

SROCC First Order Draft Expert Review Comments - Entire Report							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
1644	0	0	0			Please make sure that the figures throughout the report are easy to read and that the caption contains all information needed for the reader. Referring to the guideline: "Enhancing the accessibility of climate change data visuals - Recommendations to the IPCC and guidance for researchers" http://tyndall.ac.uk/sites/default/files/Data_Visuals_Guidance_Full_Report_0.pdf [Aurora Stenmark, Norway]	Accepted: a lot of efforts went into the final versions of the chapter and SPM figures. Authors were assisted with professionals.
2252	0	0	0			Summary for Policymakers (assuming there will be one in the final draft) should address the questions and concerns of the policymakers outside of polar and high mountain areas as to why they should care about the changes happening in the poles. [Kristin Campbell, USA]	Noted: SPM has made those linkages
2254	0	0	0			Chapters 1 and 6 are optimal places to emphasize the rate of warming and the importance of slowing melting. [Kristin Campbell, USA]	Noted. Chapter 1 does not assess the literature but SM1.1 provides the historical account of the development of assessments of climate, ocean and cryosphere change across past IPCC working group 1 assessment reports. This table supports the text in Section 1.4. The rates of warming and ice mel are mostly covered in details in chapters 3 and 5.
2256	0	0	0			General (throughout all chapters): Maintain consistency with definitions of tipping elements and tipping points. Kopp R., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment; Lenton T. M., et al. (2008) Tipping elements in the Earth's climate system. [Kristin Campbell, USA]	Accepted: both reference have been added.
2378	0	0	0			Summary for Policymakers (assuming there will be one in the final draft) should address the questions and concerns of the policymakers outside of polar and high mountain areas as to why they should care about the changes happening in the poles. [Durwood Zaelke, USA]	Noted: The spm has addressed most of the comments on larger linkages. However, due to paucity of space, we had limited them to the scope of present report.
2380	0	0	0			Chapters 1 and 6 are optimal places to emphasize the rate of warming and the importance of slowing melting. [Durwood Zaelke, USA]	See reply top comment 2254 above.
2382	0	0	0			General (throughout all chapters): Maintain consistency with definitions of tipping elements and tipping points. Kopp R., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment; Lenton T. M., et al. (2008) Tipping elements in the Earth's climate system. [Durwood Zaelke, USA]	See reply to comment 2256 above.
6378	0	0	0			In many instances, references are cited to support a statement, but the main finding of the reference does not relate to the statement. For instance, Chapter 3, page 7, line 37; the Notz & Stroeve 2016 study does not investigate polar amplification and the purpose of the study is not to estimate the ratio of Arctic temperature increase vs the planet's temperature increase. The paper rather links global emissions of CO2 with Arctic sea ice decline. Another example: the Harada et al. (2016) reference used in Chapter 1, page 12, line 21, to support the notion that Arctic sea ice is declining, is not appropriate. This paper is focused on the impacts of Arctic sea ice decline on biogeochemical cycles in the western Arctic. References should be cited for what they added in terms of incremental knowledge to the science, and not just because they have somewhere the one sentence that is helpful to support a statement in the Special Report. [François Massonnet, Belgium]	Noted. Considerable efforts went into solving issues like this one.

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10836	0	0	0			<p>I find the use of "limited evidence" in this report a little confusing because this wording is normally used in spoken English to dismiss theories or suggestions as invalid (e.g. there is limited evidence to suggest X...).</p> <p>In particular in P3-15, L4 which says "There is limited evidence that X...". As a native English speaker, I take this as meaning "X is unlikely to be true". However I assume here that the intended meaning of limited evidence here is "there is some evidence to suggest X" which I would read very differently as "X could very well be true but we don't yet have enough evidence for it".</p> <p>That said I'm happy with statements where "limited evidence" appears in parentheses so perhaps it just needs to be used more carefully. [Ed Blockley, UK]</p>	Noted. This being an IPCC report, the IPCC language is used throughout. It is very well documented (Mastrandrea et al., 2010). All expressions of the confidence language, such as "limited evidence", are show in italics to illustrate that.
10868	0	0	0			<p>Please remove all mention of "psu" which should not be used in scientific literature. Practical Salinity is a dimensionsless quantity (defined as a conductivity ratio) and so no dimensions should be assigned to it.</p> <p>It is sufficient to state that salinity is measured on the Practical Salinity Scale or just to refer to salinity as "practical salinity". Failing that you could use "ppt".</p> <p>See the following references: Millero, Frank J. "WHAT IS PSU?" Oceanography 6, no. 3 (1993): 67. http://www.jstor.org/stable/43924646; UNESCO (1985) The international system of units (SI) in oceanography. UNESCO Technical Papers No.45, IAPSO Pub. Sci. No. 32, Paris, France. [Ed Blockley, UK]</p>	Accepted
11614	0	0	0			<p>Commendable developments from AR5 with many additions of important climate research in this special report with respect to sea level rise and dynamical contribution of antarctic ice sheet along with tail proballity distribution uncertainty. I commend a well balanced editorial that have integrated some good research to this report advancing from AR5. I wish to contribute to the advancement of science and humanity through this review. [Ramesh Soysa, Sri Lanka]</p>	Thank you for your comment.
11616	0	0	0			<p>Uncertainty in the regional projections of sea level rise has to be minimized further. The tail of the probability distribution and its uncertainty perhaps need and can be quantified further to that of AR5 and this report. The dynamical contribution of the Antarctic ice sheet is a comendable inclusion in AR5 but needs further integration of atmosphere-polar, atmosphere-glacial and atmosphere-ocean interaction models encorporated. [Ramesh Soysa, Sri Lanka]</p>	We have minimized uncertainty as far as justified by current literature. The addition of estimates from expert elicitation, probabilistic models, and a sensitivity study provide additional definition to the tail beyond what process-based models are able to provide.
11618	0	0	0			<p>Reevaluation of AR5 projections of changes in frequency of regional extremes of high water associated with coastal storms and floods have been compiled well for this report. However I believe that [Ramesh Soysa, Sri Lanka]</p>	Incomplete comment
11744	0	0	0	0	0	<p>I suggest that information is available to obtain sufficient and complete information from different countries, especially countries with hydro and marine boundaries, and to define and implement joint projects with joint facilities of the countries & IPCC or UN to complete them.This completes existing information and more accurate international decisions to face climate change, especially in the oceans and frozen regions of the planet. [Hanieh Zargarlollahi, Iran]</p>	Noted with thanks

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11784	0	0	0	300	70	glaciers and ice sheets need careful definition given widespread confusion of the difference (and that ice sheets also have glaciers). This definition may need summary in each chapter given the way people will read the report [King Matt, Australia]	The definitions are in the glossary.
12578	0	0	0			I found it remarkable how little attention is given to glaciers and ice caps in the polar regions. Whereas there is an entire chapter on mountain glaciers outside the polar regions, the polar-specific chapter almost exclusively discusses the ice sheets of Antarctica and Greenland. this seems disproportionate, glaciers in the polar regions comprise more than 88% of the ice volume outside the ice sheets (according to IPCC WG1 AR5 ch4 Table 4.2) and in terms of mass change rates (2003-2009), polar glaciers are responsible for about 70% of the global value (WP1 AR5 ch4 Tab 4.4). in the past few years, considerable progress has been made assessing the mass changes of polar glaciers due to the availability of new observation technology, improved data availability and modeling tools. the six lines that ch 3 (P12, L35-40) spends on reporting recent advances are a poor representation of the existing literature on polar glaciers. due to their smaller size, polar glaciers respond faster to climate changes than continental ice sheets and due to their much larger volume, they contribute much more to SLR than the glaciers covered by ch 2 do. neglecting to update the evolution of polar glaciers may bias the assessment of eustatic SLR until 2100. [Thomas Vikhamar Schuler, Norway]	Taken into account - more material added
12760	0	0	0			In general, executive summary statements about future projections do not mention specific or, in many cases, even general information about future scenarios. Many long-term changes are dependent on emission scenario and I think it is a policy-relevant point that some changes may be avoided, or risks significantly reduced, under low vs high scenarios. Perhaps specific (e.g. RCP) projections are not available in all cases so maybe some language along the lines of 'heavily mitigated' or 'unmitigated' scenario can be used to distinguish projections at different emissions levels. Perhaps there is some recommendation from SR1.5 of how to do this? [Collins Matthew, UK]	Taken into account - text adjusted
12876	0	0	0			Summary for Policymakers (assuming there will be one in the final draft) should address the questions and concerns of the policymakers outside of polar and high mountain areas as to why they should care about the changes happening in the poles. [Gabrielle Dreyfus, USA]	Accepted
12878	0	0	0			Chapters 1 and 6 are optimal places to emphasize the rate of warming and the importance of slowing melting. [Gabrielle Dreyfus, USA]	Accepted. As framing chapter, chapter 1 introduces ocean warming and ice melt and what is know of their consequences until AR5. Chapter 4 assesses ice melt and its consequences while chapter 5 assesses ocean warming and its consequences. A focus on low lying islands and coasts can be found in the integrative crossx chapter box 9.

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12880	0	0	0			General (throughout all chapters): Maintain consistency with definitions of tipping elements and tipping points. Kopp R., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment; Lenton T. M., et al. (2008) Tipping elements in the Earth's climate system. [Gabrielle Dreyfus, USA]	This has been an area of climate science in which there has been much confusion about terminology. We here stick to the definitions as set out in AR5 and used in the SR15 report.
13012	0	0	0			My apologies - I've not been feeling well, so have only been able to skim. There were some typos, but I assume those will be corrected. This contains a lot of excellent discussion and results. HOWEVER, I suggest TWO CHANGES: 1) A discussion of the "Heat Engine" that drives atmospheric air flow powered by the temperature difference between Tropics and Poles. First case, it's one torus that carries air from the equator north to the Arctic and back, and a similar torus that carries air south from the equator to Antarctic and back.. But rotation of the Earth causes each torus to split into three toruses, creating two jet streams per hemisphere. As the poles warm, less energy is available to power the jet streames, causing them to slow down and wander and from their 'natural' track - creating chaos in the weather. Too Hot/Cold/Wet/Dry for extended periods. As polar ice melts (particularly in the northern hemisphere, due to increased population and industrial activity) our Global Cooling disappears - creating more chaos. Thus the critial need to ACT to mitigate this potential Mass Extinction Event (that we are doing to ourselves). 2) As the northern polar regions warm, Permafrost is beginning to melt, potentially (or certainly) adding sufficient CO2 and CH4 to the atmosphere to overwhelm our man-made Global Warming. If we don't act quickly, our opportunity to save orselves will dissappear. That will mean the (Near- or Total) Extinction of life on Earth. I appreciate the opportunity to read this report, and will not discuss it elsewhere until it's officially released. [Thomas Wood, USA]	Noted
13220	0	0	0			The numbering of sub-topics needs to be improved and be consistent. For example: In section 1.1, there are sub-topics introduced (Ocean, Cryospher) but without section numbers. In section 1.2, there are 3 sub-sections with the first sub-section numbered sub-section 1.2.1 being placed immediately after the heading. This is correct. In section 1.3, there is a paragraph of text inserted before numbered sub-section heading 1.3.1 System Changes.... This is incorrect. The first paragraph of text should be numbered as a sub-section 1.3.1, then the current 1.3.1 should be 1.3.2. [Zelina Zaiton Ibrahim, Malaysia]	Taken into account - corrected
13258	0	0	0			Generic terms used in sub-section headers in the content Chapters 2- 6, should be presented in Chapter 1 as part of overarching common concepts used in the report. Refer to comment 20. [Zelina Zaiton Ibrahim, Malaysia]	Accepted

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13260	0	0	0			The table of contents of each of the content Chapters 2 to 6 are different. That is to be expected as it is the first draft. My preference is for a table of contents similar to that of Chapter 4. I suggest that the writing team have a somewhat common structure for the content chapters especially for the main section. Also that the use of similar terms should be encouraged for consistency in the entire report. An obvious exception may be Chapter 6 on Extremes. [Zelina Zaiton Ibrahim, Malaysia]	Taken into account - Table contents somewhat adjusted
13268	0	0	0			Monitoring and evaluation of impacts/risks should be included for all of the chapters. See Comment 25. [Zelina Zaiton Ibrahim, Malaysia]	Accepted
13956	0	0	0			The report is not easy to read for a non-specialist. The authors are asked to write with a general educated audience in mind, not just climatologists / oceanographers. [Debra Roberts and Durban Team, South Africa]	Taken into account - many sections rewritten
13958	0	0	0			Specific locations or regions that are mentioned in the text should be shown on the nearest map. [Debra Roberts and Durban Team, South Africa]	Accepted
13960	0	0	0			There are too many acronyms. Some get defined and then never used again. This is a serious flaw throughout and makes it almost unreadable in places. Only retain commonly used acronyms - common in this document, and common in other research fields. All subject-specific acronyms should be removed and spelled out or circumscribed. A reader can't continuously go back to find the definition somewhere further back in the text, often multiple times in a single sentence. Just one example: Ch4-pg24-line36-51: 9 different acronyms in one paragraph! or p26-par1: ESL, SLP, RSL, MSL... this is impossible to read. [Debra Roberts and Durban Team, South Africa]	Taken into account - number of acronyms reduced
14006	0	0	0			This draft is still very imbalanced in terms of the information presented on the physical science and social science aspects related to these two systems i.e. impacts on human communities; the interaction between natural and social systems and response options. The Executive Summaries are virtually silent on the economic aspects of impact and response - a central concern in policy making. This makes it a daunting read for most policy makers and will limit its impact. [Debra Roberts and Durban Team, South Africa]	Accepted
14590	0	0	0			Since the report will be read by people from many different backgrounds, it might be useful not to peak of steric effect etc. (not defined in the report) but use systematically thermal expansion. [Christophe Deissenberg, Luxembourg]	Steric sea level rise can occur due to changes in salinity as well as temperature. The term is defined in the glossary so for these reasons, it is appropriate to use it in the main text.
15256	0	0	0			USE UNIFORM DESIGNATION UNLESS THERE IS A NEED TO DIFFERENTIATE: DEEP SEA OR DEEP OCEAN. COMPARE E.G. LINES 32 AND 37 p. 87 Ch. 5 [Christophe Deissenberg, Luxembourg]	Taken into consideration in the revision.
17164	0	0	0			There are so many definitions in both natural and social sciences in the report, especially, some key terms in social science, such as vulnerability, resilience, governance, should be properly defined. [Jiahong Wen, China]	These concepts are defined in the Glossary and care was taken to explain them more directly and explicitly.

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17322	0	0	0			Note that for all comments, I am writing as a former climate negotiator who has for the past 11 years worked in the science-policy connection between cryosphere scientists, and negotiators as well as the political level. Many of my comments are therefore aimed at ensuring clarity in conveying the research and basic messages as I have understood them from the research world. Authors should keep in mind the important timing of the SROCC as the last IPCC report to be released prior to the next round of revised NDCs in 2020, which will cover primarily the years 2020-2030 with an emphasis on 2025-2030. Editorial choices should be made in this light. [Pamela Pearson, USA]	Accepted, and this perspective factored in during the revision process
17370	0	0	0			As a coastal ecologist I would find it valuable to have more information clearly contained in coast subsections. I like the terms used in some places - "coastal ocean" and "open ocean". A critical issue for your consideration is - how to make this information more accessible to coastal managers (especially for local government and communities)? I have various suggestions about use of headings elsewhere in my comments. Thank you. [Helen Kettles, New Zealand]	Thank you. Taken into consideration in the revision
17636	0	0	0			The authors have done an excellent job of summarizing the extensive, and sometimes conflicting, literature that has appeared since the AR5. Most of my comments are of a fairly technical, specific nature and I am aware that is is the first draft so there are still parts to be completed and papers in the pipeline that will emerge soon but which have been difficult to adequately incorporate in this draft. Given the scope and nature of the SR I feel it is important that the text is balanced in its treatment of the literature and I have given some examples of where, IMO, this has not quite been achieved. Given the intended audience and the scrutiny the SR will receive I feel this an important issue. [Jonathan Bamber, UK]	Noted, and we have sought to address the specific issues identified separately.
17694	0	0	0			Reviewer wishes to express his compliments for the thoroughness and extensiveness of the report. The amount of scientific results processes is impressive. It is clear that the authors have put in a lot of effort to process this information to a basis for policy-making about this highly important subject [Hessel Voortman, Netherlands]	Noted, with thanks for the positive feedback
17696	0	0	0			Reviewer has a background of over 20 years of design of climate adaptation programs (engineering) combined with an extensive background in data analysis, uncertainty analysis and modelling. Review is hence focussed on the robustness of conclusions in view of design and decision-making [Hessel Voortman, Netherlands]	Noted

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17874	0	0	0			Congratulations to the authors on a comprehensive first draft. There are several areas for general improvement suggested to be addressed in the 2nd draft: 1) given the cross-WG author teams, this report provides an opportunity to better assess the risk from climate outcomes that are further out the tails of distributions (and correspondingly of lower confidence); 2) highlight what is notably new since the AR5 and provide clear traceability for these new findings; 3) sharpen language particularly in the ES's, e.g., avoiding words such as "substantial" that do not have a clear scientific meaning, and harmonizing across chapters; 4) ensure that the ES's accurately capture the underlying chapters. [Haroon Kheshgi, USA]	Accepted. These are useful steers, and we have factored them each into the revision process.
17912	0	0	0			I'm wondering how Loss and Damage is treated in the SROCC. I could not review all the chapters but have not seen this policy related issue somewhere explicitly mentioned. The SR1.5 has now a section on Loss & Damage. In my opinion the IPCC needs to provide evidence and an assessment, especially since Loss and Damage has become a separate line of action, anchored in the Paris Agreement. Oceans and the cryosphere are uniquely positioned to inform policymakers on this issue because these are systems highly affected by climate change, where climate change impacts are already strongly observed and have been attributed to climate change with high confidence (see AR5). [Christian Huggel, Switzerland]	Accepted. The treatment of loss and damage is now described in Chapter 1 (CCB), with callouts to the specific places in the text where the information can be found: "This report addresses loss and damage in relation to slow onset processes, including ocean changes (Section 5.4.2.3), sea level rise (Section 4.3), and glacier retreat (Section 2.3.6), and polar cryosphere changes (Section 3.4.3.3.4), as well as rapid onset hazards such as tropical cyclones (Chapter 6)."
19064	0	0	0			By focusing on oceans and cryosphere, this special report like almost no other deals with often irreversible impacts of climate change that already have or will almost certainly exceed the limits to adaptation. Massive change in marine ecosystems, mass bleaching of tropical corals, disappearing sea ice and glaciers, and rising sea levels threatening islands and low lying costs today often leave little to no room for adaptation. It is in this context of these risks that the concept of loss and damage has gained prominence in political and scientific circles (>160 papers dealing with Loss and Damage in SCOPUS listed journals as of June 29 2018). The special report on 1.5°C has included the concept and term. Clearly, a lot of additional work and clarification needs to be done for this concept to be advanced, but it seems inappropriate for this special report to ignore the issue pretty much altogether (with only one single sentence mentioning it in CC Box 1). The governmentally approved outline of the report calls for information on limits to adaptation, a concept linked to loss and damage, in Ch 01, 03,4 and 5. This has not been reflected in the outline of any of the chapters. As a suggestion, Ch 01 could include a box outlining the approach to limits to adaptation and loss and damage used throughout the report and each chapter include respective information in their ES. [Carl-Friedrich Schleussner, Germany]	Accepted. The treatment of loss and damage is now described in Chapter 1 (CCB), with callouts to the specific places in the text where the key information can be found.
18464	0	0	0			In the reference lists "et al." should be replaced by the name of the authors. [Anette Jönsson, Sweden]	Editorial; report will be copyedited before publication

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18916	0	0	0			<p>There seems to be a bit of a disconnect in this report. The changes of the physical/biological/Biogeochemical properties of the ocean (e.g. Chapter 5) are reported on the global and ocean basin scale, whereas human-ocean interaction occurs on a much smaller scale, and typically within the marginal, coast and shelf seas – and yet these are not really discussed. I feel that they should be included in this report, but if this is not possible/desirable, I think they should be at least acknowledged, perhaps as a box. I would be happy to help draft this.</p> <p>I have suggested some text (below) that could be the basis of a paragraph in chapter 5, or a box (in chapter 5?) - this is also a comment for ch5, pg 10, line 30 (below). If you think this is a valid point, I'd suggest this is expanded - again, I would be happy to help.</p> <p>Shelf and coastal seas are quasi-isolated from the open ocean by land (e.g. the Mediterranean and Baltic Seas) or ocean currents (e.g. the North West European Shelf Seas). They are often economically, environmentally and culturally important as they are typically where most human-ocean interaction occur. They account for 30% of the global oceanic production (Walsh et al. 1988; Walsh et al. 1991; Longhurst et al. 1995) and XX% of the global fisheries value despite only accounting for 8% of the global ocean area (Holt et al. 2009). They are often dominated by different processes than the open ocean, and so important aspects of coastal and shelf seas are typically poorly represented in GCMs. Their observed and projected response to climate change can be very different to the adjacent ocean. For example, in Europe, the North Sea is projected to warm more than the global average ($3.00^{\circ}\text{C} \pm 2s = 0.72^{\circ}\text{C}$ 2069-2098 relative to 1960-1989, based on SRES A1B, (Tinker et al. 2016)), whereas the adjacent wider North Atlantic is projected to warm less than the global mean. (Menary and Wood 2018). Care must be taken when interpreting the oceanic scale changes into the local shelf and coastal sea.</p> <p>Holt, J., Harle, J., Proctor, R., Michel, S., Ashworth, M., Batstone, C., Allen, I., Holmes, R., Smyth, T., Haines, K., Bretherton, D. and Smith, G. (2009). "Modelling the global coastal ocean." <i>Philosophical Transactions of the Royal Society a-Mathematical Physical and Engineering Sciences</i> 367(1890): 939-951 10.1098/rsta.2008.0210.</p> <p>Longhurst, A., Sathyendranath, S., Platt, T. and Caverhill, C. (1995). "An estimate of global primary production in the ocean from satellite radiometer data." <i>Journal of Plankton Research</i> 17(1245-1271) doi:10.1093/plankt/17.6.1245.</p> <p>Menary, M. B. and Wood, R. (2018). "An anatomy of the projected North Atlantic warming hole in CMIP5 models." <i>Climate Dynamics</i> 50(7-8): 3063-3080 https://doi.org/10.1007/s00382-017-3793-8.</p> <p>Tinker, J., Lowe, J., Pardaens, A., Holt, J. and Barciela, R. (2016). "Uncertainty in climate projections for the 21st century northwest European shelf seas." <i>Progress In Oceanography</i> 10.1016/j.pocean.2016.09.003.</p> <p>Walsh, J. J., Biscaye, P. E. and Csanady, G. T. (1988). "The 1983–1984 shelf edge exchange processes (SEEP)-I experiment: hypotheses and highlights." <i>Continental Shelf Research</i> 8: 435-456 doi:10.1016/0278-4343(88)90063-5.</p> <p>Walsh, J. J., Biscaye, P. E. and Csanady, G. T. (1991). "Importance of continental margins in the marine biogeochemical cycling of carbon and nitrogen." <i>Nature</i> 359: 53-59 doi:10.1038/350053a0. [Jonathan Tinker, UK]</p>	Thank you for the suggestions. The author team decided not to assess
21298	0	0	0			<p>Given their extensive use throughout the report, the notions of 'risk' and 'vulnerability' need to be explained a little more. The concept of 'resilience' has been explained at some length. [Sanjay Chaturvedi, India]</p>	These three concepts are defined in the Glossary and care was taken to explain them more directly and explicitly.

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21304	0	0	0			May be the concept of 'tipping points' could be explained more directly and explicitly. [Sanjay Chaturvedi, India]	Definition for tipping points has been included in the Glossary and care was taken to explain it more directly and explicitly.
21394	0	0	0			According to IPCC principles and procedures, the report should focus on understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. It is not the role of IPCC authors or assessment reports to opine on the need or mandate for existing, pending, or proposed international governance frameworks. In particular the report should refrain from characterizing the Paris Agreement and its goals. [Alice Alpert, USA]	onset hazards such as tropical cyclones (Chapter 6)."
21396	0	0	0			The report should limit its scope to the topics described in the outline as approved by the IPCC panel at its 45th session. [Alice Alpert, USA]	Accepted; the revision has been careful to adhere to the mandate
22520	0	0	0	0	0	A grave error has been detected in the definition of temperature feedback. After correction of the error, Charney sensitivity, hitherto on the interval [1.5, 4.5] K with some authors suggesting up to 10 K, falls to 1.15 [1.1, 1.25] K. Since it does not seem possible to describe the error in detail here, or to attach documents, the team producing the present Special Report are requested to contact the IPCC Secretariat, to which a letter has been sent describing and formally demonstrating the error and the magnitude of its influence on deriving equilibrium sensitivities. The error is large enough to call into question the entire basis for the Special Report - and, indeed, for all IPCC reports. In the circumstances, detailed review of the present draft of the Special Report is inappropriate. Therefore, this is the present reviewer's sole comment on the Special Report. [Viscount Monckton Of Brenchley, UK]	Thank you for your comment. Please note that the letter referred to in comment has not been received at the IPCC Secretariat.
23016	0	0	0	0		While the overall report is slowly taking good shape, the quality of the chapters differs substantially. Some of them (e.g., chapter 5) are very far from where they need to be. [Nicolas Gruber, Switzerland]	Noted.
23018	0	0	0	0		One of the fundamental challenges that have come to the forefront here is the limited expertise of the (C)LA s. For many issues, there is only one person on the team knowledgeable enough to write the corresponding section. Most of the time, this is not a problem. But in a few cases, this author has provided a rather unreflected and sometimes even biased view of the topic. Given the lack of counter-expertise in the team, this remained unchecked in the drafting phase, so that the FOD contains some sections that are ill researched, one-sided, and sometimes plain wrong. Contributing authors could help to alleviate this problem. But apparently, this was used not sufficiently enough (yet). [Nicolas Gruber, Switzerland]	Noted.
23020	0	0	0	0		Much work still needs to be done in order to analyze, understand, and make consistent issues that cross the individual chapters. There are redundancies, but also gaps. Just one example: Sea-level change is, of course, a source of major concern and assessed in its own chapter. But the implications of this sea-level change for the other parts of the system is only partially considered, e.g., in terms of ecosystem impact (coral reefs, mangroves), potential for blue carbon storage, etc. [Nicolas Gruber, Switzerland]	Chapter 4 now has a detailed assessment of the impacts of sea level change on many systems. Systems were chosen based on importance (e.g., to human welfare, iconic and ecological value) and sufficiency of information but a comprehensive analysis of all ecosystems affected by sea level rise is not feasible. See also discussion in Ch6. In Ch5, sea level rise is a main hazards for coastal ecosystems and thus its observed impacts and future risks are assessed as part of that chapters narrative.
23100	0	0	0			very good work ! [Jacques Beall, France]	thank you.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23144	0	0	0			Standardize "time-scale" vs "timescale". [Aimé Fournier, USA]	editorial decision to be made in final text.
23242	0	0	0			This Special Report (SR) provides a timely and important update of the scientific synthesis and knowledge on ocean and cryosphere in a changing climate. Importantly it allocates substantial length to the discussion of adaptation to the coastal climate impacts from both technical and societal context. As such I applaud the Working Group's effort in putting this SR together. [Y. Jeffrey Yang, USA]	thank you.
23244	0	0	0			I understand the limitation and difficulty in summarizing a wealth of research on such a broad and complicated subject into a manageable size of IPCC report. I also think there are several places where revision or improvement could be done, perhaps in follow-up reports if not here in this SR. My suggestions pertain to Chapter One "Framing and Context of the Report" and Chapter Five. They are described below as general comments, and specific comments to specific report section or report illustrations. Nevertheless, I think this is an important document for the complex yet important topic. [Y. Jeffrey Yang, USA]	Noted.
23246	0	0	0			For the most part, the report is focused on physical hazards in coastal zones due to changes in SLR, storm surge, coastal flooding. Other impacts on water quality and water resources, often in large scales affecting adaptation options, are only customarily mentioned. Examples include salt water intrusions to surface water ways and portable groundwater aquifers, which are referred to salinization in loose definition broadly in the Chapter 5. This treatment is not unexpected; however, it would help report's clarity by framing the topic focus in Chapter 1, explicitly. The same for ecological services in coastal wetland systems, etc. A wealth of data and information on the impacts and adaptation of coastal ecosystems such as USGCRP's SAP4.4 report (2010) and those research afterwards on the topic are not discussed or mentioned. [Y. Jeffrey Yang, USA]	Given space limits, comprehensive assessment of all impacts was not feasible.
23248	0	0	0			The report describes current advances in scientific knowledge on the status and projection of cryosphere elements (ice shields, high altitude glaciers, etc.), and related oceanic circulations. It appears to me that the review and synthesis could be more constructive when the advances since AR4 are summarized in context of previous understanding and the then-identified significant but uncertain global and regional/local climate and oceanic processes. Examples include the potential effects of more freshwater flux from middle altitude continents on oceanic circulation, the Antarctic overturning, the methane and geochemical processes affecting oceanic geochemistry. [Y. Jeffrey Yang, USA]	Taken into consideration in the revision

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23250	0	0	0			The discussion on coastal adaptation is a bright spot of this SR. Some details and structured categorization of adaptive actions, either from governance or technical actions, are provided. One important subject - coastal urban water infrastructure, however, is not given its desired attention. Many coastal cities, such as New York city, Shanghai, Miami, are experiencing difficulties in managing storm water and other infrastructure because of the changing hydraulics and hydrology in response to SLR and particularly during storm surge related ESLs. The same is true for important topics such as coastal erosion and adaptation as widely practiced. If these infrastructure-related topics are not suitable for this SR, I would suggest IPCC WGs to cover the topics in a later report. [Y. Jeffrey Yang, USA]	Thank you for the general suggestion. Protective infrastructure solutions are now dealt with in great detail in Chapter 4 and problems arising in NYC, Miami, and other cities are discussed. However, impacts to specific infrastructure systems (e.g., subways) are only discussed in a limited way due to space considerations.
23252	0	0	0			Editorial quality and consistency. This SR appears to be assembled from contribution by various authors. There is a lack of consistent editorial quality through out the report. More importantly, Chapter One provides a clear definition of terminology such as the time periods: 1986-2005 (recent past), 2005-2015 (present day) [See p.1-29, Chapter One]. This definition is constructive; however, the usage of terminology needs to be checked cross the chapters. [Y. Jeffrey Yang, USA]	Thank you for this comment. Consistency will be improved further at the editorial stage.
23254	0	0	0			Semantically, the use of "climate change" is not consistent among chapters. For example, "climate change" in Chapter One appears to be the changes in global temperature (due to GHG and solar radiation) that impacts and affects other Earth systems, including ocean and cryosphere. In Chapter Five, it appears that the term includes an assemble of major changes such as SLR and storm surge. See Chapter 5, P.4-10, Line 3-4. [Y. Jeffrey Yang, USA]	To be taken into account.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23528	0	0	0			<p>Congratulations for a well developed First Order Draft. I have the following recommendations throughout all chapters : (1) report more explicitly what is new since the AR5 and which findings of the AR5 have been confirmed or challenged / revisited based on the literature assessment ; (2) use the calibrated uncertainty language IN EACH SECTION of the report and report uncertainty / confidence in figures and tables (this is an important gap in the FOD); (3) strengthen the assessment by reducing the length of chapters (they are already 15-50% over the target length) and avoiding a tendency for a "text book" approach in several sections and figures (e.g. conceptual figures rather than the framing or outcome of the assessment); (4) have a more rigorous use of key IPCC concepts (e.g. impact / risk); (5) when reporting numbers, indicate associated error bars; when assessing specific topics (e.g. blue carbon), provide a quantitative assessment (in this case, mitigation potential) and associated uncertainty; (6) when reviewing detection and attribution studies, assess the underlying methodologies; (7) avoid being policy prescriptive or interpreting the Paris Agreement; some sections are at the limit of advocacy; others are written more like a policy brief than an assessment; (8) add a final section in each chapter on key uncertainties and knowledge gaps; (9) improve the coherency/ visibility across chapters for the treatment of e.g. sustainable development goals; climate resilient development pathways; human health; education; insights from past climates (timescales, lessons learnt); economy; limits to adaptive capacities and residual risk (linked to loss and damage) ; (10) The issue of model evaluation (including model fit for purpose and confidence in projections) should be carefully discussed across chapters; (11) Make sure that the selection of Contributing Authors considers the full wealth of available expertise (e.g. regional diversity, female authors). [Valerie Masson-Delmotte, France]</p>	Thank you for positive feedback. All the comments to be taken into account.
24288	0	0	0			SR15 should be cited wherever appropriate [Hans-Otto Poertner and WGII TSU, Germany]	Chapter 4 has increased its citations of SR1.5
24476	0	0	0			I would suggest not to use "AR5" to mark a certain point of time in the past when speaking about the actual changes in nature or climate. In my opinion, "since AR5" should only be used when changes in scientific knowledge are addressed. [Hans-Otto Poertner and WGII TSU, Germany]	Chapter 4 uses "AR5" to begin sentences about the timing of scientific developments.
24478	0	0	0			I strongly suggest to use less technical language in Executive Summaries and to bear in mind that some phrases and terms may not be understood in the correct scientific sense by non-experts (e.g. "primary productivity") or have a different connotation (e.g. "positive feedback"). [Hans-Otto Poertner and WGII TSU, Germany]	To be taken into account.
24480	0	0	0			Suggest put a stronger focus on consequences of climate change for society and economy as well as options for successful adaptation in the Executive Summaries. [Hans-Otto Poertner and WGII TSU, Germany]	Chapter 4 emphasizes socioeconomic consequences adaptation at various levels
24490	0	0	0			Spell out acronyms when they are used for the first time in a chapter or a figure and add the acronym in brackets, e.g. "El Niño-Southern Oscillation (ENSO)" [Hans-Otto Poertner and WGII TSU, Germany]	Accepted and edited

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24494	0	0	0			Please keep considering relevant literature about 1.5 and 2 degrees warming until the cut-off date for accepted papers (15 May 2019) to highlight the relevance of the SROCC for policy decisions in the context of the Paris Agreement. Please also try to point out how RCPs used in the SROCC assessments relate to the 1.5/2 degrees limit as well as the NDCs. This is especially important for the Executive Summaries and SPM. RCPs need to be introduced either in a footnote or referred to Glossary. [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account in the revision.
24506	0	0	0			Suggest to use "the ocean" in the singular form consistently throughout the report. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted.
24516	0	0	0			Please ensure consistent use of the concept and phrasing of ecosystem services. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted.
24520	0	0	0			Executive Summaries and the SPM that will be developed from them will be understood more easily if each paragraph start with one sentence that summarises its respective key message. As the first sentence may be quoted out of context (like a headline statement), it helps if all relevant aspects of the paragraph are mentioned clearly. To avoid lengthy and complex sentences, give preference to policy-relevant aspects. [Hans-Otto Poertner and WGII TSU, Germany]	Noted and taken into account
24522	0	0	0			Please add a title and a legend to each figure in the SOD. Legends should describe what is to be seen in the figure and what kind of results can be concluded from it. Symbols, patterns, lines, colours, abbreviations, scale bars and error bars should be explained in the legend and all abbreviations spelled out in the figure itself as well. For complex figures, I suggest to "read out" processes or conclusions step by step. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24524	0	0	0			Please harmonise the style of figures that address similar processes or characteristics. Please also consider merging similar figures or dropping one to favour another if messages overlap (e.g. for sea level rise, ice cliff stability, marine legal zones, distribution of mangroves (5.11) and sea grass meadows (5.16)). [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24526	0	0	0			Please harmonise the colour bars that indicate changes e.g. for temperature or decrease/increase in general for all figures across chapters and adjust to readers with colour vision deficiency or colour blindness. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24528	0	0	0			Please try to illustrate processes and changes, especially future developments or outcomes of the assessment in figures instead of depicting the current situation. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24530	0	0	0			Please clarify if "corals" refers to warm- and/or cold-water species. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
24566	0	0	0			Linking observation of physical change to observations of impacts would also provide a basis for developing a clear cause and effect, mechanism-based or process understanding (supporting detection and attribution across disciplines), enhancing confidence in relevant projections, beyond the extrapolation from empirical observations. This is relevant for ecosystems and human systems. Much more integration is needed. At the moment sections on physical changes and impacts stand side by side and are disconnected in most cases. Disciplinary discussions that have no connection but only provide some context should be moved to OSM. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24570	0	0	0			In the report, there should be sufficient emphasis on ambitious mitigation scenarios, in line with the Paris agreement. Non-linearities ("tipping points") should be identified. Cross-reference to 1.5 report may be useful. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24572	0	0	0			Biodiversity consequences of climate change are poorly developed in chapters 2,3,6 which is surprising as biodiversity loss is considered one of the major challenges for human well-being. Interaction of multiple factors is needed and and assessment of the biodiversity impact of the degree of climate change, e.g. in comparison to paleo-events. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted and highlighted biodiversity impacts in the revision.
24578	0	0	0			Executive summaries should seek to convey more specific messages with illustrative detail that capture the attention of the policymakers and have the potential to support the SPM. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24582	0	0	0			Chapter authors should consider that all authors have full responsibility for the full chapter, this will help integration across disciplines. [Hans-Otto Poertner and WGII TSU, Germany]	Taken into consideration
24584	0	0	0			The report is an assessment of current knowledge, this aspect needs to be strengthened. The focus on climate change needs to be the guiding principle across all sectors and in all chapters. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24586	0	0	0			Take AR5 as a starting point, for traceability with specific references to AR5 sections, suggest to avoid simply saying "since AR5". [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
24616	0	0	0			Chapters should provide an assessment of quantifiable risk and how it can reduced by adaptation, building on the AR5 (e.g. risk bars or burning ember diagrams developed for specific sectors beyond the 5 Reasons for Concern, s. AR5SYR). [Hans-Otto Poertner and WGII TSU, Germany]	This has been done in some chapters and SPM where relevant information was assessed
24680	0	0	0			The number of subsections and numbers should be limited to a maximum of 4 if at all possible. [Hans-Otto Poertner and WGII TSU, Germany]	Noted
24682	0	0	0			Concepts associated with SDGs, human health, economics, loss and damage, resilience, limits to adaptation should be picked up by chapter 1 and considered across the report. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: text changed in the SOD
20602	0	1	0	88		Dear authors, thank you writing very nice report. Overall it covers most of the topics, there are few palce which need a bit modiciations. I have provided my coments Chapterwise below. [Pushp Raj Tiwari, UK]	Noted
10274	0	1	1	300	70	Standardize all uses of 'decision-making' to include a hyphen. [APECS Group Review, Germany]	Noted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
24686	0	1	1	67	3	Overall comments: This First Order Draft of the IPCC Special Report on Ocean and Cryosphere is in surprisingly good shape for a First Order Draft. The lead authors should be particularly commended for such a strong draft at this stage. The comments below are intended to be helpful and none of the comments indicate a problem so strong as to prevent publication. [Elizabeth Weatherhead, USA]	Noted
24690	0	1	1	67	3	The parts on Indigenous Knowledge could be improved in both style and references. I try to offer more clear suggestions in that area. [Elizabeth Weatherhead, USA]	Noted with thanks
1926	0	1	40	1	40	As a CA in section 2.2.3, Glaciers, I have not commented on that section (G. Cogley). [J. Graham Cogley, Canada]	Noted
1930	0	3	6	3	6	Change "altitude levels" to "altitudes" throughout the report. Same for "outmigration", the correct English word being "emigration", and for "overall" (delete altogether). [J. Graham Cogley, Canada]	Noted
13222	0	5	0	32		General comment on overall structure of the whole report, however, the suggestion is that the main editing will be in how Chapter 1 is presented. Chapter 1 outlines the structure of Special Report (SR) and will be an important introduction to the concepts and information to be presented. I feel that it can be improved by some reorganization of the material and clarification of the context and concepts by an additional figure: 1. A figure of the overarching framework of the SR, placed at the very beginning of the chapter, under section 1.1 would be useful. This may be placed in section 1.1. 2. The use of the terms in section headings should be reiterated in this framework figure for consistency and to link the sections back to the framework. [Zelina Zaiton Ibrahim, Malaysia]	Noted. Chapter 1 presents the outline and overarching framework.
6558	0	6	42	6	54	Will the terms ice sheet, ice cap, and glacier be defined in a glossary? If not, then I recommend revising this section to give a clearer picture of how all three are defined in relation to one another. Are they all formed by the same process? In particular, the difference between a glacier and an ice cap is not clearly described. I think this is important because the terms come up repeatedly in later sections. [APECS Group Review, Germany]	Noted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12232	0	11	7	11	28	There is a huge gap in the chapter caused by lack of data and analysis on the effects of other chemical agents known to erode deeply, some worse than CO2, the chemical and physical properties of seawaters besides the popular CO2. Few among such agents are heavy metals (in particulate or ionic forms), pesticides, plastics, fungicides, organic compounds and derivatives. Many of them come from the ocean economies. Examples include metallic compounds from deep-sea mining, and mine exploration, organic compounds and derivatives from oil and gas exploitation/exploration/processing and seaports daily activities. It is not unreasonable to argue, that large amounts of the latter can 1) reduce significantly oceans' abilities to absorb anthropomorphic CO2 emissions, 2) distort exchanges between oceans, cryosphere and atmosphere, 3) sway climate change to some extents, and 4) disturb growth both in the mainstream and in ocean economies. An analysis and discussion on how these changes are affecting Northern and Southern oceans and, particularly the related threats on the informal economies in the developing countries endowed with mineral resources is a big gap worth addressing. [Louis Mitondo Lubango, Ethiopia]	Thank you for the suggestion. There is a section on interaction between climate change and pollution in the ocean with examples of heavy metals etc (see section 5.4.2).
12522	0	33	36	33	57	After the discussion of resilience the chapter moves on to discuss climate resilient development pathways (CRDPs). It is implicit here that CRDPs build upon the notion of resilience as previously introduced, but is this the case in reality? That is, does the CRDPs literature actually engage and build upon the resilience concept? from what i have read, it seems that much of this work is rooted in international development and human geography and is more based on vulnerability concepts and ideas than resilience, with resilience here viewed more as an antonym of vulnerability as opposed to a way of studying change. [James Ford, Canada]	Accepted and text modified accordingly.
10434	0	37	31	37	32	"the Coast, the Ocean and the Cryosphere" - Capitalization is inconsistent. [APECS Group Review, Germany]	Accepted and text modified accordingly.
10712	0	61	39	61	56	Please add some information about long-term underground fires in peatlands, which can not stop many years. This is the case for peatlands under boreal forests in Europe, which were dried for agriculture use decades years ago. Wetlands International conducts projects on watering back such peatlands in Belarus and Russia [Oxana Lipka, Russian Federation]	Noted
10758	0	101	52	102	6	It would be benefit to merge this section (4.4.6.3.3) and the former one (4.4.6.3.2) in a single section... [Jacques Andre Ndione, Senegal]	Noted