percentages just don't seem the right way to be distinguishing the comparative outcomes. [Michael MacCracken, United States of America] | The section has been revised green new peer-reviewed research on impacts at 1.5 vs 2.5 degrees C of warming, and will be further revised towards the final order draft.
19272 | 110 | 56 | 111 | 1 | Rephrase [Ruben Roberts, Spain] | Noted.
13797 | 110 | 56 | 111 | 2 | Revise sentence and parentheses [Elvira Poloczanska, Germany] | Noted.
19272 | 110 | 56 | 111 | 2 | The sentence does not look complete “Moreover—” [Kenjiro Matsutomo, Japan] | Noted.
2165 | 111 | 4 | 111 | 12 | I found this paragraph quite surprising: I didn’t think the ideas expressed very confidently here had been discussed earlier in the chapter. For instance, the discussion of the non-linearity of the response of coral to warming. I don’t recall seeing a discussion earlier that this relationship is non-linear? I think this section summarises well in the foundation discussion earlier in the chapter. [Neil Nicholls, Australia] | The foundation laid for the discussion around coral reef impacts may be found in the revised section 3.4. | The authors will carefully consider the final version of the paper by Arnell et al. and related literature on the costs of coastal protection, economic impacts of extreme storm events should be presented to properly highlight the magnitude of the economic impacts, as this is the focus of this section. [Carlos Correa, United Kingdom; [Great Britain and Northern Ireland]] | The authors will consider the latest body of peer-reviewed evidence in this context towards the final draft of the chapter.
11793 | 111 | 4 | 111 | 5 | Display a non-linear relationship between the magnitude of the risks and °C of global warming...seems to be missing a number before °C [David Schoeman, South Africa] | Noted - suggestion will be considered for the final draft of the chapter.
7499 | 111 | 10 | 111 | 12 | Please consider including this finding in the executive summary [Byrd Viborg Christensen, Norway] | Noted - suggestion will be considered for the final draft of the chapter.
19273 | 111 | 23 | 111 | 23 | Italicize “vs” [Ruben Roberts, Spain] | Noted.
7500 | 111 | 29 | 111 | 33 | This is an important aspect that merits further elaboration in the next draft as indicated [Byrd Viborg Christensen, Norway] | Point taken.
13426 | 111 | 36 | 111 | 36 | How are these regions defined? Replications of hot spots and RCI's [Bill Hare, Germany] | This section refers to regional hot-spots, whilst the RCPs refer to global concerns and large-scale singular events. | The section has been largely rewritten to now focus strongly on regional hot spots under 1.5 vs 2 degrees C of warming. A table has been introduced to summarize the findings.
14047 | 111 | 38 | 111 | 38 | wonder whether the details should be integrated above and summarized in more general terms. Alternatively the examples could go into a table. [Elvira Poloczanska, Germany] | |
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| 2358 | 111 | 36 | 11 | 36 | Can an explanation as to why the Hot Spot locations and categories have been chosen. [David Viner, United Kingdom (of Great Britain and Northern Ireland)] | The section has been largely rewritten to now focus strongly on regional hot spots.
| 1524 | 111 | 36 | 113 | 44 | This section (section 3.6.5) is little bit complicated, because the sub-sections of this section are mixture on geographical regions and regions based on land use. Therefore, it is better to categorize the chapters into two parts. [Keriichi Matsumoto, Japan] | Regional hot-spots are considered in this section. Many thanks for the reference to the study of Hare et al., which will be considered when composing the final draft of the Chapter. |
| 16720 | 116 | 36 | 116 | 45 | The terminology “climate hot spot” is quite unclear, and lack of definition, w/o clear references; L. 42-44 - Moreover, hot spots that may result from aggregated risks across the physical, natural, and human systems are also analyzed in relation to different global temperature goals, in addition to hot spots that relate specifically to the physical climate system, ecosystems of human systems.” Hot spots presenting “aggregated risks”, opposed to “specifically related to physical climate system, ecosystem, or human systems” have to be better defined, and then geographical/thematic/educational choices of hot spots more substantially exposed (in terms of climatological dangerously?) | The text has been largely rewritten to now focus strongly on regional hot spots. |
| 14048 | 111 | 45 | | | given the short sentences under each of the subheadings below, these will be essentially repeated in table 3.7. therefore a integrated overview discussion may be better placed in this section instead using subsections [Elvira Poloczanska, Germany] | The text has been rewritten following this suggestion. |
| 6295 | 111 | 49 | 111 | 49 | Probabilities are relatively high (estimated to be in the order of 43%). 43% doesn't seem very high? Rephrase or clarify. And in Table 3.7 [Nathanael Melia, New Zealand] | The text has been rewritten and will be further revised in this context towards the final chapter draft. |
| 16333 | 111 | 49 | 111 | 49 | Parenteral expression is far too precise for the wording--to be on the order of 43%? This would seem to mean from 42.5 to 43.5, and I would doubt that this is what is meant. Perhaps say “near 50%” or in the range 45-50% or something--but no two-figure precision. [Michael MacCracken, United States of America] | The text has been largely rewritten and now also refers to the latest modelling studies. |
| 16334 | 111 | 49 | 111 | 50 | The chapter is not really consistent on whether it is talking about ice-free all summer or in September and even in some places seems to imply all year long. I would also suggest that this notion that global warming has to double compared to the present to get rid of the greatly reduced amount (and thickness) of ice remaining in September seems to me to be at odds with reality and is presumably based on model simulations that do not well represent observations, and needs to be changed. [David Schoeman, Australia] | The text has been largely rewritten to now focus strongly on regional hot spots. |
| 16335 | 111 | 50 | 111 | 51 | I just do not think observational trends allow for this conclusion. Yes, models may show this, but observations really do matter and the models do not emulate what is actually happening. [Michael MacCracken, United States of America] | The text has been largely rewritten and now also refers to the latest modelling studies. |
| 6296 | 112 | 3 | 112 | 3 | TN?? [Nathanael Melia, New Zealand] | This acronym has been defined earlier. |
| 1964 | 112 | 3 | 112 | 3 | TN? [Andrew Smalley, United Kingdom (of Great Britain and Northern Ireland)] | This acronym has been defined earlier. |
| 16338 | 112 | 11 | 112 | 12 | This is an independent description and needs to be changed. [Michael MacCracken, United States of America] | The text has been largely rewritten for this section. |
| 9617 | 112 | 15 | 112 | 20 | comparing Sienan plateau and transboundary kailash sacred landscape [Jianqiu Wu, China] | This suggestion was accepted for the SOD. |
| 7501 | 117 | 12 | 117 | 17 | Please be consistent throughout the report when referring to scenarios, e.g. RCPs vs 1.5C vs 2C. Does "mild" and high emission scenarios refer to any RCPs here? [Bjørgvín Christophersen, Norway] | Noted. |
| 17280 | 112 | 20 | 112 | 17 | Many of these two subsections does not provide any information about what this section is about and the same sentence "remains to be analyzed" is stated at the end of many of them. Should this not be discussed within "knowledge gaps"? [Maria Jesus Iglesias Brones, Spain] | The sections have all been considerably extended and revised for the SOD. |
| 16337 | 112 | 24 | 112 | 25 | The text here needs to be self-explanatory, not forcing the reader to go check somewhere. Expansion of this is thus needed. [Michael MacCracken, United States of America] | The text has been largely rewritten. |
| 3880 | 112 | 34 | 112 | 36 | The African Sahel is one of the most vulnerable areas in the world to food insecurity and climate change could make that worse. The current citation [Schlesinger et al. 2016] does not completely cover that vulnerability. Please edit so that it reads something like "keeping warming to 1.5ºC would substantially reduce the number of people in the African Sahel to a lack of food and nutrition (Sultan and Gaetani 2016); Sultan, B. and M. Gaetani. 2016. Agriculture in West Africa in the Twenty-First Century: Climate change and impacts scenarios, and potential for adaptation. Frontiers in Plant Science 7: 1262: doi: 10.3389/fpls.2016.01262] [Patrick Gonzalez, United States of America] | Many thanks for these references. An Africa box has been added to further discuss vulnerabilities of the Sahel, but further careful consideration will be given to this region and its relevant literature towards the final Chapter draft. |
| 10610 | 112 | 45 | 112 | 47 | No information is really provided for this section. If it is intended as a summary of sections 3.3-3.5, it should contain more detailed or substantial conclusion. [Elenor Bineta-Elices, Costa Rica] | The text has been updated. |
| 13788 | 112 | 56 | 112 | 56 | publication in rev? prep? [Elvira Poloczanska, Germany] | The text has been updated. |
| 11794 | 113 | 6 | 113 | 11 | Is typhoons not a time-dependent system? What are the specific changes in the fires that might then cause problems? Frequency, intensity, something else? [David Schoeman, Australia] | Correct. Typhoons vulnerabilities are now discussed in more detail. |
| 11795 | 113 | 11 | 113 | 20 | All of these changes are given without context...which RCP/degree of warming? [David Schoeman, Australia] | The text has been largely rewritten. |
| 11796 | 113 | 24 | 113 | 44 | Again, significant repetition here [David Schoeman, Australia] | The text has been rewritten to avoid repetitions and now focuses largely on avoiding risks at 1.5 vs 2 degrees C of warming. |
| 16338 | 113 | 24 | 113 | 43 | While interesting to have information on yields, a key issue for decision makers is presumably total production and overall changes in total suitable cropland area. Both types of information should be given. [Michael MacCracken, United States of America] | The text has been extended using new peer revised evidence for the SOD. |
624 113 30 113 30 The following listing is relevant to this section. Iizumi et al. (2017) associates the global mean temperature change from preindustrials to global mean yield growth of major crops and estimates the differences in the impacts on global mean yields between 1.5 and 2 degree C warming. The stagnation of global mean yields of maize and soybean becomes severe with warming even when 1.5 and 2 degree C warming are compared. Many thanks for the reference, which will be carefully considered for the final draft.


4645 113 34 34 Use “1 ha-1” instead of “mg ha-1”. (Radun Tolusz, Czech Republic) The text was rewritten.

11797 113 34 113 34 Either a superscript “-1” or “per”, but not both in a single unit... (David Schwanen, Australia) The text was rewritten.

10274 113 34 113 34 German “subtrop” (Ruben Reubelt, Spain) The text was rewritten.

10275 113 39 113 40 Euphrates (Ruben Reubelt, Spain) The text was rewritten.

2803 113 46 34 What does TBC mean? (Table 3.7. Is there some explanation of acronym?) (Giacomo Pirlo, Italy) We are grateful for your suggestion, and will be including consideration of it in the next draft.

6297 113 46 113 46 Table 3.7. Time frame? Transient or equilibrium response? (Nathanael Mela, New Zealand) We are grateful for your suggestion, and will be including consideration of it in the next draft.

6298 113 47 113 47 Table 3.7 Arctic sea ice – Ice-free Arctic is September (defined as < 1% ice cover) (Nathanael Mela, New Zealand) We are grateful for your suggestion, and will be including consideration of it in the next draft.

6299 113 47 113 47 Table 3.7 Col 3; Ice free = Ice-free (Nathanael Mela, New Zealand) We are grateful for your suggestion, and will be including consideration of it in the next draft.

16339 113 47 113 47 It would be helpful here to have a column for warming of 1°C so what is happening at present. Given what has occurred, I just do not understand how it can be said it is “highly likely” that September sea ice will not disappear. More than that, it needs to be explained why September sea ice cover is the metric that is presented here given that there is so much change so many impacts occurring to get to this situation. (Michael MacCracken, United States of America) We are grateful for your suggestion, and will be including consideration of it in the next draft.

14505 114 3 3 Could much of this be captured in a table? (Elvira Poloczanska, Germany) The table on tipping points have indeed proved most useful to summarize the information, with extended discussions also added to 3.6.6.

9616 114 3 114 38 Please add content (Cizhao Wu, China) The section has been significantly extended.

16340 114 3 114 14 I am a bit confused here—does more ambitious global temperature goals mean limiting warming to perhaps 0.5 C or 1.0 C—which is a section that I think is needed. What it seems to mean, however, is achieving 1.5 to 2 C compared to 3-4 C–I am just not clear. And then it says “sensitivities to less ambitious global temperature goals are also briefly reviewed” well—doesn’t this also mean, using the terminology here, describing the results at 3-4 C? How are these two aspects different? (Michael MacCracken, United States of America) The discussion of various tipping points in the Arctic have been significantly extended.

17688 114 16 114 17 The authors should indicate that they would add the discussions for each section as they fed in the other section. Also tropical region may be considered. (Perdinin Perdinin, Indonesia) The section has been significantly extended.

17281 114 16 115 6 This section is in complete (Marco Jesus Ollenes Briones, Spain) The section has been significantly extended.

10613 114 18 114 19 Information on the avoidance of tipping points from Tundra ice is missing (Eliezer Briero-Elizondo, Costa Rica) Agreed - more information is now provided in the updated tipping points sub-section of section 3.5 in the SOD.

10614 114 20 114 21 Information on the avoidance of tipping points from Permafrost ice is missing (Eliezer Briero-Elizondo, Costa Rica) Agreed - more information is now provided in the updated tipping points sub-section of section 3.5 in the SOD.

10615 114 22 114 23 Information on the avoidance of tipping points from Indian Monsoon ice is missing (Eliezer Briero-Elizondo, Costa Rica) Agreed - more information is now provided in the updated tipping points sub-section of section 3.5 in the SOD.

10616 114 24 114 25 Information on the avoidance of tipping points from West African Monsoon and sahel is missing (Eliezer Briero-Elizondo, Costa Rica) Agreed - more information is now provided in the updated tipping points sub-section of section 3.5 in the SOD.

10617 114 26 114 27 Information on the avoidance of tipping points from Amazon Forest is missing (Eliezer Briero-Elizondo, Costa Rica) Agreed - more information is now provided in the updated tipping points sub-section of section 3.5 in the SOD.

10618 114 28 114 29 Information on the avoidance of tipping points from Boreal Forest is missing (Eliezer Briero-Elizondo, Costa Rica) Agreed - more information is now provided in the updated tipping points sub-section of section 3.5 in the SOD.

9269 114 37 Sea Rosenzwieg and Hill, 2015 for regional climate change effects (Cynthia Rosenzwieg, United States of America) This paper has been used to strengthen the outputs of section 3.6

10619 114 37 114 38 Information on the avoidance of tipping points from Agricultural systems: key staple crops is missing (Eliezer Briero-Elizondo, Costa Rica) Key staple crops is now a specific focus in the regional tipping point section of the new section 3.5 of the SOD.

2731 115 1 115 1 Good to include, livestock has not been discussed much in the chapter—perhaps not in the report on the whole? (Penny Urquhart, South Africa) Agreed. The SOD has however been extended to include a more comprehensive discussions on the risks avoided for the livestock industry under 1.5 degrees C of warming. There are still relatively few papers that distinguish between risks at 1.5 degrees C and 2 degrees C of warming, however.

6300 115 5 115 5 Table 3.8 Arctic info repeats Table 3.7 (Nathanael Mela, New Zealand) We are grateful for your suggestion, and will be including consideration of it in the next draft.

16341 115 5 115 6 In Table 3.8, why is it said that the Arctic becoming ice free in September is a tipping point? Tipping point into what? All indications are that ice will re-form in the fall even if it disappears in September. I don’t understand where the warming nonlinearity or knee in the curve is. In my view, the key tipping point was when the surface albedo went from unmelted snow to melted snow and water puddles on ice—that is where the large albedo change was (and so the largest change in energy uptake in the region). Melting the last bit of September sea ice, which already has a low albedo as the surface is melted, and going to the slightly lower albedo of open water is not really going to lead to much change in energy uptake by the Arctic Ocean, especially due to the low sun angle in September. So, where is the big tipping point. Right now, waiters are having to move to shore in late July-August is that is neither wrong enough nor in the right place to support them over potential feeding areas; now when this started happening might have been a tipping point. Or when shipping could get through the Arctic might have been a tipping point, but that has also already happened, especially as the proposed shipping can go through thin ice. So, what is meant by tipping point? (Michael MacCracken, United States of America) We are grateful for your suggestion, and will be including consideration of it in the next draft.
We are happy to see that these crucial aspects are extensively dealt with in the report. The Mitigation pathways reaching 1.5C will have far reaching consequences for biodiversity (and functional ecosystems providing ecosystem services), food security, poverty and human well-being among other factors. This information is important for policy makers. [Øyvind Christophersen, Norway]

We thank the reviewer for the comment.

What is the scientific basis for apparently accepting that 1.5C is an acceptable new norm for the climate, as the title and text seem to imply? That is a level that the negotiators chose to ask about, but there is not really a scientific basis for allowing them to think that 1.5C is a long-term choice that will not result in very serious impacts. Why isn't 1.5C being thought of as a ceiling with the intent of bringing the temperature to closer to no change or at least less than 0.5C, a level where key impacts like loss of mass from the ice sheets had not yet begun (now that was a tipping point we have apparently passed)? What I would think should be the subject here are the implications of having 1.5, 2, 2.5, 3C or even more as a ceiling for the warming while seeking to return the global average temperature to within 0.5C of the baseline (so basically within the variability caused by natural factors involving oceanic upwellings and outgoing solar output). I just think the whole report is focused on returning to a warming level not at all based on the science—surely 1.5C is less than 2C, but why is it that 1.5C is accepted as a new norm? I think the opening lines here need to address this issue, not letting the negotiators who suggested this value because they were worried about doing better would be too difficult. Well, there is no way that 1.5C is going to mean the long-term survival of the low lying island nations that were apparently the inspiration for looking at 1.5C rather than 2C, and this needs to be clearly stated. [Michael MacCracken, United States of America]

We agree there is a need to coordinate closely with chapter 5. This section is included largely because of impacts on biodiversity which does not appear in your list.


We thank the reviewer for the citations, we will consider including them in the final copy edit.

Due to associated land use change, fossil biodiversity over 21st century is worse in RCP 2.6 than RCP 4.5 or RCP 8.5 see Newbold et al. 2015. Global effects of land use on local terrestrial biodiversity. Nature 520:45-. [David Cooper, Canada]

We thank the reviewer for the citations, we will consider including them in the final copy edit.

The section on non-CO2 implications of mitigation would it be useful to have a comparison to the extent of change from e.g. socio-economic change (i.e. non-mitigation). [Bill Hare, Germany]

We thank the reviewer for the citations, we will consider including them in the final copy edit.

We thank the reviewer for the citations, we will consider including them in the final copy edit.

We thank the reviewer for the comment, the text will be revised in the final draft.

We thank the reviewer for the comment, the text will be revised in the final draft.

About under construction [Maria Jesus Iglesias Borras, Spain]

We thank the reviewer for the citations, we will consider including them in the final copy edit.

Noted, there is no intention to suggest acceptable norms or otherwise, as the text is revised in the FGD we will consider this carefully.

This text has been removed. A placeholder has been included. The text will be revised for the FGD. More background on the overshoots is also provided in the cross-chapter box on "1.5 warmer worlds".

We thank the reviewer for the citations, we will consider including them in the final copy edit.

We thank the reviewer for the citations, we will consider including them in the final copy edit.

Referenced in this section: Peters/Geden 2017 "Rapid reduction of net fossil emissions is required to achieve long term climate targets". [Andrew Smedley, United Kingdom (of Great Britain and Northern Ireland)]

We thank the reviewer for the comment, the text will be revised in the final draft.

We thank the reviewer for the comment, the text will be revised in the final draft.

We thank the reviewer for the comment, the text will be revised in the final draft.

We thank the reviewer for the citations, we will consider including them in the final copy edit.

We thank the reviewer for the citations, we will consider including them in the final copy edit.

Not addressed in this section. But some of these aspects are discussed in the cross-chapter box on "1.5 warmer worlds."

We thank the reviewer for the citations, we will consider including them in the final copy edit.

We thank the reviewer for the citations, we will consider including them in the final copy edit.

We thank the reviewer for the comment, the text will be revised in the final draft.

We thank the reviewer for the comment, the text will be revised in the final draft.
The topics addressed here are likely to be addressed in greater detail in the upcoming land SR. However, it could still be improved, both in terms of comprehensiveness and structure.

1. Afforestation: What are climate effects of those, including for atmospheric moisture recycling (e.g. van der Ent et al. 2014, Zemp et al. 2017).

2. Effects on the hydrological cycle and sustainable water use. See e.g. Jägermeyer et al. 2017

3. Mitigation - adaptation interrelations including co-benefits or negative side effects. i.e. expanded irrigation for the sake of higher agricultural productivity may lead to increased drought resistance, reduced increase in extreme temperatures, but also has implications for sustainable water use. (Bill Hare, Germany)

The figure 380-700 Mha/21-64% do not add up. If 380 Mha is equal to 21% then 700 Mha should equal to less than 40 %, not 64 % [Aage Stangeland, Norway]

The sentence is not very clear. We suggest new wording: “Other estimates (Smith et al. 2015) reach 380-700 Mha (i.e. 21-64% current arable cropland),” (Popp et al. 2014) xxx-xxx Mha (i.e. 24-36% arable cropland); or (Humpenöder et al. 2014) 508 Mha (i.e. xx% arable cropland). But the original numbers (380-700 Mha and 21-64%) are not consistent. If 380 Mha is 21% of arable cropland, so 700 Mha is 59% of all arable cropland, not 64%. [Radim Tolasz, Czech Republic]

Noted, will consider for inclusion in FG2

We thank the reviewer for the comment, the text will be revised in the final draft.

We thank the reviewer for the comment, the text will be revised in the final draft.
Comment | From Page | From Line | To Page | To Line | Comment | Response
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541 | 118 | 15 | 118 | 16 | The overall effect of either irrigation or algae has been at the most of the order of 1-2°C Please see Jacobson, M.Z. The short-term effects of agriculture on an pollution and climate in California. J. Geophys. Res., 113, D23101, doi: 10.1029/2008JD010868, 2008 for support for this contention. [Mark Jacobson, United States of America] | Noted. Will consider for the FGD.
4649 | 118 | 19 | 118 | 19 | The “see Figure 3.28” means reference to figure in Hirsch et al? Better is to add this figure direct to report. [Radim Trkal, Czech Republic] | Editorial - copyedit to be completed prior to publication.
8840 | 118 | 19 | 118 | 19 | Figure 3.28 is wrong it should be Figure 3.22 [Lubna Awan, Bangladesh] | Editorial - copyedit to be completed prior to publication.
13789 | 118 | 19 | 118 | 19 | Please numbering of Figure in the text [Elvira Poloczanska, Germany] | Editorial - copyedit to be completed prior to publication.
13361 | 118 | 34 | 118 | 38 | Please numbering of Figure in the text [Elvira Poloczanska, Germany] | Editorial - copyedit to be completed prior to publication.
13362 | 118 | 34 | 118 | 38 | Please numbering of Figure in the text [Elvira Poloczanska, Germany] | Editorial - copyedit to be completed prior to publication.
12430 | 118 | 35 | | | Figure is not linked to the text and not sufficiently explained. Plus it’s unclear what is displayed here that is specific to 1.5? Maybe a summary figure of different land-use-management climate interations is more appropriate [Bill Hare, Germany] | Noted. Will consider for the FGD.
16091 | 118 | 35 | 118 | 38 | Please consider adding a cross-reference to figure 1.2 of this report where all SRES regions are shown on a global map. [Wim Thery, Switzerland] | Noted. Will consider for the FGD.
12431 | 119 | 8 | | | for the need to be expanded and merits a figure as well. The question of SLFCs and in particular aerosols is highly relevant for the intercomparison of transient 1.5 analysis (i.e. from RCP4.5) with 1.5 and end of century etc. [Bill Hare, Germany] | Noted. Will consider for the FGD.
21149 | 119 | 9 | 119 | 12 | add citation - Ramathan and Feng 2008. On avoiding dangerous anthropogenic interference with the climate system: Forable challenges ahead,PNAS, doi/10.1073/pnas.0803838105, Ramathan and Xu 2010, The Copenhagen Accord for limiting global warming: Criteria, constraints, and available avenues, PNAS, doi/10.1073/pnas.1002293107, [Nathan Bosch-Perrell, Switzerland] | We are grateful for your suggestion, and will be including consideration of it in the next draft.
10675 | 119 | 9 | 119 | 12 | Ramathan and Feng 2008, On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead, PNAS, doi/10.1073/pnas.0803838105; Ramathan and Xu 2010, The Copenhagen Accord for limiting global warming: Criteria, constraints, and available avenues, PNAS, doi/10.1073/pnas.1002293107, [Nathan Bosch-Perrell, Switzerland] | We are grateful for your suggestion, and will be including consideration of it in the next draft.
19387 | 119 | 9 | 119 | 16 | How large are the impacts of these aerosol driven precipitation changes likely to be? Do they significantly affect the impacts of a 1.5 degree change that were assessed earlier in the chapter? [William Collins, United Kingdom (of Great Britain and Northern Ireland)] | We are grateful for your suggestion, and will be including consideration of it in the next draft.
19396 | 119 | 9 | 119 | 31 | This section on non-CO2 agents is too brief. There needs to be at least some attempt to assess the magnitude of the effects mentioned here. Hurford et al. Phil. Trans. R. Soc. A 2011 369, doi:10.1098/rsta.2010.0314 assessed some of these effects. Shindell et al. 2017 Faraday Discuss., doi:10.1039/C7FD00006J. http://dx.doi.org/10.1039/C7FD00006J assessed that the total impacts of methane in (terms of dollars) could be more than double the pure temperature impact. This section could link back to 3.4.1 and assess the additional impacts on terrestrial ecosystems from the processes outline here. The increased effect of SLFCs on the high latitudes could amplify Arctic impacts for instance which should be mentioned here. [William Collins, United Kingdom (of Great Britain and Northern Ireland)] | We are grateful for your suggestion, and will be including consideration of it in the next draft.
2967 | 119 | 16 | 119 | 18 | Grammar mistake: change strong to strongly [Bin Wang, United States of America] | Editorial - copyedit to be completed prior to publication.
19368 | 119 | 18 | 119 | 20 | These statements that methane mitigation will reduce warming in the short-term, but it will warm in the longer-term are not universally true, but depend on the metrics used to trade between methane and CO2. The Perrnubemb study used GWP100, which does indeed give this effect. Recent developments in metrics by Allen et al. in 2016 and 2017 (submitted) show that using CO2-f or the GWP* metric to equate CO2 and methane leads to different results. [Mark Jacobson, United States of America] | We are grateful for your suggestion, and will be including consideration of it in the next draft.
19396 | 119 | 20 | 119 | 23 | For completeness the contribution of methane to stratospheric water vapour should also be mentioned. The impact of methane on stratospheric ozone has not been quantified (as far as I am aware) and is not generally accounted for. This paragraph needs to state that the additional radiative forcing contributions from ozone, stratospheric water vapour, and methane oxidation are all typically accounted for in methane metrics and in the IAMs that generate scenarios. Otherwise the reader might get the impression that these need to be added to the climate projections coming from such models. [William Collins, United Kingdom (of Great Britain and Northern Ireland)] | We are grateful for your suggestion, and will be including consideration of it in the next draft.
19372 | 119 | 25 | 119 | 31 | The additional biocultural impacts of methane and ozone on climate were quantified in Collins et al. 2010; doi:10.2424/13.2471-2013 [William Collins, United Kingdom (of Great Britain and Northern Ireland)] | Noted. This will be considered in the FGD.
19370 | 119 | 27 | 119 | 28 | Increased methane always increases ozone. I don't know of any studies that have shown any ozone reduction. [William Collins, United Kingdom (of Great Britain and Northern Ireland)] | Noted. This will be considered in the FGD.
2968 | 119 | 28 | 119 | 28 | Change nitrogen oxide to nitrogen oxides; and it is better to specify other organic oxides, e.g, by adding volatile organic compounds (VOC) [Bin Wang, United States of America] | Noted. This will be considered in the FGD.
### Comment No: 2969

**From Page:** 119  
**From Line:** 29  
**To Page:** 119  
**To Line:** 29  

A latest reference about ozone impacts terrestrial GHG exchange could be cited besides the one by Myhre et al. 2013: Wang, B., Shugart, H. H., & Lentes, M. T. (2017). Sensitivity of global greenhouse gas budgets to tropospheric ozone pollution mediated by the biosphere. Environmental Research Letters, 12(6), 419. Additionally, according to this study, aside from inhibiting land vegetation productivity, ozone can also alter the CO2, CH4 and N2O exchange at the land-atmosphere interface and transform the global soil system from a sink to a source of carbon. So this information could be probably further mentioned. (Bin Wang, United States of America)

**Response:** Noted. This will be considered in the FGD.

### Comment No: 19371

**From Page:** 119  
**From Line:** 30  
**To Page:** 119  
**To Line:** 31  

Aerosols also increase the diffuse radiation and hence productivity. (e.g. Mercado et al. 2009 Nature, 458, 1014–1018). (William Collins, United Kingdom)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 12432

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

Box 4.13 gives an indepth discussion on SRM. 4.13 gives the reference to SRM - much of the discussion in this section is superfluous. (McQuaker et al. 2015) (Bill Hare, Germany)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 7601

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

Too much space is devoted to discussing solar radiation management throughout the SPD. Let us consider condensing all discussion of SRM into one comprehensive chapter box at LAM 3. (Petra Tschakert, Australia)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 1202

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

Aerosols also increase the diffuse radiation and hence productivity. (e.g. Mercado et al. 2009 Nature, 458, 1014–1018). (William Collins, United Kingdom)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 7602

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

Box 4.13 gives an indepth discussion on SRM - much of the discussion in this section is superfluous. (Entra Poloczanska, Germany)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 10026

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

This section on SRM should refer to the box in Chapter 4. It could also be shortened given discussion elsewhere in report. (Piers Forster, United Kingdom)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 14051

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

Box 4.13 gives an indepth discussion on SRM - much of the discussion in this section is superfluous. (Entra Poloczanska, Germany)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 20474

**From Page:** 119  
**From Line:** 34  
**To Page:** 119  
**To Line:** 34  

Comment on whole section. Since benefits of SRM are not treated under mitigation, I wonder if it might not make sense for this material all to go in Box 4.2, in which a lot of it is already duplicated. To justify the treatment here because that box exists (line 39) seems odd. (Obern Martin, United Kingdom)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 12993

**From Page:** 121  
**From Line:** 16  
**To Page:** 121  
**To Line:** 16  

Very useful section. Check for consistency with CH4 and CH4 and if any repetitions / overlaps can be reduced. (Jan Fugleved, Norway)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 19314

**From Page:** 121  
**From Line:** 16  
**To Page:** 121  
**To Line:** 16  

I think that this is a good chapter. Clear and well-balanced on a contentious topic. (Marco Mazzioli, Switzerland)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 4376

**From Page:** 121  
**From Line:** 16  
**To Page:** 121  
**To Line:** 16  

This section needs to be made more specific to the use of SRM as one possible element of a strategy for meeting 1.5°C, rather than simply talking generically about SRM. Unfortunately most of the literature doesn’t actually do this, to plug that gap we helped by using climate emulators to generate results specific to 1.5°C. MacMartin, D. G., K. L. Rieke, and D. W. Keith, “Solar Geoengineering as part of an overall strategy for meeting the 1.5°C Paris target,” submitted. (Douglas MacMartin, United States of America)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 20107

**From Page:** 121  
**From Line:** 16  
**To Page:** 121  
**To Line:** 16  

The conclusion of this section should draw firm consequences from the risks of SRM discussed between page 119, line 47 and page 120, line 33, and clearly state that the risks associated with SRM make it reckless to be considered as a climate response. This concerns changes in global and regional precipitation patterns, shifts in global circulations, impacts on food production and ecosystem health, and, crucially, the so-called termination shock of SRM. Chapter 3 authors should also look into literature that discuses the irreversible prospect of making humanity dependent on the continued existence and functioning of a highly volatile technology that is unverifiable in a democratic way. Whatever, what is being considered in this section are only the known risks and impacts as they have been modelled, which are sufficiently grave and unjustifiable to consider SRM as a response strategy. The report should furthermore highlight that there remain vast and potentially disastrous unknown risks of SRM as a globe-scale intervention in the climate system. (Lil Fuhr, Germany)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 21165

**From Page:** 121  
**From Line:** 16  
**To Page:** 121  
**To Line:** 16  


**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 4332

**From Page:** 119  
**From Line:** 36  
**To Page:** 119  
**To Line:** 36  

Discussed in literature please provide some references. (Silvestro Georgakis, Italy)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 16346

**From Page:** 119  
**From Line:** 37  
**To Page:** 119  
**To Line:** 37  

It might be better to say to directly alter the energy balance of the Earth system, either by reflecting more solar radiation or increasing the rate of loss of infrared (infrared) energy from the planet. It might well be that reducing winter circums in the polar regions, for example, might be an approach to consider. (Michael MacCracken, United States of America)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

### Comment No: 36129

**From Page:** 121  
**From Line:** 16  
**To Page:** 121  
**To Line:** 16  

This section represents a very narrow view of SRM, focusing only on space reflectors and SAI. What about marine cloud brightening, for example? (Rob Ballenty, United Kingdom of Great Britain and Northern Ireland)

**Response:** Taken into account. This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.
Chapter 1 states that Chapter 3 will explore the social dimensions of SRM, but this is nowhere to be seen. The authors should engage with the literature on the social dimensions of SRM, for example, Bellamy, R., Chivers, J. and Vaughan, N. (2016): Deliberative Mapping of options for tackling climate change: Citizens and specialists ‘open up’ appraisal of geoengineering. Public Understanding of Science, 25, 269 – 286. [Rob Bellamy, United Kingdom (of Great Britain and Northern Ireland)]

It is also worth highlighting in this section that impacts of SRM should be assessed in comparison to a GHG-warmed world. So, reductions in monsoon rainfall should be compared to future expected rainfall, not to today's rainfall. [David Morrow, United States of America]

Proposed solar radiation management schemes rely on the fact that the radiative forcing from scattering aerosol emissions lead to a cooling of climate via aerosol-radiation-interactions and aerosol-cloud-interactions. Aerosol-radiation interactions are via sunlight being scattered away from the Earth and aerosol-cloud-interactions are via cloud reflectivity being enhanced by injecting aerosols into clouds. Both aerosol-radiation and aerosol-cloud interactions increase the albedo of the planet. Both aerosol-radiation and aerosol-cloud interactions have been assessed as providing a potentially strong negative radiative forcing (IPCC, 2007, 2013) and thus cooling the planet. SRM schemes rely on enhancing this negative radiative forcing to counterbalance the strong positive radiative forcing from increased greenhouse gas concentrations. The most widely researched SRM methods are stratospheric aerosol injection (SAI), which aims to enhance sunlight reflected from the planet in a manner analogous to large explosive volcanic eruptions which have been shown to periodically cool the climate, and marine cloud brightening (MCB) which aims to enhance the reflectivity of clouds as observed from ship-tracks or effusive degassing volcanic eruptions. Because the detailed mechanisms of SAI and MCB require complex aerosol and cloud microphysical models within global GCMs, simple experiments such as reducing the solar constant have been utilised as a crude approximation of the effects of SRM to allow the response from more models to be assessed. [Jim Haywood, United Kingdom (of Great Britain and Northern Ireland)]

I am surprised that the following reference is not included for overcooling of the tropics. In my opinion it should replace the Curry et al (2014) reference.- [Jim Haywood, United Kingdom (of Great Britain and Northern Ireland)]

I take exception to the following statement:- [Jim Haywood, United Kingdom (of Great Britain and Northern Ireland)]

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I take exception to the following statement:- [Jim Haywood, United Kingdom (of Great Britain and Northern Ireland)]

It is also worth highlighting in this section that impacts of SRM should be assessed in comparison to a GHG-warmed world. So, reductions in monsoon rainfall should be compared to future expected rainfall, not to today's rainfall. [David Morrow, United States of America]
I think it important not to just cover global-scale SRM, but also to mention that there has been some research on the potential for using such techniques to possibly moderate regional impacts such as amplified Arctic warming, etc. [Alan Robock, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Being involved in looking at various SRM approaches, I don’t think there has been all the much research on “Sunshade Geoengineering” if what is meant is putting mirrors in space to reduce the amount of solar radiation reaching the top of the atmosphere; what is meant is arbitrarily turning down the solar constant, that is how some studies are done, but implementation in these cases is generally considered to be eventually done by atmospheric brightening (of clouds or, possibly, clear skies) by stratospheric aerosols. [Michael MacCracken, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

The explicit contrast between “Sunshade geoengineering” (SG) and SAI seems unattended here. SG is total science fiction; it’s not going to happen. Models study it only because it’s a convenient approximation for more plausible implementations of SRM. I’m not sure the difference between studies that turn down the solar constant and studies with more detailed simulations needs to be drawn here. But if it is drawn, I would recommend simply pointing out that different studies model SRM at different levels of detail. [David Morrow, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

It is not clear that sunshade geoengineering is an “implementation method” (in Chapter 4 p85 it is referred to as not feasible) or that anything can be “mostly hypothetical”. Also much of the work here is hardly “assessment” in the normal sense, and these studies very rarely amount to SRM actually being “proposed”. Maybe redraft the opening of this paragraph as follows: “Two modes of global-scale SRM have been explored in the literature; implementations of the first, “Sunshade geoengineering” (SG), in which the amount of sunlight entering the Earth system at the top of the atmosphere is uniformly reduced, have been proposed using either very large or very numerous space-based reflectors. Such implementations are not currently feasible, but SG is still widely studied because it is comparatively easy to implement in climate model simulations. The second, Stratospheric Aerosol Injection (SAI) would in effect mimic the effects of volcanic eruptions...” [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Delete “modesty” [Alan Robock, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Change “injections” to “injection” [Alan Robock, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Most commonly proposed as implementation: What does this mean? Nobody is actually proposing actual implementation. [Alan Robock, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Change “mimics” to “would mimic” [Michael MacCracken, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Temperatures are repeated [Ruben Retuerto, Spain] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Change “offset the global mean warming” to “offset all or part of the global mean warming” [Alan Robock, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Regarding the word “significant”, the question is what is this with respect to. While an SRM-affected climate may not perfectly match the non-GHG influenced world, every indication is that the climates that are created are much closer to their original state than the GHG-modified climate. Unless context is provided here, there is no justification for using the word “significant”. A reasonable metric to consider might be how many standard deviations different the SRM-corrected climate is compared to the GHG-only climate, and over what fraction of the Earth this is the case (and in that standard deviations of unperturbed climates are pretty small in low latitudes, how large the actual change is, etc.) In that “significant” can imply statistical significance and/or ecological or societal significance, it is also a very confusing word—thus it is essential to clarify what is meant and to provide a metric for comparing to the climate that results without SRM. There are many numbers of papers that get into this, and it is quite clear that the climate is much closer to the unperturbed climate with SRM than without. [Michael MacCracken, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

This is not true. One can choose how much SG or SAI to do; a specific simulation might be set up to balance a particular radiative forcing, but that is not a property of SG or SAI in general. [Douglas MacMartin, United States of America] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.

Suggest rephrasing to “Both SG and SAI are often in the literature set up to offset a particular radiative forcing (e.g., 4xCO2, or parts of the anthropogenic forcing of IPCC-5), but SAI may produce a more non-uniform forcing depending on where, when and in what form aerosols are aerosolized in the stratosphere (e.g., Irvine et al. 2016; Laakso et al., 2012).” The time of year injection also matters for the distribution of a global, homogenous aerosol layer due to transport and the Brewer-Dobson circulation. Also, in theory SG and SAI could be set up to offset climate variables like temperatures and precipitation (e.g. Kravitz et al. 2014; Kravitz, B., MacMartin, D. G., Robock, A., Rasch, P. J., Richey, K. L., Cooke, J. N. S., Curry, C. L., Irvine, P. J., Ji, D., Keith, D. W., Kristjánsson, J. E., Moore, J. C., Muri, H., Singh, B., Tilmes, S., Watanabe, S., Yang, S. and Yoon, J. - H. (2014). A multi-model assessment of regional climate disparities caused by solar geoengineering. Environ. Res. Lett. 9, 074013. doi: 10.1088/1748-9326/9/7/074013) and not just radiative forcing. [Helene Murt, Norway] Taken into account. This whole subsection (3.7.3) has now been deleted so that SRm covered only in Chapters 1 and 4.
The use of "diff" is not really appropriate. In that altering solar forcing will not be the same as the IR forcing augmented by GHGs (e.g., there is no solar analog to high latitude winter), that one can induce non-uniform forcing can be an advantage in seeking to reframe the climate to near its original state. Thus, it would be better to indicate that the non-uniform forcing can be used to help adjust for the inherent differences between the alteration to the solar radiation that is created and the change in forcing due to changes in GHG and aerosol concentrations. I would also note that with respect to potential use of SRM in the context of what this report is about (limiting the temperature change to no more than 1.5°C so perhaps offsetting 1°C of global temperature change at the maximum), the SRM effect will be able to be much smaller than trying to completely offset the warming of 4 times CO2 or even all of RCP8.5 which is the type of study that has been done to SRM and the studies find is not perfect in offsetting the change. Thus, this sentence really needs reworking to be more relevant to the type of situation being discussed here and to realize the assessment to be made is between GHGs without SRM and GHGs with SRM, not SRM alone, which is what has led to concerns over some of the types of response to SRM. [Michael MacCracken, United States of America]

The climate responses to stratospheric aerosol geoengineering can be tailored using multiple injection locations. [Douglas MacMartin, United States of America]

Although this section attempts to distinguish between extreme and moderate uses of SRM, I think it needs to do so more clearly and to convey more clearly the difference between the two. The term "extreme" deployment is used to describe cases if SRM were introduced gradually as the GHG built up and iteratively (so adjusted along the way) rather than what is done in many of the studies that have been done are envisioning going from 3-4°C (or higher; e.g., 4x CO2) to preindustrial), so a global cooling of at least 3.4°C. Yes, there are some pattern and latitudinal differences for such large change, but these are much smaller if the SRM-induced reduction in temperature is only 1 to 2°C. Thus, again, some context is needed here rather than just pull statements from the current literature and articles about invoking a full counterbalancing of 2 to 4 times the CO2 concentration. [Helene Muri, Norway]

The problem with the termination-shock argument is that if termination shock looks highly hazardous termination is unlikely (since the capacity for SRM is unlikely to be limited to one, or even a few, actions). This requires avoiding the with the addition of something along these lines at the end of the paragraph: "The prospect of such a shock may make termination unlikely—in which case the world might find itself saddled with damaging side effects of SRM in perpetuity." [Steven Monteith, United Kingdom (of Great Britain and Northern Ireland)]

First, this whole paragraph is drawing conclusions for application of SRM to create very large counterbalancing of warming (2 to 4 times CO2), so a much larger offset that would be wanted and proposed based on what this report is proposing—that is, with aggressive mitigation and aiming to have a 1.5°C world. As such, all of the findings are really overstated. Second, the appropriate assessment to be made are the relative benefits-detriments of GHGs without SRM to GHGs with SRM as compared to some baseline climate (possibly preindustrial, possibly mid-20th century). All of the studies that are done indicate that virtually the whole range of climate with SRM will be better off with SRM than GHGs without SRM, and this would especially be the case if SRM were introduced gradually as the GHG built up and levitatively (so adjusted along the way) rather than what is done in many of the modeling studies, which involve taking until some amount of warming has built up and then seeking to suddenly offset it based on some emergency declaration. There actually is a real world analog for a gradual invoking of SRM, which is the first decade of the 21st century, during which, per Santer et al., relatively small volcanic eruptions slowed the rate of increase in warming—and nobody noticed until Santer and his colleagues worked very hard to investigate what might be happening. Overall, I just think this paragraph misrepresents, at least in terms of implied attitude, the potential benefits of SRM and greatly overshoots the potential negative consequences. [Michael MacCracken, United States of America]

This is not true. Because one can choose where to inject aerosic, and hence adjust the jai distribution of radiative forcing, there is potentially less regional change in climate with SRM than with GHG. See MacMartin et al. (2015) for a more interesting reference than Muri et al. 2014 regarding the SAJ and non-uniform forcing patterns. [Helene Muri, Norway]

While this is true, if there is aggressive mitigation so that the overshoot only goes to 2.5°C, for example, then the SRM might only be invoked to reduce the global warming by 1°C to 1.5°C, or, my preference if it were to be done, maybe 2°C back toward 0.5°C. Virtually all of the global SRM studies that have been done are envisioning going from 3.4°C (or higher; e.g., 4x CO2) to preindustrial), so a global cooling of at least 3.4°C. Yes, there are some pattern and latitudinal differences for such large change, but these are much smaller if the SRM-induced reduction in temperature is only 1 to 2°C. Thus, again, some context is needed here rather than just pull statements from the current literature and articles about invoking a full counterbalancing of 2 to 4 times the CO2 concentration. [Michael MacCracken, United States of America]

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The report states that "In general, global model experiments suggest that in case of a global SRM implementation surface temperatures would be reduced most in regions with expected greatest warming under elevated GHG conditions (i.e., high latitudes) and lead to less temperature and precipitation extremes (Curry et al. 2014)." When summarizing the effects of geoengineering it is critical to recognize which results are scenario-specific and make contingent or more general statements. This sentence is illustrative of this more general point. It would be better to say that: solar forcing is more effective at reversing the effects of CO2 forcing at low latitudes than high latitudes, which means that if global mean temperatures were restored to some baseline there would be an over-cooling of tropical oceans and an under-cooling of high-latitudes. This problem occurs throughout this section. [Joshua Horton, United States of America]

This is a strange comment, as it also applies to using mitigation to meet the 1.5C goal. A better comparison would be to compare a 1.5C world achieved through mitigation alone to a 1.5C world achieved through a combination of less-aggressive mitigation and some limited SRM; the case with SRM indeed has less precipitation on average (that is, even closer to preindustrial precipitation for most of the planet than the 1.5C world achieved through mitigation alone). See MacMartin, Rico and Keith, Phil Trans Royal Soc A (2017) noted earlier. [Douglas MacMartin, United States of America]

This is a very poorly constructed sentence...it could be interpreted in at least three different ways...[David Schoeman, Australia]

This sentence is illustrative of this more general point. It would be better to say that: solar forcing is more effective at reversing the effects of CO2 forcing at low latitudes than high latitudes, which means that if global mean temperatures were restored to some baseline there would be an over-cooling of tropical oceans and an under-cooling of high-latitudes. This problem occurs throughout this section. [Joshua Horton, United States of America]

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In this section, the discussion on marine cloud brightening and SRM is almost completely in references to other studies, particularly those involving the effects on ENSO. However, the text also mentions the potential for SRM methods to further reduce sea-salt emissions, which could have implications for marine cloud brightening experiments. The discussion suggests that SRM methods may further reduce shifts in the ITCZ by emitting sea salt, which could be of interest to marine scientists. The potential for SRM methods to influence ENSO is also discussed, with references to studies suggesting that SRM could alter ENSO patterns.

The text also includes a discussion on the impact of SRM on the distribution of marine cloud brightening. The text mentions the potential for SRM methods to influence the distribution of marine cloud brightening, which could have implications for the effectiveness of SRM experiments. The discussion suggests that SRM methods may alter the distribution of marine cloud brightening by changing the vertical profile of cloud formation, which could have implications for the effectiveness of SRM experiments.

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This conclusion with respect to how land surface SRM might be done applies even more strongly to the tropospheric SRM approaches; see "The role of Earth system feedbacks in designing stratospheric sulfate aerosol geoengineering to meet multiple simultaneous climate objectives", submitted, J. Geophys. Res. A, Kravitz et al "First simulations of designing stratospheric sulfate aerosol geoengineering to meet multiple simultaneous climate objectives", submitted, J. Geophys. Res. A., as well as Z. Dai, D. Waisvisz and D. Keith. "How controllable is stratospheric radiative forcing through sulfur injection", submitted. [Douglas MacMartin, United States of America]

The paragraphs jump from SAI to land surface, leaving out the troposphere. In that there is a regionally varying sulfate forcing from SO2 from coal and aerosol forcing from smoke from fires, the present situation that they can have influences concentrated in particular regions that do spread a bit broader. In an SRM sense, the most researched approach is cloud brightening over the ocean, but it would also be possible to do this with clear air modification as well, just as sulfate haze does now but way out over the ocean where even a small loading over the dark ocean would have a relatively large influence with no real adverse impacts in that the action is taken over the ocean, so far from people, and widely spread out so not overlapping as occurs when SO2/sulfate result from coal-fired power plants over land areas and concentrated populations. I would also note that the SAI approach has been focused on achieving large offsets of warming and is optimally suited for this; however, for the situations arising in this report, only a quite limited SRM modification is needed, and the tropospheric approaches are quite well suited to this scale of counterbalancing GHG effects. So, there are tropospheric possibilities—just not yet as researched as use of stratospheric aerosols. I therefore think that it is important to add a paragraph here on tropospheric approaches. [Michael MacCracken, United States of America]

While it is a step forward to be considering more realistic cases, the overall conclusion of this paragraph is not quite correct. There is a tropospheric alternative to SAI that is accomplished by stratospheric brightening which has the potential to be focused on particular regions and can create regional RF. In addition, with SAI, there is no reason that the aerosol injection has to be uniform—there are all sorts of way to create seasonal and latitudinal patterns in forcing and so seek to address certain types of issues, etc. Finally, there is the regional approach of clearing wintertime cirrus to allow greater IR emission to space. Given all of these possibilities, I just do not understand what the basis for the second sentence. [Michael MacCracken, United States of America]

The claim that "SRM would thus inevitably create winners and losers" is not supported by the citations here, and I do not believe it can be made categorically. The approach to SRM in Aasheim shows there is to losers in their model. The Hegel and Sokol 2009 piece asserts that their could be winners and losers but does not show it to be the case. The Kravitz et al 2014 paper cited finds losers at a very high level of SRM (offsetting 65% of 2xCO2 warming in a 4xCO2 world)—but it specifically concludes that this does not mean that "winners and losers" are a necessary part of SRM. "Related to our study is the often stated claim that geoengineering will create winners and losers...[if] only moderate amounts of global-scale solar geoengineering are used, there is no model-based evidence to support this concern... There is no evidence that an implementation in which low levels of SRM are pantos optimal on a regional basis could not be designed. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]

The cited reference Kravitz et al (2014) actually reaches precisely the opposite conclusion of the claim for which it is being cited, namely that whether or not there are "winners and losers" depends on the metric chosen for winning and losing, and that indeed there are reasonable choices for metric for which current climate models don't project any losers. While it is quite plausible that there will be winners and losers, the literature quite clearly rejects the strong claims made in this sentence regarding inevitability, and "cannot be avoided." [Douglas MacMartin, United States of America]

While it would seem appropriate to mention marine cloud brightening as well (e.g. Latham et al 2012, see chapter 4 for citation). See chapter 4, and box 4.13. [Douglas MacMartin, United States of America]

This section essentially says that local SRM comes with negligible impacts on the global climate, and that upscaling of SRM comes with indefensible and unjustifiable risks. How can the IPCC, tasked with developing realistic response strategies and the leading scientific authority on climate change related issues, lend itself to seriously considering high-risk, unrealistically technological changes that are prone to military abuse as well as causing conflict over inevitably unevenly distributed impacts? The IPCC should exhibit a clear position on such dangerous and reckless proposals and outright reject SRM. [Lili Fuhr, Germany]

This conclusion with respect to how land surface SRM might be done applies even more strongly to the tropospheric SRM approaches; see MacCracken, M.C. -2016: The rationale for accelerating regionally focused climate intervention research, Earth's Future 4, 649-657, doi:10.1002/2016EF000495 for some discussion of possibilities. [Michael MacCracken, United States of America]
While true, a couple of comments that should be associated with the statements here. First, there is no intent to suggest that SRM is a substitute for mitigation—this needs to be pursued as much as possible. Second, just because one can't do everything does not mean one should not do what one can. Third, there are separate geoengineering approaches to deal with ocean acidification that could be done along with SRM, including a whole range of CDR approaches that could eventually be phased up so that SRM can be phased out; such approaches include reforestation, direct air capture, increased ocean uptake of carbon by various types of fertilization, and more. So, this criticism of SRM is something to note, not a disqualifying aspect, especially given the very extensive impacts of climate change that would be counter-acted. (Michael MacCracken, United States of America)

20455 120 57 120 57 Farther elsewhere in the special report it is explicitly stated that SRM is not a form of adaptation [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]

20455 120 57 120 57 This whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.

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<tr>
<td>4391</td>
<td>121</td>
<td>5</td>
<td>121</td>
<td>7</td>
<td>Line 5 correctly includes the adjective “potentially” when talking about simulation results that suggest SRM isn’t awful, but the same adjective should be included in line 7 for talking about winners and losers, as noted earlier this claim is not universally supported by the literature. [Douglas MacMartin, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>4392</td>
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<td>7</td>
<td>Line 6 the adjective “negative” seems normative here; unclear whether the precipitation impacts of a limited deployment would indeed generally be negative (insofar as the precipitation would be restored closer to preindustrial almost everywhere; see e.g. the summary in MacMartin, Rieck and Keith, 2017) [Douglas MacMartin, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>20486</td>
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<td>121</td>
<td>7</td>
<td>The “winners and losers” remark should be removed in line with my comment on Chapter 3 p120: line 33: it is not a given that winners and losers must be created, through it is certainly possible. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>1600</td>
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<td>9</td>
<td>fix font size in &quot;and&quot; [Alan Robock, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>19281</td>
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<td>9</td>
<td>Change format in &quot;and&quot; [Rubén Retuerto, Spain]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>20487</td>
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<td>Given this point about “winner and loser” regions, I do not think that the expert judgment assessment is merited. The last sentence of this paragraph should be removed. [Oliver Morton, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>4393</td>
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<td>16</td>
<td>The sentence construction is unclear whether the intent is to say that given present knowledge we should err on the side of caution today and not deploy today or rely on this being an available solution (which is pretty clear and no-one would disagree with), or whether the intent is to say that the present state of knowledge is sufficient to support medium confidence that the risks will outweigh the benefits in some hypothetical future deployment (which is quite clearly an unreportable claim given the published literature). There is no evidence to support that latter claim; additional research is needed, and the answer depends on the counterfactual: if mitigation were only sufficient to lead to 2-3°C of warming, all climate modeling to date supports the statement that a 1.5°C world achieved through a combination of SRM and that level of mitigation is much more similar to a 1.5°C world achieved through mitigation alone than either is to a higher temperature world, in both temperature and precipitation, almost everywhere. That is certainly not a claim that there is sufficient evidence to rely on the present state of knowledge to conclude that the benefits will outweigh the risks, but given the sign of the evidence it is difficult to persuasively conclude the opposite. [Douglas MacMartin, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>16360</td>
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<td>Given my comments and the need for rephrasing I indicate, doing a risk analysis of GHG change with and without SRM, I just do not think there is any justification for the concluding sentence here. And to say &quot;at the present state of knowledge&quot; also seems inappropriate, though it is certainly relatively little (too little) research has been done. With respect to the level of uncertainties, it seems to me very hard to see how uncertainties for the SRM situation that keeps the climate generally within bounds of actual recent experience via mechanisms for which the models already are treating analogous processes (for SA: doing volcanic aerosols, etc.; for Impacts: approaching, treating cloud microphysics, etc.) would have greater uncertainties that simulations with GHGs at elevated levels and representing a world for which we have no analogs (yes, Earth’s climate history had warmer periods, but we don’t have good information on these periods and are indeed actually unable to explain how the Cretaceous climate could be so warm). So, asserting that SRM isn’t well enough understood seems quite a tenuous conclusion given the very strong conclusions and inferences that are being drawn from model simulations of elevated GHG concentrations. I would strongly urge reconsolidating this conclusion--and instead calling for more research, especially research focused on potential plausible types of invoking SRM (so a slow build-up to, for example, offset future warming and a bit more) using a range of approaches and seeking to only offset what might be any overshoot of 1.5°C (or better yet, 1°C) and to make analyses of comparative risk–GHG without SRM versus GHG with SRM. [Michael MacCracken, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>12433</td>
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<td>This section is not comprehensively covering all the issues that needs to be addressed, e.g. ocean acidification, glacier melt, changes to the hydrological cycle and biosphere. Plus it does not address the key question of reversibility. Several of the issues, such as sea-ice and ice sheet dynamics are also repeated in other sections. [Bill Here, Germany]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>14952</td>
<td>121</td>
<td>19</td>
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<td>Why are natural (ecosystems) and human systems not included here?? [Elvira Poloczanska, Germany]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<tr>
<td>175</td>
<td>121</td>
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<td>why the adjective “negative” seems normative here; unclear whether the precipitation impacts of a limited deployment would indeed generally be negative (insofar as the precipitation would be restored closer to preindustrial almost everywhere; see e.g. the summary in MacMartin, Rieck and Keith, 2017) [Douglas MacMartin, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>19282</td>
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<td>121</td>
<td>22</td>
<td>Remove “with” [Rubén Retuerto, Spain]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>16361</td>
<td>121</td>
<td>22</td>
<td>121</td>
<td>28</td>
<td>Indeed, so why all the previous focus on the sea ice in September as a tipping point in the earlier text. [Michael MacCracken, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>2983</td>
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<td>24</td>
<td>hypothesis - what hypothesis is being tested? The hypothesis needs to be stated [Erica Head, Canada]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<tr>
<td>3344</td>
<td>121</td>
<td>32</td>
<td>121</td>
<td>32</td>
<td>There is a missing word “in” in the phrase “are likely (to) have a profound impact” [Siz KUOSS, Turkey]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<tr>
<td>16352</td>
<td>121</td>
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<td>121</td>
<td>33</td>
<td>Why put ten millennia? Why so be precise? [Michael MacCracken, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>2984</td>
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<td>50 m of committed sea level rise is potentially possible Surely if the 50 m or sea level rise is &quot;comitted&quot; then it is certain, rather than being &quot;potentially possible&quot; [Erica Head, Canada]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>16363</td>
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<td>121</td>
<td>36</td>
<td>This statement needs qualification--first, dependence is likely on cumulative emissions, so going to zero emissions in the late 20th century does not lead to no further sea level rise. Second, there is very significant momentum in the processes controlling ice volume. Third, there are amplifying processes that will tend to continue the loss of ice (lower elevations are warmer, once the ice is warmed, it will take a long time to cool it enough to slow its movement; etc.). Fourth, unlike sea ice, the loss of ice on Antarctica is not likely to be reversible, in any short time, at least--experiences through the glacial cycling indicates that loss of ice much more rapidly than it forms. [Michael MacCracken, United States of America]</td>
<td>Taken into account. The whole subsection (3.7.3) has now been deleted so that SRM covered only in Chapters 1 and 4.</td>
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<td>4394</td>
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<td>44</td>
<td>Same issues in this summary statement as in the text. L39 the adjective &quot;entirely&quot; is redundant. Line 39 is also true for mitigation a 1.5C world achieved through mitigation has less tropical precipitation than a 3C world achieved through less aggressive mitigation, so the statement as written is not useful (and presumably reflects authors' biases rather than scientific evidence). It is sufficient to say that a 1.5C world achieved through less aggressive mitigation and SRM will not be the same as a 1.5C world achieved through aggressive mitigation alone. Again, would be valuable to include a summary statement to reiterate the counterfactuals being considered. If the choice were between the two 1.5C worlds, there is less physical climate risk to achieving it purely through mitigation, but if the choice was between 3C without geosequestration or 1.5C with some geosequestration, then it is not so clear. Again, the assertion regarding winners and losers is not supported by the published literature (e.g. Kravitz et al, 2014, cited herein).</td>
<td>Rejected. The comment does not appear to be related to this subsection.</td>
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<td>11801</td>
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<td>39</td>
<td>A number is missing unit...</td>
<td>Accepted.</td>
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<td>16364</td>
<td>121</td>
<td>41</td>
<td>121</td>
<td>43</td>
<td>That the Greenland and Antarctic ice sheets will not be threatened except on centennial time scales and beyond seems to me a statement meritting greater qualification than indicated here. The DeConto-Pollard model includes a process that can lead to greater calving from ice shelves, and in a seminar they gave they indicated that they had arbitrarily limited the rate of calving that might occur based mainly on a preference—not physics. Thus, they basically cannot rule out considerably faster rates of ice shelves and so the potential for considerably higher glacial stream flow than their published paper has indicated. I also think that it is important to be indicating that the process of eventual large losses of ice sheet mass can be initiated on shorter than a centennial time period and would then carry forward for many millennia at rates of potentially a few or more meters per century. The text here makes it seem as if the ice sheets and associated sea level rise are potential problems well off in the future, and this is simply not the case. [Michael MacCracken, United States of America]</td>
<td>Rejected. The assessment is based on published work and reflect the published version of the last IPCC report. Seminars are grey literature.</td>
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<td>15062</td>
<td>121</td>
<td>49</td>
<td>121</td>
<td>49</td>
<td>The word preindustrial should be pre-industrial to be similar in all chapters [Heba Elbasiouny, Egypt]</td>
<td>Accepted.</td>
</tr>
<tr>
<td>11802</td>
<td>121</td>
<td>52</td>
<td>121</td>
<td>55</td>
<td>This sentence contains both grammatical errors and typos, which seem to be symptomatic of the last third of this chapter, which reads far more like a rough draft then the earlier parts [David Schoeman, Australia]</td>
<td>Accepted. Sentence deleted.</td>
</tr>
<tr>
<td>16365</td>
<td>121</td>
<td>53</td>
<td>121</td>
<td>63</td>
<td>What does &quot;more cooler&quot; mean? Presumably getting lower elevations cold enough to build up a snow would be quite a significant cooling, likely to well below the present temperature (note that there is no snow buildup occurring at present temperatures at latitudes equivalent to Greenland—indeed, mountain glaciers at the same latitude are losing mass. Based on what we know, suggesting that build up might occur seems unduly risky. It would also be appropriate to note that glacial cycling tells us that loss of ice occurs much more rapidly than build up of ice on mountains. Thus, it seems to me that the sentence on lines 52-55 is thus offering an unjustified, very speculative possibility to decision makers and this is really not at all likely. [Michael MacCracken, United States of America]</td>
<td>Taken into account. Sentence has been deleted.</td>
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<tr>
<td>19283</td>
<td>121</td>
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<td>bathym (Ruben Reubita, Spain)</td>
<td>Taken into account. Sentence has been deleted.</td>
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<td>9335</td>
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<td>14</td>
<td>More recent references on the Antarctic ice sheet may be inserted, including but not limited to &quot;Antarctica's Changing Larsen Ice Shelf&quot; <a href="https://www.nasa.gov/image-feature/antarcticas-changing-larsen-ice-shelf">https://www.nasa.gov/image-feature/antarcticas-changing-larsen-ice-shelf</a> [Sirk KILKIS, Turkey]</td>
<td>Rejected. Grey literature.</td>
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<td>16366</td>
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<td>7</td>
<td>I would just note that this same instability applies to the ice heading inward on the Jakobshavn ice stream, and perhaps other such (folds, as a result of the underlying land in the center of Greenland having been pushed down to hundreds of meters below sea level. [Michael MacCracken, United States of America]</td>
<td>Taken into account. Sentence has been deleted.</td>
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<td>9119</td>
<td>122</td>
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<td>14</td>
<td>I am confused on p.108, line 46-50 [Michael Oppenheimer, United States of America]</td>
<td>Taken into account. SCO has attempted to address tipping points etc in a more coherent fashion. Strong overlap with likely content of SROCC so that need to maintain focus on 1.5C and not a wider discussion of instabilities etc.</td>
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<td>2332</td>
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<td>size of this store of ice is a bit misleading. Permafrost is defined as a thermal condition of the ground which may or may not contain ice (it is not a big block of ice which the statement suggests) and the amount of ice is highly variable with location and depth. [Sharon Smith, Canada]</td>
<td>Accepted. Sentence rewritten.</td>
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<tr>
<td>7503</td>
<td>122</td>
<td>18</td>
<td>122</td>
<td>20</td>
<td>Consider rewriting this sentence to better explain the response lag [Bryn Christophersen, Norway]</td>
<td>Accepted. Sentence rewritten.</td>
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<tr>
<td>2334</td>
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<td>122</td>
<td>26</td>
<td>These models lack two different things so the comparison may not be valid especially with not at a time period. Chadburn et al. (2017) considers equilibrium conditions so the time period over which the changes occur is not considered. While I agree the total potential loss of permafrost in response to a given change in air temperature is likely to be somewhat greater than that predicted to occur over a shorter period with a transient model; the actual difference is going to depend on the time period considered under the transient model and you have not provided that. Also, Slater and Lawrence (2013) only consider loss of permafrost in the upper 3 m so they are not really looking at the entire thickness of permafrost. Chadburn et al (2017) are looking at the size of the permafrost zones (the ones on Brown et al. map) and how that changes in response to air temperature changes, where as the transient models are considering the actual ground thermal conditions so they are not looking at the same thing. [Sharon Smith, Canada]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
</tr>
<tr>
<td>2333</td>
<td>122</td>
<td>22</td>
<td>122</td>
<td>22</td>
<td>permafrost cover is incorrect terminology as permafrost is below the ground surface (term also used later in paragraph in line 25). Refer instead to the area underlain by permafrost. I expect that this terminology has come about because Chadburn et al. (2017) examine how the permafrost zones will change with changing air temperature and therefore may have referred to the land covered by the permafrost zones or regions (which is quite different than saying permafrost cover). [Sharon Smith, Canada]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
</tr>
<tr>
<td>15084</td>
<td>122</td>
<td>22</td>
<td>122</td>
<td>22</td>
<td>Change &quot;empirical&quot; by &quot;empirical&quot; [Ruben Reubita, Spain]</td>
<td>Editorial - copyedit to be completed prior publication</td>
</tr>
<tr>
<td>15085</td>
<td>122</td>
<td>22</td>
<td>122</td>
<td>24</td>
<td>Remove &quot;it&quot; after &quot;2.5&quot; [Ruben Reubita, Spain]</td>
<td>Editorial - copyedit to be completed prior publication</td>
</tr>
<tr>
<td>12434</td>
<td>122</td>
<td>22</td>
<td>122</td>
<td>29</td>
<td>The section has been updated and expanded. It examines general knowledge gaps and some specifically identified as relevant to the previous sections.</td>
<td>Section has been renamed Chapter Limitations and Knowledge Gaps</td>
</tr>
<tr>
<td>10202</td>
<td>122</td>
<td>22</td>
<td>122</td>
<td>29</td>
<td>Should not have title of research needs - not allowed in IPCC reports [Piros Forster, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td></td>
</tr>
<tr>
<td>Comment No</td>
<td>From Page</td>
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<td>Comment</td>
<td>Response</td>
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<tr>
<td>2359</td>
<td>122</td>
<td>29</td>
<td>123</td>
<td>15</td>
<td>Knowledge Gaps: A key issue for understanding different levels of warming and the subsequent differentiation of impacts relates to how climate resilience research needs to be incorporated into natural and human systems. A great deal of evidence is being collated by the practitioner community (see Viner D and Howarth C 2014 Practitioners work and evidence in IPCC reports. Nature Climate Change Vol. 4 October 2014) and it is this community that is delivering resilience through infrastructure and asset design. Key areas of research that are needed by the policy and practitioner community are: investigation into how components of the urban system interact with each other to impact upon adaptation and resilience targets; the use of risks frameworks in asset and system design to deliver resilience to 1.5, 2.0 or higher warming world; the benefits of the Resilience Dividend for financial investment and future returns. [David Viner, United Kingdom (of Great Britain and Northern Ireland)]</td>
<td>Agreed. The section now acknowledges that: A better understanding is needed of the interaction of climate change with development pathways. Projecting risks under a range of climate and development pathways would promote understanding of how development choices could increase or decrease the magnitude and pattern of risks, and would therefore provide better estimates of the range of uncertainties.</td>
</tr>
<tr>
<td>516</td>
<td>122</td>
<td>31</td>
<td>123</td>
<td>15</td>
<td>If there is emerging literature, please provide some examples. [David Croquet, Belgium]</td>
<td>Significantly more emerging literature has been incorporated in the entire chapter for the SOD. This factor is now acknowledged in this section. Specific examples are not referred. However the limitation of inco55</td>
</tr>
<tr>
<td>16926</td>
<td>122</td>
<td>31</td>
<td>123</td>
<td>31</td>
<td>italicize “it” [Ruben Retturo, Spain]</td>
<td>The section has been rewritten and the sentence no longer appears in the revision.</td>
</tr>
<tr>
<td>17669</td>
<td>122</td>
<td>31</td>
<td>123</td>
<td>15</td>
<td>The higher Education Institutions critical role could be mentioned [e.g. Implementing climate change research at universities. Barriers, potential and actions Journal of Clean Production 170 (2018) 2986-2977 <a href="https://doi.org/10.1016/j.jclepro.2017.09.015">https://doi.org/10.1016/j.jclepro.2017.09.015</a>] [<a href="http://www.scienceofco2future.com/science/article/pii/S0308525717309945">http://www.scienceofco2future.com/science/article/pii/S0308525717309945</a>]</td>
<td>The section acknowledges the need for more relevant literature. It is perhaps beyond the scope of the section to determine where the literature should emerge from.</td>
</tr>
<tr>
<td>7281</td>
<td>122</td>
<td>31</td>
<td>123</td>
<td>15</td>
<td>The point made here is important–there are significant impacts at 1.5°C and the implication in this report that 1.5°C might be an acceptable new, long-term level for global temperature might be acceptable to me unjustified by even the limited information that is available [e.g., with respect to ice sheet mass, biodiversity loss, etc.] this value is a politically chosen value and not a location that provides some boundary between minimal and very large impacts. To make this clear, expanded discussion of the impacts of 1.5°C needs to be included throughout the report instead of focusing primarily on the difference between 1.5 and 2°C (both of which are politically chosen values). To get the needed information, it seems to me there needs to be a recommendation to have more research on the difference in impacts between 0.5 and 1.5 °C should be called for. [Michael MacCracken, United States of America]</td>
<td>The introduction to the section adopts the recommendation made. It notes that: More research and analysis is also needed to clarify projected differences of climate change impacts and consequences for +1.5°C or +2°C global warming.</td>
</tr>
<tr>
<td>16367</td>
<td>122</td>
<td>37</td>
<td>123</td>
<td>41</td>
<td>I agree with this statement, but wonder why the authors seem so confident with many of the statements they make through this chapter when, as they say, “Relative little literature is designed to study the impacts of the two warming levels”. In particular, do not see how the authors can make so many statements that restraining the warming “significantly” reduces the risks relative to 2°C, with the available literature. In most cases they have not, to my mind, provided sufficient justification for their confident statements. They may well be right, but more evidence is required. Until then they need to use the IPCC calibrated language and avoid overstating their confidence. [Rebecca Nicholls, Australia]</td>
<td>Significantly more literature has emerged since the FOD which in many instances have bolstered the ability the assess impacts. However, the point is taken, and the rewriting of the chapter for the SOD does incorporate more use of the IPCC uncertainty language.</td>
</tr>
<tr>
<td>9097</td>
<td>122</td>
<td>47</td>
<td>123</td>
<td>16</td>
<td>please add contents more contents and literatures are needed about the risk of species extinction following climate change [Jianguo Wu, China]</td>
<td>Knowledge gaps with respect to terrestrial and oceanic ecosystems have been expanded.</td>
</tr>
<tr>
<td>9621</td>
<td>122</td>
<td>53</td>
<td>122</td>
<td>54</td>
<td>[please delete “it”]</td>
<td>Noted.</td>
</tr>
<tr>
<td>19629</td>
<td>122</td>
<td>55</td>
<td>123</td>
<td>56</td>
<td>Agree strongly with this point. These should be strong cross-cutting messages throughout the report. It is also disconcerting that chapter 5 does not have a similarly deep analysis on this topic as is found in chapter 3 and this should be rectified. [Dorsten Stabinsky, United States of America]</td>
<td>Noted.</td>
</tr>
<tr>
<td>21168</td>
<td>122</td>
<td>55</td>
<td>123</td>
<td>56</td>
<td>this finding should be acknowledged in ch 2 [David Cooper, Canada]</td>
<td>Noted.</td>
</tr>
<tr>
<td>13451</td>
<td>122</td>
<td>56</td>
<td>123</td>
<td>56</td>
<td>Whereas the lack of such studies is mentioned in the text. Outside of a reference to oceanic circulation, it is not explicitly noted in this section. This will be considered for the TOD. [Udaykumar Velinam, Norway]</td>
<td>Noted.</td>
</tr>
<tr>
<td>19630</td>
<td>123</td>
<td>124</td>
<td>123</td>
<td>124</td>
<td>Box is very necessary [Kieran Stainton, United States of America]</td>
<td>Noted.</td>
</tr>
<tr>
<td>5485</td>
<td>123</td>
<td>2</td>
<td>123</td>
<td>2</td>
<td>[please delete “it”]</td>
<td>Noted.</td>
</tr>
<tr>
<td>5904</td>
<td>123</td>
<td>2</td>
<td>123</td>
<td>2</td>
<td>Please delete “it” [Jairol A. Lopez-Bustos, Spain]</td>
<td>The section has been rewritten and the sentence no longer appears in the revision.</td>
</tr>
<tr>
<td>12677</td>
<td>123</td>
<td>2</td>
<td>123</td>
<td>2</td>
<td>Remove “it” after “incorporation” [Ruben Retturo, Spain]</td>
<td>The section has been rewritten and the sentence no longer appears in the revision.</td>
</tr>
<tr>
<td>13452</td>
<td>123</td>
<td>15</td>
<td>123</td>
<td>15</td>
<td>Economic impacts due to natural hazards like hurricanes, storm surges and floods exist for few regions. However a detailed list of economic impacts</td>
<td>Agreed. More research and analysis is also needed to clarify projected differences of climate change impacts and consequences for +1.5°C or +2°C global warming.</td>
</tr>
<tr>
<td>9881</td>
<td>123</td>
<td>16</td>
<td>123</td>
<td>16</td>
<td>I suggest that further research on the impacts of increased temperatures and changing patterns of precipitation on social relationships is needed. [Susan Clayton, United States of America]</td>
<td>Acknowledged. Will be added for third order draft.</td>
</tr>
<tr>
<td>20511</td>
<td>123</td>
<td>16</td>
<td>123</td>
<td>16</td>
<td>It is clear from this discussion earlier in chapter 3 that there are a number of knowledge gaps wrt to SRM which should be included at the end of this section. These might include a widely range of impacts, food security, ways of reducing moral hazard, modification of tab ozone layer, etc. [David Viner, United Kingdom of Great Britain and Northern Ireland]</td>
<td>The substantive content on SRM has been moved from the chapter to a cross chapter box. SRM is now only briefly mentioned in the chapter and the reader referred to the cross-chapter box. Limitations relevant to SRM are now considered in that box.</td>
</tr>
<tr>
<td>17726</td>
<td>123</td>
<td>16</td>
<td>123</td>
<td>16</td>
<td>Also, little is known about impacts in the different systems/regions resulting from the different overshoot scenarios [Ana Barata, France]</td>
<td>Both the need for regional focus and for assessment other than transient scenarios are acknowledged as knowledge gaps.</td>
</tr>
<tr>
<td>14053</td>
<td>124</td>
<td>1</td>
<td>124</td>
<td>1</td>
<td>There is a SR on climate change and land (SRCCL) under development (agreed outline is available on IPCC website). I suggest this box focuses on 1.5 and 2 and provides a handshock for the SRCCL to address in more depth [Elvira Poloczanska, Germany]</td>
<td>Agreed. We have now emphasized that the box focuses on 1.5C and hence on the land footprint of negative emissions.</td>
</tr>
<tr>
<td>2822</td>
<td>124</td>
<td>1</td>
<td>124</td>
<td>20</td>
<td>This finding should be acknowledged in ch 2 [David Cooper, Canada]</td>
<td>We will consider if there is space for this in next draft.</td>
</tr>
<tr>
<td>16315</td>
<td>124</td>
<td>1</td>
<td>125</td>
<td>25</td>
<td>The proposed box on Land Use is extremely important; the proposed outline is convincing. [Marco Mazzotti, Belgium]</td>
<td>Noted. The section has been rewritten and the sentence no longer appears in the revision.</td>
</tr>
<tr>
<td>17283</td>
<td>124</td>
<td>1</td>
<td>125</td>
<td>25</td>
<td>Under construction [Maria Jesus (Iglesias) Brienza, Spain]</td>
<td>Yes, this box was under construction in FOD.</td>
</tr>
</tbody>
</table>
### Comment and Response - Chapter 3

<table>
<thead>
<tr>
<th>Comment No</th>
<th>From Page</th>
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<th>To Page</th>
<th>To Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>12435</td>
<td>124</td>
<td>1</td>
<td>125</td>
<td>25</td>
<td>(1/2) Cross-chapter box 3.11: land-use.</td>
<td>Agreed. Text revised. We now (a) acknowledge the land footprint of biofuels in general (b) retitled the box to explain focus on negative emissions and 1.5°C (more general treatment will occur in Land report) (c) expanded final section on ecosystem restoration.</td>
</tr>
<tr>
<td>21169</td>
<td>124</td>
<td>1</td>
<td>125</td>
<td>25</td>
<td>Box 3.11: also discuss potential role of afforestation, reforestation and other ecosystem restoration in front-loading CDR see Houghton RA, Byers B, Nassaikis AK. 2015. A mix for tropical forests in stabilizing atmospheric CO2. Nature Climate Change 5:1022-1033. [David Cooper, Canada]</td>
<td>Agreed. This is done in Chapter 4's mitigation section. 4.3.6 specifically. We added a cross reference.</td>
</tr>
<tr>
<td>12436</td>
<td>124</td>
<td>1</td>
<td>125</td>
<td>25</td>
<td>(2/2) Cross-chapter box 3.11: land-use.</td>
<td>Agreed, but space did not permit us to include this. If it is not covered in the chapter 4 this will be addressed in the next draft.</td>
</tr>
<tr>
<td>4650</td>
<td>124</td>
<td>5</td>
<td>124</td>
<td>6</td>
<td>Change &quot;GICO2 copying&quot; by &quot;GICO2 copying&quot;.</td>
<td>Editorial - copyedit to be completed prior to publication</td>
</tr>
<tr>
<td>4651</td>
<td>124</td>
<td>10</td>
<td></td>
<td></td>
<td>The abbreviation for plural is usually Xs. For example &quot;National Meteorological Services&quot; as &quot;NMSs&quot;. So for &quot;negative emission technologies&quot; is better use &quot;NETs&quot; instead of &quot;NETS&quot;.</td>
<td>Accepted.</td>
</tr>
<tr>
<td>4652</td>
<td>124</td>
<td>13</td>
<td></td>
<td></td>
<td>Change &quot;NETS&quot; by &quot;NETs&quot;.</td>
<td>Agreed.</td>
</tr>
<tr>
<td>16368</td>
<td>124</td>
<td>13</td>
<td>124</td>
<td>14</td>
<td>Consideration should be given to additional approaches to CDR beyond BECCS and afforestation. [Michael MacCracken, United States of America]</td>
<td>Agreed. Due to space constraints we have added a cross reference to Ch.4 where this is considered in more detail. We will consider altering the balance of the text in the final draft.</td>
</tr>
<tr>
<td>2733</td>
<td>124</td>
<td>13</td>
<td>124</td>
<td>19</td>
<td>Important to consider other perspectives e.g. Larkin et al 2017 - their paper on 'what if NETs fail at scale?' [Penny Urquhart, South Africa]</td>
<td>Agreed : the feasibility discussion occurs in Ch 4 and a cross reference will be provided in the next draft.</td>
</tr>
<tr>
<td>13397</td>
<td>124</td>
<td>19</td>
<td></td>
<td></td>
<td>Abandoned land could also play a role here. Could be mentioned after &quot;marginal land&quot;. [Helene Muri, Norway]</td>
<td>Agree.</td>
</tr>
<tr>
<td>8847</td>
<td>124</td>
<td>25</td>
<td>124</td>
<td>38</td>
<td>Box 3.11: Figure 2 is not there. [Lubna Alam, Bangladesh]</td>
<td>Agree.</td>
</tr>
<tr>
<td>21167</td>
<td>124</td>
<td>30</td>
<td>125</td>
<td>34</td>
<td>address also reforestation and other ecosystem restoration [David Cooper, Canada]</td>
<td>Box revised.</td>
</tr>
<tr>
<td>21168</td>
<td>124</td>
<td>30</td>
<td>125</td>
<td>34</td>
<td>factor in also LUC reforestation lines 44-50. [David Cooper, Canada]</td>
<td>See response to comment 18386.</td>
</tr>
<tr>
<td>4653</td>
<td>124</td>
<td>36</td>
<td></td>
<td></td>
<td>Change &quot;NETS&quot; by &quot;NETs&quot;.</td>
<td>Text revised.</td>
</tr>
<tr>
<td>4654</td>
<td>124</td>
<td>38</td>
<td></td>
<td></td>
<td>Change &quot;NETs&quot; by &quot;NETs&quot;.</td>
<td>Text revised.</td>
</tr>
<tr>
<td>1567</td>
<td>124</td>
<td>44</td>
<td>124</td>
<td>90</td>
<td>Some useful references for this section: The Joint Research Center from the EU states that &quot;From the studies analyzed it emerges that in order to assess the climate change mitigation potential of forest bioenergy pathways, the assumption of biogenic carbon neutrality is not valid under policy relevant time horizons (in particular for dedicated harvest of stemwood for bioenergy only) if carbon stock changes in the forest are not accounted for.&quot; [<a href="http://publications.jrc.ec.europa.eu/repository/bitstream/JRC170653/1.c25354en.pdf">http://publications.jrc.ec.europa.eu/repository/bitstream/JRC170653/1.c25354en.pdf</a>]</td>
<td>Accepted.</td>
</tr>
<tr>
<td>14951</td>
<td>125</td>
<td>18</td>
<td>125</td>
<td>18</td>
<td>On the proposed subsection on implementation issues and &quot;negative consequences for equity&quot;.</td>
<td>Text revised; however as these reports have very similar messages as peer reviewed literature now cited in the revised Box, we have focused on these sources instead.</td>
</tr>
<tr>
<td>14952</td>
<td>125</td>
<td>18</td>
<td>125</td>
<td>18</td>
<td>continued: It is important that any such analysis include the literature on ethics and climate change - including equitable burden sharing. [Simon Caney 'Cosmopolitan Justice, Responsibility, and Global Climate Change'. [Lesien Journal of International Law, vol.18 no.4 (2005), 747-775 and Simon Caney 'Two Kinds of Climate Justice: Avoiding Harm and Sharing Burdens', Journal of Political Philosophy, vol.22 no.2 (2014), 125-149.]</td>
<td>Rejected - this is beyond the scope of this box due to space constraints.</td>
</tr>
<tr>
<td>9998</td>
<td>125</td>
<td>27</td>
<td>132</td>
<td>70</td>
<td>Here, reaching 2°C carbon budget figures or comments adapted from IPCC WGI ARS can be added in order to compare with 1.5°C. [Mustafa Tufan Tur, Turkey]</td>
<td>Rejected - this is beyond the scope of this box due to space constraints.</td>
</tr>
</tbody>
</table>
### Box 3.12: this is fantastic - great job! (Petra Tschakert, Australia)

**Response:** Noted. Thank you.

### 12437

12437 125 32 125 33

This box needs to be improved considerably to be useful or deleted altogether. Most importantly, the scope needs to be refined. The current box is overly broad. It tries to cover what is otherwise the topic of large parts of Ch 01 and 02 (plus Ch 02) in just a few pages. This is an impossible task unless the box is renamed to 'Summary for policy makers'.

Several elements are of particular concerning:

- [Reference to SRM. It is clear that the Paris LTTG is linked to a risk assessment based on GHG mitigation pathways. The way to achieve that as established in Article 4 is explicitly and solely linked to GHG mitigation. A 1.5°C world as envisioned in the Paris Agreement can therefore not be achieved through SRM. (Bill Hare, Germany)]

### 12438

12438 125 32 125 33

If key aspects of 1.5°C world are insufficiently covered.

In my view, such a box could be very useful if it establishes for which impacts GMT alone is a good indicator, so all 1.5°C worlds are equal, and for which it is of limited applicability starting from the geophysics of it. This includes TCR (we don’t know the exact CO2 level of when 1.5°C will be reached, leading so substantial uncertainty for ecosystem and ocean acid impacts), timing including overshoot, beyond 2100, etc. Special focus should be given to oceanic and cryosphere processes.

In a next step, the socio-economic uncertainties of such a 1.5°C world should be outlined. That goes beyond mitigation side effects, but links to broader aspects of the SSPs including in particular vulnerability and exposure and obviously adaptation. Timing is again very important here as e.g. vulnerabilities end-of-century would be lower than 2030. (Bill Hare, Germany)

### 12439

12439 125 32 125 33

**Box 3.12:** Apart from the introduction of new concepts to classify uncertainty (unluckily I didn’t find a definition of the IPCCs official understanding of how to handle this) this table has fundamental issues and I can only recommend to delete it.

1. Pathway classification: From what I understand, the table includes just one category that could be seen as a 1.5°C pathway under some definitions. All the others are not. What is the point of including them in a box that is called 1.5°C warmer worlds?

2. The set of impact indicators, in fact all extreme weather event indicators, is not more than a selection of ‘chance’. How can this selection be justified? Shouldn’t such a box rather adopt concepts of Ch 03 such as hot spots or RFCs?

**# Table 2:** I am sympathetic to the idea, but the logical connections drawn are problematic at times.

- [Minor comment: 1.5 warmer worlds - incorrect wording of topic “goals”. The language should reflect what was reflected in the Paris Agreement that refers to one temperature goal (see e.g. Ciaisauthor et al. 2016). (Bill Hare, Germany)]

### 16369

16369 125 32 125 33

Is it really the case that the Paris Accord offers these levels as potential new stabilization levels rather than viewing them as desirable peak levels with the intent to go back to lower levels thereafter? Were it not for possible natural carbon feedbacks and other long-term adjustments occurring, wouldn’t we require some actions to keep the world at 1.5°C once one stabilizes at that level. To get this level, emissions of short-lived species will be down and their concentrations will rapidly drop and so will their forcing, etc. While the UNFCCC objective does suggest stabilization and so it is perhaps conceivable of thinking of 1.5°C as a new stable level, but if this is the level chosen, the ongoing impacts of 1.5°C will likely violate the qualifications of Objective 2 of the UNFCCC. For example, even if temperature is stabilized, sea level rise will not be stabilized and that will be creating havoc with coastlines. In addition, the CO2 level at 1.5°C will be having severe impacts on ocean ecosystems, etc. It very much seems to me that the stabilization level needs to be back below 0.5°C, not 1.5°C or 2°C. And this need to get back to below 0.5°C and the inadequacy of a 1.5°C stabilization level needs to be made clear to readers, so very clearly stated. (Michael MacCracken, United States of America)

**Response:** Noted. The amount of material was in part reduced (e.g. smaller table). Regarding SRM. Because this topic is addressed within the report (cross-chapter box on SRM), it is felt that this topic needs to be mentioned (though briefly). The question of whether SRM is compatible with the Paris agreement should be addressed in the cross-chapter box on SRM rather than the present box. The material included here highlights the pitfalls of considering SRM in the context of the Paris agreement, i.e. focusing on global temperature alone without considering the associated regional footprint.

### 2360

2360 125 42 125 45

If we are talking about global average temperatures, yes, this value can be derived from observations or models. However, the use of a prefixing term “global” is normally applied. For example: the observed global mean temperature; or the modelled global mean temperature. Does this also need to state what are the 30-year reference time periods that are being referred to in this chapter and report? (David Viner, United Kingdom (of Great Britain and Northern Ireland))

**Response:** Noted. We have now included the definition of 1.5°C global warming introduced in Chapter 1.

### 16370

16370 125 43 125 44

It is not the “globally averaged temperature of the Earth”—it is the change in temperature averaged across the Earth, up from something like 15°C to 18.5°C. (Michael MacCracken, United States of America)

**Response:** Noted. This text does not need to be revised, it refers to the absolute global mean temperature.
IPCC WGI SR15 First Order Draft Review Comments And Responses - Chapter 3
This is a nearly misleading statement rather than an assessment of the relative risks of GHGs with or without SRM. The GHG induced is clearly very different and novel - simulations of the GHG with SRM climate all show the climate to be much closer to the situation without the GHG increase at all. Also, the conclusion here is based on only one type of SRM, namely stratospheric aerosol injection, and, indeed, only one implementation of that approach, namely uniformly distributed aerosols. In addition, the conclusions appear to be drawn from a very large dose of SRM instead of the type of use that would be consistent with what is assumed in this report, namely offsetting whatever modest overshoot of 1.5°C that might result from strong, but not adequate mitigation. For the GHG case, however, there would be, essentially, only quite to very large losers whereas with SRM offset, the net effects would be small, though indeed with relatively small winners and losers; to suggest that the latter situation is better is really quite perverse. The question is not how a 2.5°C GHG case with 1°C of SRM compares to a 1.5°C GHG world, but how a 2.5°C GHG world with no SRM compares to a 1.5°C world achieved with SRM from the 2.5°C GHG world. The comparison in the text is really irrelevant as no one researching SRM is advocating any moderation at all in mitigation. If at all possible, 1.5°C should be achieved by mitigation--and if that can be done, applying SRM to get the world to 0.5°C should be considered for a 1.5°C world involves many significant impacts and commitments to very large sea level rise. So, this whole paragraph needs a complete rewrite. [Michał MacCracken, United States of America]

This table is climate of 1.5°C warmer worlds as it does not include ecosystems or human systems [Elvira Poloczanska, Germany] Noted. We will try to include such information for the FGD, but it is more difficult to synthesized.

Table 1 of Box 3.12 does not look very good. Consider either making smaller text not to cut words or reducing the amount of information. For example, more text describing the storylines should be added. These storylines are very nice and show possible future worlds in which we will live. [David Docquier, Belgium]

Box 3.12, Table 2: These storylines are extremely important and effective ways of communicating the consequences associated with which pathway we choose to follow to reach the 1.5 degrees global warming limitation. [Øyvind Christophersen, Norway]

Table 1 of Box 3.12, which follows this line, storyline/scenario 1 is unsatisfactory. There is no reason why, in this most appealing of worlds, quality of life should remain similar to that of 2018 in 2100. Stasis of this sort seems highly unlikely. Given recent widespread improvements in quality of life, why would a world in which climate change impacts were largely curtailed merely enjoy the same quality of life as we have today? The third scenario is also problematic. It shows SRM having a strongly negative effect. This is of course possible. But including it as the only SRM scenario necessarily adds to the lack of balance in treating SRM as a climate response that stems from a willingness to discuss (mostly negative) impacts in chapter 3 without moderation at all in mitigation. If at all possible, 1.5°C should be achieved by mitigation--and if that can be done, applying SRM to get the world to 0.5°C should be considered for a 1.5°C world involves many significant impacts and commitments to very large sea level rise. So, this whole paragraph needs a complete rewrite. [Michał MacCracken, United States of America]

In Table 2, which follows this line, storyline/scenario 1 is unsatisfactory. There is no reason why, in this most appealing of worlds, quality of life should remain similar to that of 2018 in 2100. Stasis of this sort seems highly unlikely. Given recent widespread improvements in quality of life, why would a world in which climate change impacts were largely curtailed merely enjoy the same quality of life as we have today? The third scenario is also problematic. It shows SRM having a strongly negative effect. This is of course possible. But including it as the only SRM scenario necessarily adds to the lack of balance in treating SRM as a climate response that stems from a willingness to discuss (mostly negative) impacts in chapter 3 without discussing potential benefits in chapter 2. [Oliver Brient, United Kingdom] Noise in the revised text but does not seem to be in the final of the SOD. This will be fixed for the FGD.

In reality, the Earth responds not only to cumulative CO2 emissions but to all cumulative greenhouse gas emissions (CO, NH4, N2O, etc.). This should appear somewhere in the SR15 report. [David Docquier, Belgium]

Table 1 of Box 3.12 does not look very good. Consider either making smaller text not to cut words or reducing the amount of information. For example, more text describing the storylines should be added. These storylines are very nice and show possible future worlds in which we will live. [David Docquier, Belgium]

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Please, this point should not be buried in a box in this chapter. It should be part of the overall framing of the report in chapter 1. The report will be heavily revised at all in mitigation. If at all possible, 1.5°C should be achieved by mitigation--and if that can be done, applying SRM to get the world to 0.5°C should be considered for a 1.5°C world involves many significant impacts and commitments to very large sea level rise. So, this whole paragraph needs a complete rewrite. [Michał MacCracken, United States of America]

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Box 3.12, Table 2, Scenario 1: Please define "marginal land" and consider the use of this term in this context. If the agricultural definition of "edge of cultivated areas" (i.e. areas where growing crops is difficult) is used then growing crops on such areas may not reduce conflict with biodiversity and biodiversity conservation since such areas normally house ecosystems as long as these areas are not ecologically degraded, meaning that land use change on such land will have impacts on biodiversity. Thus the potential conflict with conservation. Economically not valuable land from an agricultural aspect is not equal to ecologically not valuable land. To avoid conflict with biodiversity and conservation all land use change resulting in impacts on existing ecosystems and biodiversity should be minimised. [Byrdn Christophersen, Norway]

Comment Response

Noted. Will be defined in the FGD.

These storylines constitute a very nice way to show policymakers and citizens what the world would look like in the future according to different scenarios. Although many assumptions are made to build these storylines, I think citations of these storylines in the text are lacking. Box 3.12 is often cited throughout Chapter 3, but I think these storylines (Table 2 of Box 3.12) should be explicitly cited. [David Docquier, Belgium]

Noted, thank you. We are now providing references for the underlying material in the Supplementary Information (annotated version of the storylines). The references will be expanded for the FGD.

Noted, thank you.

Would it be possible to develop schematics from these tables? [Elvira Poloczanska, Germany]

Noted. We will consider including schematics to illustrate Table 1 in the FGD. It seems more difficult to find a way to illustrate Table 2.

Noted. Other reviewers have appreciated the storylines, hence they were kept. They are of purely illustrative character.

Regarding Box 3.12, Table 2: Considering points made in my comments regarding CDR and SRM, I'd like to suggest a couple of additional scenarios that are added to the scenarios listed here that I think would merit consideration: Scenario 1a: After suitable research, modest SRM is begun in 2025 and ramps up to keep global warming from exceeding about 1.2 C and then is continued, as necessary, to bring overall warming back to 0.5 C in conjunction with the scaling up of global scale CDR in 2040 that is built up so that SRM can be phased out by 2100 (that is, combined SRM and CDR geoengineering is used to limit overall warming to 1.2 C and then to bring warming down to 0.5 C, with CDR used as the exit strategy for SRM) Taken together, these efforts significantly slow the rate of increase of sea level rise and biodiversity loss while also reducing the increased risks of extreme events that are already becoming evident. Scenario 3a: SRM is invoked somewhat more strongly to keep global warming from about 1.4 C and CDR is ramped up more rapidly so that the period above 1 C is kept to only several decades, and their combined efforts are such as to bring the warming in 2100 back to 0.7 C and headed to below 0.5 C at which point it would be possible to phase out SRM while continuing to aggressively pursue CDR to reverse much of what ocean acidification has occurred. With respect to Scenario 3, fine to leave as an attempted effort, although it is misleading to suggest that the effect of SRM would not bring the climate back closer to the unaltered state than without SRM--it would likely be beneficial and most would be better off, but there could be reasons that it ends and the situation could get very different. For Scenario 3a, I would again have SRM begin early and then have to build up to higher levels--and the problem would be much longer need for SRM and CDR with quite significant ocean acidification effects. And one could well postulate problems with retaining SRM for so long because people would be enjoying the climate and just not understand how necessary the costs of SRM and quite massive CDR that would be needed to sustain not excessively deleterious conditions--and so the international system collapses and great warming occurs and the situation ends up being challenging. As a general comment, my view is that SRM makes most sense if there is strong mitigation and then SRM is used to very much limit overall warming and push the warming back toward 0.5 C and below, and that if there is a deficit commitment to mitigation so the GHG concentrations become quite high and climate change is large, relying on large SRM efforts does become problematic both due to the large amount needed and the long period it would be needed. I really think the present representation of how SRM and CDR might be utilized in the chapter are not scientifically well presented nor politically optimal and need significant revision. [Michael McCracken, United States of America]

The Scenarios. These should not be included in this assessment. They are based purely on conjecture and personal judgement rather than any reviewed science. There are a whole series of questions that could be raised about these. Most notably the lack of supporting references. Furthermore, mentioning dates and locations for things to happen (whilst being a sensible approach for this type of storyline) holds the IPCC hostage to fortune. For example, in scenario 3 the dates of 2035 and 2038 are mentioned, notwithstanding this, what happens if these events do not occur on these dates. The IPCC will be open to criticism saying its predictions/forecast are no good. So, in summary, it is best to remove these as they open a whole series of issues which could be misconstrued by critics and taken wildly out of context. [David Viner, United Kingdom (of Great Britain and Northern Ireland)]

Noted. The supplementary information now includes an annotated version of the storylines with relevant references. It will be fully updated for the FGD. Sentences that cannot be fully traced back to underlying report material will be removed.

Noted, thank you.

I question the wisdom of including these storyline scenarios (Box 5,12) which could easily be read as commentary on the politics of climate change policy. It would be more constructive to set out some tables that move from the three mitigation scenarios in Column 1 to columns identifying potential ecological, social and interactive impacts. There is no need to comment on the Paris Agreement or to suggest city and state governments will make up for lack of national leadership in the USA. There is especially no need to speculate about centralised government control over meat prices. Since the report does not systematically analyse policy options it should not be commenting on them, particularly in a manner that could be read as being critical of particular governments or otherwise misconstrued. [Steuart Lockie, Australia]

Noted. It seems more difficult to find a way to illustrate Table 2.

I have kept Miami as an example, this is purely for illustrative purposes, and we note that 2017 hurricane Irma had one possible trajectory reaching Miami.
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<td>We consider the Scenario 3 storyline describing SRM deployment to be biased, misleading, and unscientific. It is biased insofar as it is the only storyline involving SRM and is concerned solely with imaging consequences of a &quot;termination shock.&quot; Without explicitly stating so, the narrative strongly suggests that the widespread devastation following cessation of SRM is attributable to SRM, in effect presenting solar geoengineering as a dangerous technology with no potential to reduce climate risks and enhance global welfare. The scenario is misleading in that it presents SRM as the worst-case scenario, without acknowledging the range of ways in which SRM could help global society, especially poor countries. We consider the Scenario 3 storyline describing SRM deployment to be biased, misleading, and unscientific. It is biased insofar as it is the only storyline involving SRM and is concerned solely with imaging consequences of a &quot;termination shock.&quot; Without explicitly stating so, the narrative strongly suggests that the widespread devastation following cessation of SRM is attributable to SRM, in effect presenting solar geoengineering as a dangerous technology with no potential to reduce climate risks and enhance global welfare. The scenario is misleading in that it presents SRM as the worst-case scenario, without acknowledging the range of ways in which SRM could help global society, especially poor countries.</td>
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| 7330       | 132       | 132       | 17      | 17      | Delete the text "and human security." |

| 12895      | 133       | 133       |         |         | Editorial - copyedit to be completed prior to publication |


| 11         | 133       | 133       |         |         | Editorial - copyedit to be completed prior to publication |

| 844        | 133       | 133       |         |         | There is an extra "if" after Vol. and DOI missing [Lubna Alam, Bangladesh] |

| 845        | 133       | 133       |         |         | Reference included in the list of references |

| 846        | 133       | 133       |         |         | Editorial - copyedit to be completed prior to publication |

| 847        | 133       | 133       |         |         | We are grateful for your suggestion, and will be including consideration of it in the next draft editorial. |

| 848        | 133       | 133       |         |         | Editorial - copyedit to be completed prior to publication |

| 849        | 133       | 133       |         |         | Several references are identical, e.g. Allen et al., 2017a and 2017b; Davin et al., 2014a and 2014b; Dove et al., 2013a and 2013b; Hirsch et al., 2017a and 2017b; Kaniwsky et al., 2015a and 2015b; Schläpfer et al., 2015, 2016a and 2016c (non-exhaustive list). [Win Thiery, Switzerland] |

| 850        | 133       | 133       |         |         | Editorial - copyedit to be completed prior to publication |

| 851        | 133       | 133       |         |         | Noted. This is an illustrative scenario, chosen as "worst-case outcome". |

| 852        | 134       | 134       |         |         | We are grateful for your suggestion, and will be including consideration of it in the next draft editorial. |

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Reference is correct, it refers to Chapter 25 "Australia" from AR5-WGI.
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<td>Insert: ...significant benefits for all known ecosystems (including terrestrial, wetland, coastal, and ocean ecosystems including coral reefs, freshwater systems, and food production systems (i.e., fisheries and aquaculture)) [Matthias Honegger, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
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<td>Do these paragraphs summarize particular sub-sections of chapter 3? If so, they should indicate the corresponding sections; otherwise they may be a bit shortened. Also it appears that these sections almost exclusively address marine and other aquatic ecosystems, omitting almost entirely discussions of terrestrial and in particular agricultural lands and their productivity. [Matthias Honegger, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
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<td>15638</td>
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<td>The second half of the sentence (on ecosystem services) seems obsolete after the first sentence (line 16-19) already addressing terrestrial and wetland ecosystems and unrelated to the first part regarding the risk of species extinction. [Matthias Honegger, Germany]</td>
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<td>It would be beneficial to add a note on related avoided methane emissions from avoided melting of permafrost soils. [Matthias Honegger, Germany]</td>
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<td>Remarkably short section, consider subheadings for above section to render section size more consistent. [Matthias Honegger, Germany]</td>
<td>We are grateful for your suggestion, and will be including consideration of it in the next draft.</td>
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