Comment ID	From Page	From Line	To Page	To Line	Comment	Response
7714	0	0	0	0	The authors have obviously invested considerable time in preparing WG! AR6, and their work is greatly appreciated. While most of the report is generally well composed, these concerns stand out in order of priority: (1) This draft has very little information about the role of water vapour as the leading greenhouse gas, a fact that is clearly stated throughout the literature and in AR5, which I also reviewed. Especially troubling is the absence of any information about research that either shows the absence of trends or declining trends in global total column water vapour. This is very troubling, because water vapour plays the key role in CO2 forcing. The IPCC guidelines require that assessments be: "comprehensive, objective, open and transparent." The NVAP-M paper (citation below) is a classic paper in this regard, for the author's report an increase in global total column water vapour from 1989 to 1998 and a decline from 1998 to 2010 (the 29.3-year time series at my surface site yields a similar outline as the NASA-sponsored NVAP-M program with an overall decline of 0.5 mm/decade; 30-year paper in preparation). The authors are reminded about NVAP-M below, and I will also express my concerns to IPCC leadership about what appears to be a biased view against the enormously important role played by water vapor. [Forrest Mims, United States of America]	Taken into account in the SOD. Chapter 2 assesses observed changes in the surface humidity and total column water vapour. Chapter 3 assesses the detection and attribution of the observed changes in atmospheric water vapor and surface humidity. Water vapour feedback and radiative forcing are assessed in Chapter 7. Water vapour and its transport are assessed in Chapter 8.
7716	0	0	0	0	(2) Some of the FAQs in AR6 are of minimal general interest. Please consider adding some of the excellent FAQs in AR5, including the one that explains the misnomer "greenhouse gas" and the one about water vapour's role as the leading greenhouse gas. Perhaps the latter FAQ could be expanded to include the famous quotation by John Tyndall, who wrote in 1863 that water vapour: "…is a blanket more necessary to the vegetable life of England than clothing is to man. Remove for a single summer-night the aqueous vapour from the air … and the sun would rise upon an island held fast in the iron grip of frost." (John Tyndall. On radiation through the Earth's atmosphere. Philosophical Mag. 1863, 4 (25), pp. 200–206.) (3) First use of obscure jargon and puzzling initials should be defined/explained in parentheses. (4) All references to "carbon emissions" should be replaced by "CO2 emissions" or "carbon dioxide emissions." (Some chapters use the incorrect phrase many times and other chapters mix both correct terms when the consistent use of one or the other is best.) [Forrest Mims, United States of America]	(2) Rejected Chapter 1 discusses water vapour as a dominant GHG and refers to the pioneering work of Tyndal (1861). Chapter 7 provides a detailed assessment of water vapour feedback mechanism. Water vapor changes are also assessed in other chapters (e.g., 2, 3, 4, 8, 11). The AR5 FAQ which discusses water vapour as a dominant GHG is very informative and there was a decision to focus the FAQs in AR6 on more novel topics. (3) accepted. the use of jargon is avoided as much as possible and acronyms are defined when they are used for the 1st time. (4) Rejected. Some FAQs talk about GHG more broadly than only CO2 emissions but an effort has been taken to be clearer in the next draft.
28814	0	0	0	0	Radiative forcing is used to mean effective radiative forcing in different many chapters and ERF and RF are both used as abbreviations. I suggest we try and only use ERF as an abbreviation and never RF unless we really do mean stratospherically adjusted radiative forcing or instantaenous forcing... [Piers Piers Forster, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. We use ERF when we need to be explicit
55468	0	0	0	0	Overall, several of the chapters are very long and very dense. While I have a background in the topic and the IPCC process, I found entire sections very hard to read. I think an open discussion to who the readership should be and what background these people have would benefit the overall ability of the reader to digest the information. [Daniela Schmidt, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Agreed that long and dense chapters make it hard to read. In the SOD, Chapters 2, 3, 8 and 9 have reduced chapter length. Length of SOD Ch8 is exactly equal to the IPCC allotted page length of 80 pages. SOD of Chapters 1, 4, 5 and 6 moderately exceed the page limit (< 5 pages). The SOD of Chapters 7, 10, 11, 12 and Atlas are excessively long (> 9 pages of the page limit) but will strive to reduce their FGD to their allotted page limit.
35260	0	0	0	0	In some cases, the "CE" suffix is provided when referring to years (e.g. when dealing with "pre-industrial baselines"), but in other parts of the report this suffix is simply ignored. SO, I suggest homogenizing that, especially because the scale of chronologies could change from Ka (Kilo year -with ou without BP at the end) to BCE and then to CE when talking about changes in the deep-time (thousands of years) and about recent centuries. For instance, see the Cross-Chapter Box 1.3, where several chronological units are clarified, but in the rest of the chapter this effort is simply ignored. I insist in this, because except for the paleo community, most scientist are not familiar with these chronological terminologies (neither policy makers or general public). [eugenia gayo, Chile]	Taken into account. The new cross-chapter box 2.1 is an attempt to enforce a greater degree of homogeneity.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
25554	0	0	0	0	At first use and subsequently as necessary the term "equilibrium climate sensitivity", should be qualified as actually denoting a steady state, noting that the term "equilibrium" sees widespread use and is used herein. [Stephen E Schwartz, United States of America]	Accepted. Term clarified as the equilibrium response
25556	0	0	0	0	state once and for all that uncertainty ranges given in sq brackets denote 5-95% range; don't repeat at each use. Something like "1.1 °C [0.9 to 1.3 °C 5% to 95% range]" is very cumbersome repeated over and over. Better "1.1 [0.9, 1.3] ˚C" or "1.1 [± 0.2] ˚C". [Stephen E Schwartz, United States of America]	Rejected. The report will not be read in its entirety by most readers. As such, a degree of repetition on certain topics that aid understandability is needed.
25558	0	0	0	0	Whenever there is a time series presented in a figure such as temp anomaly, Figure 2.12, or forcings in Figure 7.15, please provide that time series in an annex to the report. [Stephen E Schwartz, United States of America]	Accepted. An ongoing process for data curation is in progress and involves archival of input datasets, codes, and final datasets. Specific information on each figure is documented in the data table found in the supplementary material of each chapter.
25560	0	0	0	0	When referring to atmospheric abundance of ghg's use mole fraction or mixing ratio not concentration. I am pleased to see this usage at Figure 2.4. Contrast Page 2-5, line 7 "concentrations of CO2". I recognize that concentration is common parlance; so perhaps at first use in a given chapter qualify that by something like mole fraction (conventionally referred to as concentration). But concentration denotes amount per volume, which changes with changing pressure, whereas mixing ratio is insensitive to that and thus to be preferred. [Stephen E Schwartz, United States of America]	Taken into account. There was significant and sustained discussion around this topic in the preparation of the SOD. The challenge is that what is measured / available from proxies / modelled differs and the measures while similar are not directly equivalent.
25562	0	0	0	0	When presenting latitude dependence of a quantity in a figure such as 2.29, 5.24, I suggest that you present as a function of sine(latitude) or better give latitude on a sine scale, to avoid visually overemphasizing the polar regions and to permit integration (by eyeball or numerically) and certainly for variables as a function of latitude, please present these in tabular form as well. [Stephen E Schwartz, United States of America]	Taken into account. Efforts have been made across all figures to be more consistent with the style guide in SOD.
15324	0	0	0	0	I highly recommend the inclusion of a glossary in each chapter of the report that explains all key terminology in the chapter so that lay people have a better chance of understanding and interpreting the reports' contents, e.g. radiative forcing, diurnal temperature range, ppm, etc. [Lia Cairone, United States of America]	Noted. A glossary is included as an annex for the entire report.
25564	0	0	0	0	Throughout: Suggest avoid first person plural. Inevitably ambiguous. "What have we learned?" [p. 7-114, line 3] Who has learned? The authors? the scientific community? The inhabitants of Earth? Better "What has been learned?" or even better "What are findings?" Shifting references: "and simulated well enough to enable us to narrow the range of possible cloud feedbacks and cloud responses to aerosol changes, which will ultimately help us better constrain future projections of climate" [p. 7-115, lines 32-34 vs "our emissions of polluting gases such as sulphur dioxide and particles enhance"; [same para, p. 7-115, line 36.] "scientists are hungry and we have much better nutcrackers" [same para, line 38] [Stephen E Schwartz, United States of America]	Accepted. Third person avoided as much as possible
25566	0	0	0	0	Climate Sensitivity. I continue to advocate use of systematic units for this quantity, K/(W m-2). This is supported herein by Figure 7.8, which shows sensitivity to different forcing agents to be nearly the same. The unit K/ (W m-2), or equivalently K W-1 m2, facilitates communication across disciplines and is gaining some traction in the paleo community, e.g.,Kohler et al (2017). Köhler, P., Stap, L. B., von der Heydt, A. S., de Boer, B., van deWal, R. S. W., & Bloch-Johnson, J. (2017). A state-dependent quantification of climate sensitivity based on paleodata of the last 2.1 million years. Paleoceanography, 32, 1102–1114. https://doi.org/10.1002/2017PA003190 . In order to make the transition, I propose use of double set of units with specified F_2x (4 .0 W m-2) throughout the report. The UK educated the general public to transition from degrees F to degrees C. IPCC should do no less. [Stephen E Schwartz, United States of America]	Taken into account. We have tried to use consistent units as much as possible, while following the guidelines provided by the TSU. Please note that this is an editorial issue that will be checked and fixed during the production of the report
15330	0	0	0	0	Suggest including a table that describes 'confidence levels' used in the report, e.g. "likely," "high confidence", etc, and their associated probabilities at the ouset of each chapter as a reminder for readers not accustomed to IPCC-speak. [Lia Cairone, United States of America]	Taken into account. Please see Box 1.1 in Chapter 1.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
15344	0	0	0	0	Ensure all graphs are high resolution so that they can be exported and used in a variety of communications tools. [Lia Cairone, United States of America]	Noted. The quality of the figures has decreased during the compilation of the FOD, to keep the size of the chapter file to an acceptable level. Published report figures will be of high quality and available for download on the IPCC website.
15346	0	0	0	0	Consider hiring a graphic designer to translate scientific charts into charts that are easier to interpret and understand by laypeople. [Lia Cairone, United States of America]	Taken into account. Authors are working in collaboration with the communication officer from the TSU to improve the readability of the figures. Additionally, the figures from the FAQs and SPM are co-produced by graphics designers, scientist and the TSU.
27646	0	0	0	0	et al in italics, bibliographical citations in chronological order. [Poot Delgado Carlos Antonio, Mexico]	Editorial. Please note that the final report will undergo a professional copy-edit before publication. This sort of issue will be fixed then.
9634	0		0		Please clarify which measure to be used for past temperature increase, GMST or SAT throughout AR6/WG1 and explain the reason why. This point should be explained also in SPM, though it is not ready yet. [Mitsutsune Yamaguchi, Japan]	Taken into account. This is covered in CC-Box 2.3, and discussed throughout the report.
24228	0			10	The immediate feeling of the average reviewer after having downloaded the FOD elements may well be: how big this is! How is this enormous work going to be used? The policymakers will of course stay with the SPM, The people in the press and media will look for summaries; in addition to the SPM, they will find plenty of them, both opening each chapter and closing in many cases sections within chapters. Some among these partial summaries are by the way quite good and useful. Then one is left with the question: who is going to use and read the full report? [philippe waldteufel, France]	Noted. Thank you for the comments. It is indeed a challenge to achieve overall consistency and accessibility across such a massive scope and amount of literature to be assessed. The outline of each report is set at a scoping meeting, and given to the author teams to complete. We strive to achieve overall consistency and unified messages, but must also ensure the rigor of each individual assessment. This has led to the evolution of the current structure, which is at least somewhat different to the previous Assessment Reports - partly to answer the issues you bring up here.
24230	0			11	Undoubtedly, this matter has been discussed inside the IPCC; hence I suggest that the report includes a few indications reflecting these thoughts. In my mind, the text should first play a role as a reference document, to be consulted occasionnally by people who do not necessarily want to read it but need accurate information on the state of things and knowledge concerning climate. In addition, a fair chance should be given to candidate readers, i.e. people who have adequate scientific awareness and are interested in climate. [philippe waldteufel, France]	Noted. Thank you for the comments. It is indeed a challenge to achieve overall consistency and accessibility across such a massive scope and amount of literature to be assessed. The outline of each report is set at a scoping meeting, and given to the author teams to complete. We strive to achieve overall consistency and unified messages, but must also ensure the rigor of each individual assessment. This has led to the evolution of the current structure, which is at least somewhat different to the previous Assessment Reports - partly to answer the issues you bring up here.
24232	0			12	This brings me to the way the chapters are related to each other. In some cases, a trend can be detected to draft chapters in such a way they are able to stand on their own. I would plaid personnally in favour of the oppposite strategy: privilege the overall consistency, make as much use as possible of cross references between chapters. This would also help to remove some redundancies and bring somewhat down the size of the document. [philippe waldteufel, France]	Noted. Thank you for the comments. It is indeed a challenge to achieve overall consistency and accessibility across such a massive scope and amount of literature to be assessed. The outline of each report is set at a scoping meeting, and given to the author teams to complete. We strive to achieve overall consistency and unified messages, but must also ensure the rigor of each individual assessment. This has led to the evolution of the current structure, which is at least somewhat different to the previous Assessment Reports - partly to answer the issues you bring up here.
24244	0			20	Concerning high resolution modelling, a paragraph dedicated to expected added values (8.5.1.2.1) is found in chapter 8. To the zeroth order this makes sense, inasmuch as this chapter contains indeed the largest number of mentions of high resolution modelling, in at least 8 separate sections. [philippe waldteufel, France]	Noted with thanks. The SOD includes an improved and more complete assessment about high resolution global climate models in 8.5.1.2.1

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
24246	0			21	At the same time, mentions are also found in chapters 1, 3 (for oceans and land surfaces), 5 (for inverse modelling), 6 (for megacities), 7 (for cloud resolving models), 9 (for ocean fluxes, coastal oceans...), 10 (for regional modelling). Even this broad presence of the high resolution modelling issue over the whole front of climate change work deserves an assessment! And logically an effort to ensure consistency across the chapters. [philippe waldteufel, France]	Noted with thanks. Indeed high resolution modelling is important for a diverse range of climate change studies involving the different components of the Earth system (e.g., oceans, land surfaces, clouds). For instance the focus in 8.5.1.2.1 is on high resolution modelling which is of relevance, particularly to precipitation and circulation aspects of the water cycle.
24248	0			30	The word "bias" is probably one of the most often quoted in the report.Considering only the case of models, biases are mentioned many times in chapters 3, 7, 8, 9, 10, for all kind of components of the climate system, quantities and phenomena. Chapter 10 discusses specifically bias adjustment and includes a dedicated box (10.2). Later on, the Atlas features some maps built using particular bias-correction methods, which are explicited in Annex VII. [philippe waldteufel, France]	Noted.
24250	0			31	It is not easy on the basis of this rather scattered information to reach definite opinions. Obviously model biases are a problem far from being solved. Is it a major one? For which cases (looking at figure Atlas.20 biases seem quite relevant for extremes) ? Are they features which make the model bias issue for climate different from the case of GCM for numerical weather prediction? What are the major causes for climate model biases? How do the magnitude of biases compare with the spread of model outputs? [philippe waldteufel, France]	Taken into account. Fitness for purpose is evaluated across the report where models are applied. Chapter 3 includes more assessment of CMIP6 model biases in the SOD than the FOD, and considers implications for attribution across large-scale climate indicators. In some cases, biases limit confidence in attribution assessments.
24252	0			32	When combining the summary with the knowledge gap section of chapter 6, it sounds like we know very little; Indeed the "low confidence" and "medium confidence" appreciations dominate. Since the knowledge gap section repeats (after the summary) that SLCF changes fed by LULCC account for up to 45% of anthropogenic global warming, one wonders how it is possible, on the basis of the remaining 55%, to reach robust conclusion. At the same time, the summary of chapter 3 for example presents a convincing list of such robust conclusions. How are these contradictories pictures to be reconciled? [philippe waldteufel, France]	Executive summary has been totally rewritten and the knowledge gaps section has been removed.
51970	0				There is ostensibly too much overlap in the consideration of methane between chapters 5 and 6 which needs to be resolved. The assessment doesn't seem inconsistent per se but rather it feels very odd to cover so much of the same ground twice - particularly so in consecutive chapters. Splitting the consideration of methane into two chapters in this manner is not necessarilly accessible to the reader. [Peter Thorne, Ireland]	Efforts have been done to avoid overlaps between chapter 5 and 6 regarding CH4
51972	0				There is a degree of chapter-to-chapter stylistic inconsistency which would be useful to try to reduce. Particular differences are: i) whether to open each section with a summary of AR5 / SR findings or not; ii) whether to place new assessment finding up front, embed in text or place at end and whether that text is lifted transparently to the ES; and iii) how to present the remaining knowledge gaps (both style and length). For a reader wanting to read more than one chapter trying to make this more uniform would be of enormous benefit. [Peter Thorne, Ireland]	Chapter 10 now includes Figure 10.4 which describes the approach taken by each of the regional chapters (CH10-12 and Atlas), as well as connections to the earlier chapters (CH1-9), and the types of assessments taken in each chapter (e.g., observational trends, attribution, projections, emergence). Cross-Chapter Box 10.3 also describes how these multiple lines of evidence are assessed for regional climate information, with synthesis in Chapter 12 and Technical Summary 4.3 (particularly TS Table 5). Chapters have also established more consistent structural approaches that follow these lines of evidence, for example Chapter 12 includes discussion of observational trends and projected changes for each regional CID (in Section 12.4), with a concentrated discussion of emergence in Section 12.5.2.
51978	0				There is a reticence for many chapters to make findings that are not couched in likelihood / confidence language even when the result is so clear that their use is superfluous and misleading. The IPCC has a history with e.g. unequivocal change and clear human influence of using statements that imply certainty. There is a need for consistency in how the individual chapters handle such cases where we would need to be so substantively wrong in our understanding that implying likelihood / confidence is actually misleading and unhelpful. [Peter Thorne, Ireland]	Noted and taken into account. We realize that there are inherent challenges in assigning likelihood / confidence language to changes in some of the variables (e.g., water cycle related variables), especially at regional scales. The use of likelihood and confidence language has been improved considerably in the SOD, for example in Chapter 8.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
32012	0				Is there a reference periode defined against which the anomalies are computed? At this stage it does not seems so. Will that be the case for the SOD? [Marie-France Loutre, Switzerland]	Noted. There is a main reference period (1850-1900) that is used where possible, but the underlying literature and availability of data must also be considered. Please see section 1.4 for more information.
51982	0				An in depth assessment of LLGHGs beyong N20, CO2 and CH4 seems to fall somewhat between the cracks with neither chaoter 5 nor chapter 6 considering their processes and lifetime in the way doe for remaining forcers. Given the Kigali amendment and the import in SR1.5 of managing these very potent LLGHGs is there a need for these to be assessed more holistically? [Peter Thorne, Ireland]	Rejected. The mandate for chapter five was to focus on the three main GHG of CO2, CH4 and N2O.
53774	0				The responses to SLCF is a topic that is somewhat spread around in the outline and needs coordination across chapters. Section 4.4.4 covers this based on scenarios, while ch6 is the "main chapter" for SLCF. The ERF from SLCF is covered by ch7, while the precip responses belongs in ch8. Ch10 also deals with the regional responses to SLCF from a somehwat different angle (10.4.2). This needs coordination in order to achieve the assessmen that is needed on this topic and to avoid inconsistencies. [Jan Fuglestvedt, Norway]	Coordination has been done in the virtual LAM to limit overlaps or at least ensure consistency between chapter especially regarding methane and aerosols.
51984	0				In several places there are issues of completeness of assessment where the management of overlaps has been made too extreme. Each chapter should stand alone which means it should contain a substantive assessment within its charge. In several places, particularly so where the overlap is with chapter 9, the assessment is too light in one or other chapter. This may well optimise the per strand assessment across the report but within chapter it leads to s substantive gap in the assessment which diminishes the chapter. What is key is to have consistent assessments and managed overlap. In my judgement this has been taken too far in several places and needs rebalancing. [Peter Thorne, Ireland]	Noted. Closer coordination across chapters has been established to ensure consistency across chapters.
10004	0				Authors, references: there is a huge imbalance concerning the regional representation of authors (CLAs, LAs, CAs) in almost all chapters. According to the rules of procedures of the IPCC, the proper geographical representation should be ensured, i.e. appropriate representation of experts from developing and developed countries and countries with economies in transition. One can identify some authors from developing countries and hardly find representatives of EiTs or more generally from the large EE-region with 23 countries. (I am aware: WMO/IPCC regions are different from the UN-regions.) Such balance is important for the global reputation of the IPCC and acknowledgement of this report in all regions. E,g, there are experts/scientists of EE-region who deal with climate modelling, drivers of climate change, ghg-trends etc. As a consequence, there is also such an imbalance in the References due to the overwhelming majority of authors from developed “western” countries. [Tibor Farago, Hungary]	Taken into account: The suggestion for greater diversity in the author team and assessment is well noted. The contributing author list spans a wider range of countries in the SOD.
44564	0				Framing and context: The FOD Chapter 1 Executive Summary begins with "The IPCC 6th Assessment Report assesses information that is relevant for the knowledge needs of a world that is rapidly changing, in terms of the physical climate system and the international processes set in place to address the changes and resulting challenges. The Paris Agreement set (...) Together with a range of related international processes and initiatives, such as the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the Global Framework of the Climate Services, and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, the Paris Agreement forms a key framing for the present report." For this framing statement to carry weight, it is essential that all chapters consider how their various conclusions and assessments could be of relevance for these ongoing and rapidly expanding global processes. I would encourage each chapter to add at least one Executive Summary statement that highlights their (global or regional) policy and stakeholder relevance, in addition to all that is presently shown. This, and the later comments by reviewers and governments on the future drafts, would make the individual chapters more accessible to policy makers, help in structuring the SPM and Synthesis Report, and make the present report into something more than an update of AR5 (as envisioned in the revised structure). [Bjorn Samset, Norway]	Noted.
53782	0				OHC is s topic that requires coordination across several chapters; 2, 3, 7 and 9. [Jan Fuglestvedt, Norway]	Taken into account. Additional coordination on this topic took place in preparing the SOD.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
33304	0				Most figures were provided at a size and resolution which made them very difficult to evaluate. Given the importance of figures in this document, suggest providing higher resolution figures to reviewers in the future. [Erika Wise, United States of America]	Noted. The quality of the figures has decreased during the compilation of the FOD, to keep the size of the chapter file to an acceptable level. The actual figures have a better resolution and will be made available as vectors when the final report is published.
53784	0				We need to consider how GSAT and GMST are used and presented across the chapters. In addition to the consistent use, we also have a communication challenge here that we need to prepare for. [Jan Fuglestvedt, Norway]	Taken into account. Cross-Chapter Box 2.3 (surface temperature metrics - global mean surface temperature or global surface air temperature?) discusses how to deal with GSAT and GMST across WGI and how to translate observed GMST estimate into GSAT estimate.
53786	0				Documentation and transparency must have high priority. It also helps better integration across chapters, as well as across WGs and gives flexibility and oppotunities for the Synthesis Report [Jan Fuglestvedt, Norway]	Noted.
50464	0				One of the key issues with communicating climate change to lower-climate-change-literate audiences and climate-change-skeptical audiences is the density of the information presented to them and it's lack of clarity. This lack of clarity in a number of areas has been a criticism of IPCC asessment reports in the past, and used as a "wedge" for climate-skeptic groups and those who spread misinformation to sow seeds of mistrust and confusion over the message put forth buy the reports. [Anton Holland, Canada]	Noted.
51488	0				“Mountains” should be recognised as a cross-cutting theme (cf Distribution of cross cutting themes in AR6 WGI First Order Draft) [Petra Seibert, Austria]	Rejected. This is a valid point, but not sufficiently reflected in the underlying assessment.
50466	0				One of the strategies to overcome this issue is applying plain language principles and data visualization techniques to key elements of content that are directed to certain types of audiences, like members of the public and policy/decision makers in government. Of course, it may not be possible to apply this approach to the entire report, as it is a science document that must also communicate scince in a presribed way to the scientific community. (And I cannot comment on data visualization at this point since examples have not been included, apart from the Atlas.) [Anton Holland, Canada]	Noted. Significant attention has been given to generating clear visuals and text understandable by non-experts, especially in the Technical Summary.
50468	0				However, it appears that in areas where attempts have been made to simply or direct information to non-scientific audiences, the resulting text has not sufficiently met these goals. For example, readability scores for these content areas (analyzed using a variety of algorithms) show that these areas are essentially out of reach except for the most dedicated non-expert reader. (Some of these readability assessments will be provided for specific sections throughout the comment spreadsheet.) [Anton Holland, Canada]	Noted. Where relevant, especially in the Technical Summary, plain and non-specialist language is used.
50470	0				The comments expressed in rows 1 through 3 above, are both "substantive" and "editorial" so they are being raised again here to ensure that those who address both substance and editorial review comments are aware iof them. From an editorial perspective, it should be noted that adaptation to plain language is not a "copyediting" process. It is a much more involved task that miust be performed by experts in plain language comunication, and is an expertise that is limited to subset of writers and editors. It requires skill at handling comples technical material, compbined with the sill to anticiapte the needs of a target audience in order to adapt the content and language to the reader's needs, without sacrificing technical/scientific integrity. This is a process that is quite separate from the technical editing and copy editing processes that the entire report must undergo as a mater of quality assurance. [Anton Holland, Canada]	Noted. Through the external review process and internally by science writers and communication specialists in the TSU, text was identified where its communication potential could be improved by using more plain and non-specialist language and relevant edits were introduced.

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50472	0				The comments expressed in rows 1 through 3 above, are both "substantive" and "editorial" so they are being raised again here to ensure that those who address both substance and editorial review comments are aware iof them. From an editorial perspective, it should be noted that adaptation to plain language is not a "copyediting" process. It is a much more involved task that miust be performed by experts in plain language comunication, and is an expertise that is limited to subset of writers and editors. It requires skill at handling comples technical material, compbined with the sill to anticiapte the needs of a target audience in order to adapt the content and language to the reader's needs, without sacrificing technical/scientific integrity. This is a process that is quite separate from the technical editing and copy editing processes that the entire report must undergo as a mater of quality assurance. [Anton Holland, Canada]	Noted. Through the external review process and internally by science writers and communication specialists in the TSU, text was identified where its communication potential could be improved by using more plain and non-specialist language and relevant edits were introduced.
45616	0				Changes in extratropical atmospheric circulation, modes of variability and blockings are discussed (at least) in Chapters 2, 3, 4 and messages are not always consistent across various sections at this stage (especially between trends identified in Chapter 2 and attribution made in Chapter 3). [Julien Cattiaux, France]	Taken into account. Efforts have been made to better coordinate across chapters 2,3,4,8, and 11
52034	0				The use of brief introductions to each section is something that has been done unevenly across the FOD with the norm being not to include ther. For a reader who wants to look across multiple chapters it would be good to be consistent. [Peter Thorne, Ireland]	Noted
33352	0				Chapters 1-9 follow the new IPCC format of integrating paleoclimate information with the text, but this seems to break down in Chapters 10-12. Chapter 10 & 12 contain little paleo info and Chapter 11 contains paleo info in a box (11.2) rather than integrated into the chapter. [Erika Wise, United States of America]	Taken into account. Several discussion on the more consistent addition of paleoclimate were discussed in the third lead author meeting.
50504	0				Is there an area that provides layman definitions of terms like paleoclimate, cryosphere, etc? [Anton Holland, Canada]	Noted. Key concepts are defend in the glossary.
29514	0				I recommend to define natural climate variability at some point which is either due to natural internal variability of the climate system or external natural forcings (solar and volcanoes), this should be also checked across chapters as it provides a source of confusion if the terms are used differently in the different chapters. [Katja Matthes, Germany]	Taken into account. 'Internal variability' is defined in the SOD glossary as variability internal to the climate system. Glossary definitions are intended to support consistency across chapters. 'Natural variability' also includes changes forced by natural forcings, as described in the comment.
33360	0				The Working Group I contribution to the IPCC Sixth Assessment Report is extremely clear, thorough, and well-organized. Thanks to everyone involved for their hard work on this. [Erika Wise, United States of America]	Noted, thank you.
28514	0				Its beyond reasonable dout that anthropogenic acivities enhance climate change globally. Policies to support adapatation, mitigation and crop productivity need to be strengthened for achievement of sustainable development Goals [Wycliffe Tumwesigye, Uganda]	Noted. No action needed.
28518	0				Precesion Agriculture and integration of ICT in the agricultural systems for the 21st century can improve production and enhance farmers livelihood across the globe. Farmers need capacity building and credit facilities to implement CSA practices [Wycliffe Tumwesigye, Uganda]	Agreed.
50538	0				As I came to the review provcess late, Ihjave not been able to carry out detailed anayses on every chapter of the report, although I will conti ue to do so after my comments are submitted. After a quick review, it appears at a glance that many of the principles I have described would apply to all of the chapters. [Anton Holland, Canada]	Noted. No action needed.
9084	0				The Medieval Warming Period was warmer than today, as also were the prior Roman and Minoan Warming Periods, as extensively documented in H H Lamb's "Climate, History and the Modern World", Chapters 7 to 13, published in 1982/1995. Current warming is therefore not unprecedented. [Jim O'Brien, Ireland]	Rejected. The latest available estimates do not support the reviewer's contention here as noted in the substantive assessment on the issue undertaken in chapter 2 and summarised in their revised ES.

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9086	0				The solar/cosmic ray influence is again not recognised in AR6, which can explain much of the 20th century warming; this is based on extensive research by Henrik Svenmark and Nir Shaviv. It is now proven that an increase in solar activity, as measured by the number of sunspots, causes a small increase in solar magnetic fields allowing fewer cosmic rays to enter the Earth's atmosphere, so reducing the ionisation of air molecules, thereby creating fewer or smaller cloud nuclei. This produces more transparent clouds and so less reflection of solar radiation back into space, hence more and stronger solar radiation then reaches the Earth's surface, increasing surface temperatures. Their research is summarised in the paper: https://www.thegwpf.org/content/uploads/2019/03/SvensmarkSolar2019-1.pdf [Jim O'Brien, Ireland]	Taken into account. The influence of galactic cosmic rays on climate is assessed in 7.3.4.5 in the SOD.
9088	0				Another area of natural influence on climate is the possible impact of interplanetary oscillations, particulatly in the post-2000 hiatus, based on the extensive work by Nicola Scafetta, reported in his papers: "Natural climate variability, part 1: Observations versus the modeled predictions", by Scafetta et al, The International Journal of Heat & Technology September, Vol 35, ppS9-S17, special issue 1, Sept 2017, doi: 10.18280/ijht.35Sp0102, and "Natural Climate Variability, Part 2: Interpretation of the Post-2000 Temperature Standstill", by Scafetta, Mirandola and Bianchini, International Journal of Heat and Technology, Vol 35, Special Issue 1, Sept 2017, pp S18-S26, DOI: 10.18280/ijht.35Sp0103. This research can quite remarkably characterise recent climate trends as based on the frequencies of planetary oscillations plus a small anthropogenic influence.. [Jim O'Brien, Ireland]	Noted. The early 21st century global temperature evolution and its causes are assessed in Cross-Chapter Box 3.2.
9090	0				As both of the above natural forcings can explain much of the later 20th century warming, the finger-printing analysis of the GHG influence on climate change needs to be reconsidered, meaning it is then very plausible that less than half of the warming is due to GHG emissions. [Jim O'Brien, Ireland]	Rejected. The influence of natural forcings and internal variability are considered in assessment of the human contribution to observed warming (see Section 3.3.1.1).
9092	0				The latest research into climate sensitivity, shows ECS estimates to be approaching 2°C and TCR estimates to be approaching 1°C, see https://notrickszone.com/2017/10/12/2-new-papers-models-severely-flawed-temp-changes-largely-natural-co2-influence-half-of-ipcc-claims/. It is to be particularly noted that Prof Ray Bates estimates ECS to be only 1°C, see: "Estimating Climate Sensitivity using Two-Zone Energy Balance Moels", JR Bates, Earth and Space Science, 3, 207-225, doi:10.1002/2015EA000154, 2016. Sensitivity is also of over-riding importance to the conclusions of AR6. The lower sensitivity can make achievement of the Paris Agreement 1.5°C goal far easier, possibly even without significant emissions reduction, a conclusion of fundamental importance. [Jim O'Brien, Ireland]	Taken into account. Chapter 7 makes a full assessment of both TCR and ECS but discounts these low estimates from multiple lines of evidence.
9094	0				Also on climate sensitivity, a recent paper by Dr John Christy has demonstrated that the climate models used in AR5 significantly over-estimated the tropical mid-troposphere warming since 1979 to 2015 by almost 0.5°C compared to rhe average of all models, see https://www.thegwpf.org/content/uploads/2019/05/JohnChristy-Parliament.pdf. [Jim O'Brien, Ireland]	Taken into account. Chapter 2 and Chapter 3 assess the mid tropical troposphere warming and its causes.
56198	0				Would be useful to include "extremes and abrupt changes" as a cross-cutting theme in the AR6 WG1, since these are topics of high interest within the public (with main inputs from Chapters 11, 12, 8, 4, and 5) [Sonia Seneviratne, Switzerland]	Taken into account. Table 1.6 now includes this term.
9096	0				This Christy paper and the two above lines of research (Svensmark, Shaviv and Scafetta) point to significantly greater natural influence, and hence the the anthropogenic influence may be two to three times less than predicted in AR5. This finding has profound implications for the conclusions of AR6. [Jim O'Brien, Ireland]	Rejected. The influence of natural forcings and internal variability are considered in assessment of the human contribution to observed warming (see Section 3.3.1.1).
52104	0				Given the fairly frequent allusion across chapters to the mid-pliocene as an analogue to where we are / are heading I wonder whether a cross-chapter box is warranted pulling together these strands and presenting the limitations to the analogy. I'm not clear where in the report this would best fit but it clearly isn't chapter 1 which is full of boxes already. Perhaps chapter 2 or 4? This may support use as an analog in the SPM construction? Naively using past analogs is more relateable to for non-experts? [Peter Thorne, Ireland]	Noted. This is very good suggestion but it requires sufficient discussion across several WGI chapters. It would appear that Ch2 is the natural home for such a box.

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9098	0				There is need for an overall summary of the modelling uncertainties in AR6, as was done in AR5. In that context, it is probably inappropriate to make any climate projections in AR6 beyond 2100 [Jim O'Brien, Ireland]	Taken into account. Multivariate model evaluation for CMIP6 models, including uncertainties, is assessed in Section 3.5.2 in the SOD. Projections for the 21st century and beyond in this report are not based solely on CMIP6 models, but draw on multiple lines of evidence, including observational constraints.
9100	0				In terms of the models used, it is arguable that the SSP5-8.5 scenario should be dropped; it effectively represents an emissions growth trajectory similar to that of China in the 1990s, which is very unlikely to be repeated. [Jim O'Brien, Ireland]	Rejected. All scenarios must be considered equivalent since there is still no scientific basis for characterizing any one SSP scenario as more or less plausible than any other scenario.
9102	0				The WG1 Report is a scientific report, and reference to ethical issues (eg Sustainable Development Goals) tends to debase its scientific objectivity. [Jim O'Brien, Ireland]	Noted. The chapter does not mention the SDGs, although it discusses the role of values in the generation of regional climate information. Adequate supporting literature is provided in this assessment.
52110	0				Chapter 4 makes use of both large ensemble simulations and a single illustrative high impact run but these are then rarely taken up by subsequent chapters even where they cold prove valuable. Some thought is required as to how to proceed in this regard. [Peter Thorne, Ireland]	Agreed, but this is much easier said than done. It probably requires X-Chapter interaction through the drafting of TS/SPM.
56472	0				There is a tremendous amount of useful information in the report, but after looking at several sections it appears to me that the authors have been given an impossible task. Many of the subsections have only a few pages but should discuss the advance in wide areas of research, where many new publications have appeared. This is a truly impossible task. I make an example with chapter 10: In the case of climate change in Europe, I found about 1500 publications on climate projections in Europe since 2013 [searching for: climate and change and europe and (atmosph* or ocean)]. How should that be discussed in the few pages available (in chapter 10)? The result is that the discussion is often "stochastic" in the sense that it is not clear why some aspects are discussed and many others not (or may be even worse, in some areas the authors discuss what they are familiar with). In many subject areas, I thus doubt the value of the product. I suspect this problems derives from IPCCs idea to provide a full overview of the science (which probably is a concept that should be given up since unachievable). I ask you to consider the following proposal: IPCC should ask specific questions, provide sufficient pages to these questions, and nominate the respective experts in the field. Examples of questions could include: How do storms track change? What will happen with the Indian summer monsoon? Do we understand the Mediterranean amplification? Or the polar amplification? How can we constrain estimates of equilibrium climate sensitivity? What is the role of km-scale resolution climate models? What is the role of model tuning? Some of these questions are addressed in the draft, but scattered in a report of >1000 pages. [Christoph Schär, Switzerland]	Noted. This is a very interesting proposal, but it's beyond the chapter team's capabilities to comment on it. What can be said is that at least the teams are making their best to assess as much of the recent literature as possible and that the review process helps with this.
52122	0				A common issue in chapters 5 through 9, to a greater or lesser extent, is repetition of aspects within each chapter. This appears to be a function of chapter structures. I was under the impression from the scoping meeting that these were to be integrative. Part of the problem is that the chapters split consideration of the same aspect from theory / observations / projections. This isn't necessarilly optimal in my view and it woulcd be better to try to assess issues overall in a more integrative manner bringing together theory, observations, attribution and projections per assessed aspect holistically. This would also likely save substantive space in these chapters. Addressing this would also help to address present conflicts with chapters 2 through 4 that do stovepipe in this manner. Persisting with current structures risks a bigger consistencies headache than being explicitly integrative. Chapter 9 comes closest to the integrated approach, particularly in its oceans section which may provide a working example. [Peter Thorne, Ireland]	Noted
54684	0				In chapter 9, AMO is used and in chapters 3 and 10, AMV. [Sabine Undorf, United Kingdom (of Great Britain and Northern Ireland)]	Accepted
24226	0				Warning: a couple of my comments concerning the entire report are splitted among several rows. In such cases, I have added specific numerotations in the column G "to line" [philippe waldteufel, France]	Noted. No action needed.
52386	0				Note that my comments, especially for this FOD are from the context of the degree to which this report effectively communicates its scientific messages to policy makers, with a special though not exclusive focus on those portions relevant to cryosphere feedbacks. [Pam Pearson, Sweden]	Noted

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24234	0				While "climate change" is the central issue of the assessment report, the reader must wait until chapter 07, page 07, line 35, for this expression to receive a definition, although of course it has been used several tens of times earlier in the FOD. Certainly "climate change" will figure in the glossary? At the same time, this would ensure that the common definition is shared all over the report. [philippe waldteufel, France]	Taken into account. Climate change is defined in the glossary
24236	0				While section 1.2.4.2 (lines 9-10) defines what is called an abrupt climate change, this definition is repeated word for word in section 8.1.4.3 (page 23, lines 6-7). [philippe waldteufel, France]	Noted and taken into account. In the SOD, we have dropped the section 8.1.4.3 that was previously included in the FOD. Also the SOD includes link to Chapter 1 while referring to the definition of abrupt climate change (see SOD 8.6, page 100, lines 42-43).
24238	0				I assuming the glossary will list words or expressions which carry a specific weight and meaning in this report. Then please pay attention to polysemic terms. "framing" is an example I submit: while in many places throughout the FOD it is used in a quite general and commonly used sense, chapter 11 page 05 line 21 supplies a rather specific definition when writing that the attribution statements depend on "framing", i.e. the attribution question being adressed. Although not contradictory, this definition is different because much more focused. [philippe waldteufel, France]	Noted
24240	0				Concerning the "BOXES", I find somewhat confusing the fact that both the "cross chapter" ones and the standard ones are numbered in parallel. Would not it be simpler for the reader to give up this distinction and adopt a single numerotation system? Besides, I have been unable to find in the documents the rules for stipulating a BOX should or not belong to the cross chapter category. I do not understand these rules fully either: for example, I wonder about the case of BOX 1.1 (calibrated uncertainty language), which deals with issues found in most of the chapters. Finally a table (along the glossary) listing allboxers or a least those which deal with major methodological issues might be useful. [philippe waldteufel, France]	Rejected. Cross-chapter boxes are meant for topic spanning several chapters and are drafted by authors from various chapters. Chapter boxes are used to discuss specific topics mostly relevant to the chapter they are featuring in. Noted regarding the suggestion of a table.
27312	0				In general , the deep uncertainties associated with climate science are not appropriately communicated . The balance of the literature evaluation-summary is too much towards scientific certainty. The report should more explicitely mention in all relevant chapters the deep structural uncertainties, just as we find them in the original literature. Example Gabriele Hegerl (Clim Change 2018) : "the ongoing discussion on the cause of that so-called "hiatus" reveals that decadal variability in the large-scale climate is still poorly understood." Example Reto Knutti (Nature Geoscience 2017) : "Evidence from observed climate change is also uncertain. Observational uncertainty remains, even for the most recent decades..Also, natural variability superimposes on the forced trend and causes uncertainty even for multidecadal trends." And many more examples of the cited literature are not sufficiently mentioned in the report. [ferdinand meeus, Belgium]	Taken into account. This topic has been widely discussed in preparation of the final version of the report, and is hopefully now better introduced in Chapter 1, which discusses various sources of uncertainty, including "deep uncertainty", and some pointers for how they should be read and interpreted. Chaptesr follow the guidelines for the treatment of uncertainty which can be found here: https://www.ipcc.ch/site/assets/uploads/2017/08/AR5_Uncertainty_Guidance_Note.pdf
52144	0				Model weighting arises several times and the assessments may not be entirey consistent. Chapters that assess this should be invited to consider a pathway forwards that minimises repetition and ensures consistency [Peter Thorne, Ireland]	accepted
24242	0				While chapter 10 discusses at length bias adjustment, the Atlas chapter makes use of both bias adjustment and bias correction. Certainly the notions have to be very close, but are they strictly identical? [philippe waldteufel, France]	Noted. Cross-chapter box 10.2 "Issues in bias adjustment" serves as a reference of the way bias adjustment (and bias correction as a synonym) are used in the regional chapters.
27316	0				The narrative of the report displays key characteristics of "groupthink and normal science" as described by TS Kuhn (The Structure of scientific Revolutions") . There is a tendency in all chapters to avoid the reality, and the explicit expression, of uncertainty related to climate science, although explicitly mentioned in the cited scientific literature . [ferdinand meeus, Belgium]	Rejected. Not clear what needs to be done with this comment.

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56244	0				To be considered in overall AR6 report: What is the risk of Type II errors? Could we assess certain questions in two ways, i.e. a) which level of global warming would be likely considered to be unsafe? vs b) which level of global warming would be considered likely to be safe?. It is probable that the respective temperature levels would differ substantially for these two questions, with lower global warming for the 2nd. [Sonia Seneviratne, Switzerland]	Information provided by WGI enables more complete analysis of projections to reduce Type II errors. Assessment is done for the physical mechanisms behind climatic impact-driver changes, observed/attributed/projected changes in regional CIDs, and analysis of both time/scenarios and global warming levels. This information feeds into WGII assessments of risk that stakeholders can use to determine 'safe' levels of change, and IPCC guidance includes confidence statements and uncertainty information to aid in the informed use of projected changes.
56256	0				I am deeply concerned about the approach taken in chapter 4 regarding projections: 1) These are only based on 5 models from CMIP6, it is questionable if such an ensemble would be robust, also given the fact that this first subset is shown to have a substantially different climate sensitivity compared to the CMIP5 ensemble; 2) No RCP1.9 scenarios were considered. However, the RCP1.9 scenarios are the only ones that would be consistent with a stabilization at 1.5°C, which is what world's countries have commited to aim towards within the Paris Agreement. Both of these assumptions lead to conclusions such as "there is unanimity that global mean temperature will rise above 1.5°C". This seems to exclude any possibility of humanity following an RCP1.9 pathway and is deeply at odd with the SR15 conclusions. [Sonia Seneviratne, Switzerland]	Taken into account. The point is moot since Ch4 used whatever was available at FOD stage -- and this did not include a single SSP1-1.9 projection. In SOD, chapter 4 utilizes more available CMIP6 models (about 20 models depending on SSPs) and includes assessment of SSP1-1.9.
12994	0				Thank you for the opportunity to review the First Order Draft. Unfortunately, I have had some family issues and also will have to travel from now to the end of the review period. [Norman Bowers, United States of America]	Noted.
12996	0				I'm sorry that I have not been able to contribute more to the review. I have gone through some sections, but I do not have time to do a good job of analyzing the inputs and outputs of the models and comparisons between them (it would be an even larger task to look inside the models themselves). For some of this I may have had to contact the creators of the models, which I have not had time to do. It seems I was far too ambitious with hoped for availability. [Norman Bowers, United States of America]	Noted.
8646	0				The data used to make all the figures should be accessible and downloadable in a usable form. [Julia Hargreaves, United Kingdom (of Great Britain and Northern Ireland)]	Agreed. All data and related processing code to generate the figures (including those available from the Interactive Atlas) are archived and made available.
12998	0				The biggest thing to look at is why the models do not match reality. Why the over-prediction of warming and why the tremendous variation on predicted temperature change to this point in time. A tremendous amount of good work has gone into making the models more precise, but unless they reflect the underlying reality they are not useful. We need to find more proof that the underlying theory is correct. I hoped to examine what different parameters and assumptions were made within models that more accurately reflected the lower than expected global temperature (lower 5% band) versus those that give much higher rises in temperature. [Norman Bowers, United States of America]	Taken into account. Chapter 3 now includes more assessment of the rates of warming in CMIP6 models versus observations. While the multi-model mean exhibits good agreement with the observations, some models warm more than observed while others warm less, and this is now more clearly explained.
31942	0				Several notation are used for 'before present' (BP; B.P.; b.p.; BCE). A single one should probably be decided. Along the same line, the abbreviation for 'thousnad of years' should be checked throughout (K; ka; Kyr; kyr; ….). [Marie-France Loutre, Switzerland]	Editorial. Please note that the final report will undergo a professional copy-edit before publication. This sort of issue will be fixed then.
13000	0				Coming from an engineering modeling and simulation background, we normally have a much more determined system. It is not a chaotic system like the earth's climate is, yet it is still very challenging to properly model known launch vehicle and satellite systems and the variations in the atmosphere and even "empty" space. From my experience, obtaininng a more exact match of the 20th century temperatures will not be evidence that the theory is correct. We need to find the underlying reasons the models generally are not correct. [Norman Bowers, United States of America]	Noted.

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27336	0				In view of increased knowledge about natural variability (decadal to centennial to millennial modes of ocean circulation as summarised in chapters 3.5 and 3.7) and the deep uncertainties associated with a coupled ocean-atmosphere-cryosphere non-linear chaotic climate system (AR5), this report (The Physical Science Basis) should seriously discuss if climate model based detection&attribution and projections & scenario's are fit to justify&support political decision-making related to altering world social, economic and energy policies.Because nearly every model has been tuned-calibrated precisely to the 20th century climate records (Voosen, Held, Science 2016). The modelling community (Hourdin 2017) knows that a good tuning-calibration fit with historical climate records is not a good basis for confidence in the future climate projections&scenario's. This aspect is not addressed in the relevant chapters. Stating that " It is assumed that the models are fit for their purpose" is not a good scientific approach for this report [ferdinand meeus, Belgium]	Taken into account. Model tuning is now assessed in more detail in Sections 3.2 and 3.3.1.1, and Hourdin et al. (2017) is assessed. Figure 3.3 shows which CMIP6 models have been tuned to match historical warming. Implications for attribution are also assessed. Only a small number of CMIP6 models were tuned to historical warming, and their behaviour is not systematically different from those models which were not tuned in this way.
13002	0				For an example, after a launch vehicle failure we in the Special Studies Group all immediately started working to determine the cause of the failure. Looking at the data, it looked like it could be an anomaly in the thrust vector control system. I modeled it as such and the match was extremely close. The issue, however, was a failure in another part of the launch vehicle (determined later by video evidence). Getting an answer that reflects reality in a control/feedback system does not show that you are modeling reality correctly. This case was a known system, where there was no flexibility in changing parameters in the model. There certainly are far more unknowns in the earth/sun system. [Norman Bowers, United States of America]	Noted.
13004	0				I would like to see attempts at modeling past history with these climate models. If we run these models through what we know of the Roman Warm period, the Dark Ages, the Medieval Warm period, and the Little Ice Ace, do they correctly match the changes in temperature? Of course, we know only some data on this and I was cheered to see some work done on analyzing the temperatures and other levels during these eras. Can they give us knowledge of why there were dramatic changes in temperature? This may be a far-off goal, but since we currently only have one example (recent times) to match, there is no real evidence that we have not just tweaked the models to give the desired result. [Norman Bowers, United States of America]	Taken into account. We have added more evaluation of model simulations of past climates compared to paleo data. See, for example, Section 3.3.1.1.
13006	0				On a side note, one thing I wish I could have examined would be the effect of the larger atmosphere when it is warmer (are the results correlated to how the top of the atmosphere is modeled?) just because it is a particular interest of mine. How does that affect the heat balance (if at all)? Just haven't even had time to look. [Norman Bowers, United States of America]	Noted. Changes in geopotential height throughout at the atmosphere (i.e. the larger atmosphere) as it warms are modelled by the climate models on which this assessment is based.
13008	0				Since I have not had time to coordinate my participation in this with my employer - BAE Systems (corporate communications, etc.) can you please change the affiliation to my consulting company: [Norman Bowers, United States of America]	Noted.
43472	0				These comments concentrate on peer-reviewed observational data. The draft does not include wording such as "based on an average of the four available global datasets that are supported by peer-reviewed publications" (SR1.5 page 1-13 Final Government Draft). I presume such wording will be added in a later draft. [Peter O'Neill, Ireland]	Noted. The references to the literature on these products is given in the text.
13010	0				RS Synergy Consulting [Norman Bowers, United States of America]	Noted.
43474	0				GISTEMP should no longer be regarded as "supported by peer-reviewed publication", i.e. Hansen et al., 2010. As stated in GISS Surface Temperature Analysis (v3) Updates to Analysis (2012-May 2019), https://data.giss.nasa.gov/gistemp/updates_v3/, from December 14, 2011 onwards "GHCN v2 and USHCN data were replaced by the adjusted GHCN v3 data". This may indeed have "simplified the combination procedure since some steps became redundant", as stated, but it also departed materially from Hansen et al (2010) [Peter O'Neill, Ireland]	Rejected. There is a new paper which is cited in the SOD appropriately.
13012	0				If this is an issue, in light of my minimal contribution, it would be fine if you deleted me completely. [Norman Bowers, United States of America]	Noted.
28884	0				Personally I found the allocation of material between the chapters very confusing, especially between chapters 2 and 3. There is a large amount of overlap and some extreme repetition between the chapters. When there is repetition the chapters have not always been consistent between each other, including in the confidence assigned to the results and in terminology. The chapters seem very disjoint and independent from each other at present. [Matt Tully, Australia]	Noted. Efforts have been made to better coordinate chapters via the addition of a further internal version point to enable intercomparison of advanced drafts.

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43476	0				Although GISTEMP appears principally in Chapters 1, 2, and 3 these comments are described as "Entire Report" since they apply to all use of GISTEMP rather than specific lines [Peter O'Neill, Ireland]	Not applicable. (This seems to be a preamble to other comments.)
55764	0				At this point, would it be possible to change the term "virtually certain"? Maybe to "known certain"? The use of "Virtually" makes it sound very remote. [Ariane Middel, United States of America]	Rejected. The point is well taken, but the calibrated uncertainty language is taken as a prior input to this report. See box 1.1.
13014	0				Again, I am sorry I have not been able to contribute more. [Norman Bowers, United States of America]	Noted.
43478	0				Hansen et al., 2010: “The current GISS analysis adjusts the long-term temperature trends of urban stations on the basis of neighboring rural stations, and we correct discontinuities in the records of two specific stations as described below. Our standard urban adjustment now utilizes satellite observations of night lights to identify whether stations are located in rural or urban areas. The urban adjustment, described in section 4, is carried out via our published computer program and the publicly available night light data set.” These comments are based on version 3 of the GISTEMP software but apply equally to version 4. The main difference with version 4 is use of GHCN version 4 data instead of GHCN version 3 data. There are some code corrections moving from legacy FORTRAN/Python code to a pure Python version and (personal communication from Reto Ruedy, GISS, 05 December2016) "The GISS homogenization routines in the 2 versions give somewhat different results", but these changes are relatively minor. [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
13016	0				Thank you, [Norman Bowers, United States of America]	Noted.
43480	0				“on the basis of neighboring rural stations”: Three problems arise here: 1) The GHCN location metadata which GISTEMP uses in conjunction with the night light data set to identify whether stations are located in rural or urban areas are not fit for this purpose, even if fit for use with the GHCN PHA procedure. (further details below) 2) The GHCN PHA procedure does not distinguish between rural and urban stations during adjustment, so even where GISTEMP has correctly identified a neighbouring station as rural, its adjusted GHCN v3 data may have been influenced by urban stations. 3) The night light data set used by GISTEMP is publicly available with the GISTEMP source code, dating from the 1990s, and was I understand already a deprecated version by 2010, replaced by a preferred version with fewer artefacts. [Peter O'Neill, Ireland]	Taken into account. The literature on this subject is assessed in 2.3.1.
53976	0				Labelling of the scenarios is quite confusing with respect to AR5 labelling. All this originated from Scenario-MIP and probably should have been debated a bit more at the time it was proposed, so the scientific community at large is culpable. SSPs are used to express socioeconomic vulnerability and exposure in WG II studies, are used to underpin emissions scenarios and mitigation targets in WG III, but in WG I they will be taken as climate drivers. This could be avoided if the explicit SSP label was removed in WG I from the (CMIP6) terminology. I suggest reversing the labelling in WG I to have the forcing first, dropping the SSP reference and placing the SSP marker number last. There could be a code to begin this which is equivalent to RCP from AR5. So SSP1-2.6 becomes RCP2.6-1. Or if RCP is not favoured, then use RF for radiative forcing (could also be lower case rf). Whatever is used, this would then avoid the inevitable confusion between AR5 and AR6 climate forcing terminology and between AR6 WG I, II and III interpretation of SSP terminology. All that would be needed as explanation would be that rf replaces RCP in AR6. Just a thought, anyway! [Timothy Carter, Finland]	Rejected. The SSP-RCP combination is consistently used across WGs. There will be more confusion if the WG1 report uses different scenario naming from other WG reports.
13018	0				Norm Bowers [Norman Bowers, United States of America]	Noted.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
43482	0				1) GHCN location metadata — Hansen et al 2010 states: "Station location in the meteorological data records is provided with a resolution of 0.01 degrees of latitude and longitude, corresponding to a distance of about 1 km. This resolution is useful for investigating urban effects on regional atmospheric temperature." The data is provided with resolution of 0.01 degrees of latitude or longitude, but this is resolution, not accuracy. The inaccuracy may be acceptable for GHCN processing, where location is only used to select the 100 nearest stations, from which the 40 with the highest correlation with the station record to be adjusted are then selected regardless of proximity. When however location metadata is used to determine whether a station is rural or urban inaccuracy does matter. Approximately 500 v3 GISTEMP stations are wrongly classified as urban or rural because of inaccurate location metadata. [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
43484	0				Limassol (Cyprus) illustrates the problem. A one degree longitude error (32.00° E instead 33.05° E) leads to examination of a location in the Mediterranean("rural") rather than the port city of Limassol ("urban") when the night light data set is used. More significantly still, since WMO stations provide the majority of currently reporting stations (1397 of the 2117 stations reporting in 2018), when coordinates for stations updated as part of the WMO programme to provide higher precision Volume A coordinates are substituted for those in the GHCN inventory, 430 stations are found to be wrongly classified as rural or urban by GISTEMP (with yet more corrected station coordinates leading to no change in classification). A listing of these 430 WMO stations is not included as part of this comment but is available on request to peter.oneill@ucd.ie (including KML files to locate correct and incorrect station locations in Google Earth, with associated night light classifications) [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
43486	0				Not all 430 wrongly classified stations are due to faulty coordinates. The code used for night light lookup is not publicly available, but appears in some cases to locate the station one cell away from the coordinates given, probably as a result of truncation/rounding practices similar to those corrected in the current pure Python implementation. In some cases use of the preferred night light data set rather than the deprecated data set leads to the change in classification. [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
43488	0				Identification of location errors in the GHCN v4 station inventory used by GISTEMP version 4 is more difficult as the station identifier pattern no longer allows immediate identification of WMO stations for comparison with the WMO inventory. Similar location errors to those in version 3 do however exist although it will take time to build a comprehensive list. [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
43490	0				The unsuitability of the GHCN station location metadata was brought to the attention of the Hansen et al 2010 authors in response to Dr Hansen's request for comments on an early draft of the paper. The response that "I'm not surprised at all that there are serious mistakes in this inventory file. It has been traditionally treated with less than the proper care; e.g. it took years after I notified them until they fixed the error of systematically dropping the 1000s in all altitudes ... I will also look into the other places you mention. Unfortunately, we don't have the manpower to check out all entries of that file. Here is a case, where the general public can really be helpful and report, as you already do, any suspicious data to NOAA/NCDC or to us" was less than satisfactory. Use of data from another agency, collected to meet other requirements, should entail checking that this data is fit for your different purpose. [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
43492	0				2) Use of adjusted GHCN v3 data — This is the major material departure from Hansen et al 2010. Homogenization by changing "the long-term temperature trend of an urban station to make it agree with the mean trend of nearby rural stations" is no longer being carried out once a potential urban influence on rural station records is allowed. In addition, the fact that "The GISS homogenization routines in the 2 versions give somewhat different results" (personal communication from Reto Ruedy, GISS, 05 December2016), even if these differences are minor, indicates departures from Hansen et el 2010 which need to be addressed in a new peer reviewed publication. [Peter O'Neill, Ireland]	Taken into account. There is a new GISTEMP paper and this has been cited in the SOD

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43494	0				Use of station location metadata not fit for the purpose of station classification by night light data set lookup also highlights the need for examination of data used as part of peer review. A comprehensive peer review would need to include examination of code. Publication in a journal which does not accept comments, such as Reviews of Geophysics, is also an obstacle to correction of errors. [Peter O'Neill, Ireland]	Noted. No specific changes suggested or enacted
43496	0				3) Night light data set — Use of more recent data sets should be preferred [Peter O'Neill, Ireland]	Taken into account. The most recent versions of all datasets are used across the report
43502	0				SR1.5 states "The IPCC has traditionally defined changes in observed GMST as a weighted average of near-surface air temperature (SAT) changes over land and sea surface temperature (SST) changes over the oceans". If a weighted mean of observational temperature data is presented in AR6, the weights should be specified (absent in SR1.5). [Peter O'Neill, Ireland]	Taken into account. Cross-chapter box 2.3 discusses the issues and implications
9462	0				The writing team has made a significant job in studying the ever increasing huge amount of literature and assess it for the benefit of all. Many thanks for that huge effort! [Klaus Radunsky Radunsky, Austria]	Noted with thanks
52984	0				can we have consistency using 'heat waves' or 'heatwaves'. For marine heatwaves the latter is generally preferred (so as not to confuse with 'hot surf'). Sometimes within the same chapter different variants are used. [Lisa Alexander, Australia]	Editorial. Professional copy-editint to be completed prior to publication. This kind of issue will be fixed then.
27854	1	1	1	1	R. Antwerpen, B. Biemond, S. Brouwer, F. Castino, G. Francis, A. Groot, S. ten Hietbrink, H. Hoogland, I. Kruse, K. Mesdag, D. Peperkamp, JB. Pronk, I. Quax, M. Rahman, A. Scherf, I. Schiller-Weiss, M. Sprenger, J. Valenti Muelas, E. Workman all Institute for Marine and Atmospheric research Utrecht contributed to this review [roderik van de wal, Netherlands]	Editorial. Please note that the final report will undergo a professional copy-edit before publication. This sort of issue will be fixed then.
28560	1	1	99	40	Refs used: Atampugre, G., Nursey-Bray, M., & Adade, R. (2019). Using geospatial techniques to assess climate risks in savannah agroecological systems. Remote Sensing Applications: Society and Environment, 14(February), 100–107. https://doi.org/10.1016/j.rsase.2019.01.006 Belay, K. T., Rompaey, A. Van, Poesen, J., Bruyssel, S. Van, Deckers, J., & Amare, K. (2014). SPATIAL ANALYSIS OF LAND COVER CHANGES IN EASTERN TIGRAY (ETHIOPIA) FROM 1965 TO 2007 : ARE THERE SIGNS OF A FOREST TRANSITION ? FAO. (2017). Integrating climate change adaptation and mitigation into the watershed management approach in Eastern Africa Discussion paper and good practices. Sereenonchai, S., & Arunrat, N. (2018). Practical agricultural communication: Incorporating scientific and indigenous knowledge for climate mitigation. Kasetsart Journal of Social Sciences, 1–8. https://doi.org/10.1016/j.kjss.2018.05.014 Tumwesigye, W., Wasige, J., & Thomas, G. (2015). Effect of land use change and slope position on soil organic carbon in Kitabi Watershed Rwanda. Journal of Scientific and Innovative Research, 4(5), 213–217. Retrieved from www.jsirjournal.com [Wycliffe Tumwesigye, Uganda]	Thank you for the references, but they are not key references to support current statements. References seem more appropriate for WGII and III.
6247	1	1	199	8	More than 500 Ph.ds have agreed with this science. [Dave White, United States of America]	Noted.
6249	1	1	199	8	The amazon rain forest deforestation started in 1950. The current rise started in 1957. They have burned almost 900 million hectares since 1950. The correlation coefficient is 0.99. This is the cause of the rise of CO2. Also the cause of the oscillation of the CO2 rise and O2 reduction (Rxy= -0.99). The total northern hemisphere CO2 consumption by photosynthesis is only 1 billion tons annually. The correct solution is to stop non-sustainable deforestation like the Indian and Amazon rain forests. Also plant trees and shrubs. Increase the equilibrium point with photosynthesis. Then atmospheric CO2 will be 330 ppm by 2031. So far India completely stopped deforestation and are planting trees, Pakistan has planted 1 billion trees. Nine billion more in the next 4 years. China is planting millions of trees. [Dave White, United States of America]	Noted. The drivers of observed changes in CO2 concentration are assessed in Section 5.2.1 of the SOD. While the reviewer is correct that emissions from land use change have contributed to the increase in CO2, emissions from burning fossil fuels have made an even larger contribution.
6251	1	1	199	8	Worldwide oxygen levels declining here: https://www.oxygenlevels.org/ [Dave White, United States of America]	Noted.

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6255	1	1	199	8	Your global warming potential is wrong; CO2 emissions correlate to 363 ppm and are not the cause of the rise. Dr. Jim Skea WG-III agrees with this. Atmospheric CO2 is a lossof photosynthesis. We have deforested so much of our forests that our current total worldwide photosynthesis (oceans and land) is only 12 billion tons yearly. We need to reduce emissions by 67% to get to equilibrium. This is more than human emissions account for; human emissions are 58% of the total. We need to increase the equilibrium point, and we do that by increasing photosynthesis. [Dave White, United States of America]	Noted.
32042	1				Please see my comments 1-13 on Chapter 1, which also have consequences for the whole report. Concerning projections, there must be a clear and justified choice about whether the focus will remain (as in previous WGI reports) almost entirely on assessment of the likely range for key parameters, or whether there will also be systematic assessment of potential high impact scenarios. (See Sutton, ESD, 2018, and BAMS, 2019) [Rowan Sutton, United Kingdom (of Great Britain and Northern Ireland)]	Noted. The concept of high-risk/low-likelihood (or similar) is brought into the SOD in a more holistic way than the FOD, and is the topic of ongoing discussions in advance of the FGD.
6794	2	1	5	20	From pages 2 to 5; lines 1 through 20 of Chapter 5; the sections listings e.g. 5.2.1.4, 5.2.1.5 etc are not alligned. Guess coverting from word to pdf. Among other comments. [David Ojo, Nigeria]	Accepted. Fixed.
21706	37	44	37	44	Sherwood and Fu (2014) do not report on changes in precipitation (but on changes in dryness, which is not the same, as they explain in detail). I would remove this reference from the "monsoon" paragraph. Also Byrne and O'Gorman (2015) assess Precipitation - Evaporation changes rather than changes in precipitation. You may delete this sentence and state more clearly that little is known about changes of the monsoon circulation (see Seth et al., 2019) [Gwenaelle GREMION, Canada]	Accepted. This sentence appeared in the FOD of Chapter 11 (page 37, line 44). Subsequently, in the SOD of Chapter 11 the words "monsoon" and "precipitation" were dropped from this sentence (see SOD page 77, lines 3-4).
6774	135	4		5	Make the figures illustrative keys (i.e. to the leftside of each figure) more legible/readable. Cant see it well. Besides, in pages 2 to 4 lines 1 through 40 of this same document of Chapter 6; the sections listings e.g. 2.1, 2.1.1 etc are not alligned. Guess coverting from word to pdf. Among other comments. [David Ojo, Nigeria]	Such editorial issues have fixed for the FGD version.
57808	149	1	149	3	I understand that these are not final figures, but I would recommend greater care be vested in all figures (i.e. basic figure quality) for the SOD. For example, Figure 1.1 has illegible text. Figures in the FOD PDF chapter files generally have low resolution/quality, which would be unacceptable for the final report and makes them more difficult to assess in the draft. [Peter Kalmus, United States of America]	Noted. This was mainly a technical issue that arose during the compilation of the FOD. The actual figures have a much better quality and their text is readable.
33288					This meta analysis highlights the emphasis placed on data homogenisation and modelling to predict future possible or probable outcomes. The use of models as tools for scientific research is valid and justified, however they should be used with caution. [Michael Schwabe, Uruguay]	Noted.
42760					Overall figures comments: I kept specific comments to graphics that I thought may be used with wider audiences (big-idea topics), so those were more present in earlier chapters (and late chapters had many placeholder graphics). Generally, lots of figures were missing units in figures and captions, which I assume will come with the SOD, but I also think being sure that acronyms are spelled out in captions is important - a graphic doesn't have to stand completely alone, but all other necessary comprehension information should be in the caption. Chapter 12 big-idea graphics were excellent. Overall excited to see more figures in SOD. [Stephanie Courtney, United States of America]	We appreciate the positive remarks on the Chapter 12 big-idea graphics. In the course of the second-order draft and final government draft we have undertaken extensive editorial review of the figures and ensured that units are provided, captions are clear, acronyms are spelled out, and figures are more coherently integrated into the text.
50696					When possible, in order to reach a wider audience, try to include in the figure captions the full names instead of the acronyms only. In particular, those that are not very well known outside the scientific community (e.g. PMIP, etc.). [Hernan Edgardo Sala, Argentina]	Taken into account. We have revised figure captions for a wider audience to better understand.
27156					The general tone of the report is unnecessaryly alarmist since the reason for this alarmism is unsubstantiated, even undemonstrated in view of the too large uncertainties. An important weakness of the report is that infrared spectra of the atmosphere, in particular those of CO2, are missing althought they are essential data in terms of metrics of greenhouse effect. Their very weak temporal evolution - so weak that it has been essentially unmeasurable up to now - would contribute to tone down the alarmism. [François GERVAIS, France]	Noted. The radiative impacts of CO2 are assessed in chapter 2 and compared to other radiatively active gases.
47638					Consistently use either PgC, GtC or GtCO2 throughout the report. For pblic understanding GtCO2 seems most appropriate [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. We have used PgC throughout the entire chapter, but use both PgC and GtCO2 in the remaining carbon section where it is most policy relevant and historically the numbers have been provided in GtCO2.
47640					Include regional and National per capita figures. Because Human Development is important for every aspect of the AR6, include emissions and other indicators for different development levels (UNDP HDI) [Birgit van Munster, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. The WG I report assesses physical climate information not socio-economic information.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
38946					Mentions and discussions on storylines/narratives are scattered in many places. Please arrange them and place a section where readers can comprehend thier concept and practice in the earliest part of the report. [Masahide Kimoto, Japan]	Taken into account. The discussion has been collected in section 1.4.4, although it is necessary to revisit it in 1.6 in the context of scenarios.
13614					Agreement' should be capitalized in 'Paris Agreement' throughout the report (although this is potentially 'editorial' I am marking it as 'substance' since it makes a material difference whether we refer to the 'Paris agreement' or the 'Paris Agreement' -- only the latter refers unambiguously to the relevant text.) [Stephen Humphreys, United Kingdom (of Great Britain and Northern Ireland)]	Accepted, text revised. Please note that the report will undergo professional copy-editing prior to publication, during this phase this kind of spelling mistakes should be fixed.
46382					Considering the main body of the report, final decisions and judgements are based on the document and available data. It is not clear how the final decisions and judgements are made. Are they based on scientific decision making method(s) or just simple descriptive statistics methods? It is necessary to illustrate the method(s) that the decision makers and experts use to make final decision. This could definitely help to increase the transparency of final judgements and decisions. If the scientific decision making methods could be illustrated, one may verify and track final decisions, suggest new ways of decision making or criticize [sadegh zeyaeyan, Iran]	Noted. The approach is described in box 1.1, we hope this is sufficient.
45874					The report should clearly cross-reference to assessments performed by other Working Groups and refrain from using information that has not been assessed as this may create problems with coherency acrossreports. Suitable references would therefore be AR5 WG reports as well as SR1.5. Items which are core in other WGs should not be discussed extensively in the WGI report. [Katja Mintenbeck, Germany]	Noted. Cross-referencing has been improved for the SOD, and there is ongoing cross-WG discussions on how to deal with topics assessed elsewhere that still form a critical foundation for WG1 (such as scenarios and the risk framework).
36150					The authors no doubt already account for the knowledge gaps when agreeing on confidence and likelihood qualifiers associated with their key findings, but readers may miss this when reading the knowledge gap text unless the text is carefully worded. If the knowledge gap text is written in too general or open-ended a way, there is a danger that this will weaken readers' confidence in the assessment conclusions of the chapters, particularly as they come right at the end of each chapter. I think the best way to mitigate this is to make the knowledge gaps text specific and to describe how each knowledge gap has limited confidence (and resulted in lower calibrated confidence/likelihood) in particular assessment conclusions of the chapter - as is done for example in the knowledge gaps section of Chapter 2, pg 94, ln 40-43 'Assessment of pre-instrumental evidence for the Pacific Decadal Variability relies mostly on paleoclimate reconstructions from the Northern Hemisphere, with limited evidence for the South Pacific Ocean, and, thus, changes in Pacific Decadal Variability over the last millenium have low confidence'. I suggest recasting knowledge gaps such as Ch 4 (pg 77, ln 48-52) 2) 'Translation of past performance into assessment of the quality of long-term projections' or 3) 'Potential for abrupt changes - this is the perpetual known unknowns question wherein a hirtherto unquantified positive climate feedback mechanism may come to play' into more specific text which links to the assessment conclusions of the chapter, and where these knowledge gaps have limited confidence in those assessments. [Nathan Gillett, Canada]	Taken into acount. In the FGD, the guideline given to chapters is to include any limits to the assessment (relevant topics that not be assessed). The use of the IPCC uncertainty language also reflect the state of knowledge on each topic being assessed.
9530					Work between chapter authors to adopt a common wording and convention for period 129-116ka, e.g., "last interglaciation" vs. "last interglacial" - it is currently confusing in multiple chapters, where the definition is switching between the two names, as well as their time scales. [Jeremy Hoffman, United States of America]	Taken into account. The SOD now contains a new cross-chapter box 2.1 which defines all paleo periods used and which al chapters have been requested to follow
57658					Considering the main body of the report, final decisions and judgements are based on the document and available data. It is not clear how the final decisions and judgements are made. Are they based on scientific decision making method(s) or just simple descriptive statistics methods? It is necessary to illustrate the method(s) that the decision makers and experts use to make final decision. This could definitely help to increase the transparency of final judgements and decisions. If the scientific decision making methods could be illustrated, one may verify and track final decisions, suggest new ways of decision making or criticize [Sahar Tajbakhsh Mosalman, Iran]	Taken into account. The chapter deals mainly with the generation of climate information. The formulation of climate messages and the role of the climate information in decision making are mentioned (through the concept of climate messages) to put the emphasis on the growing body of literature that explains that the basis for the messages and the decision making should be co-produced. However, the chapter does not illustrate the process through which the messages are constructed and the decisions are made because this is considered to belong to the remit of WGII.
27452					Many scientists are highly productive in their domains but I would like to invite writing teams to be careful regarding the risk of excess in citation of the same authors [Fatima Driouech, Morocco]	Noted with thanks. The review and subsequent revisions have helped broaden the divsersity of citations.

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27456					Many FAQs are very well chosen but some titles needs to be changed/reformulated to make the FAQ more attractive [Fatima Driouech, Morocco]	Taken into account, many FAQs have been renamed to make them more attractive (e.g. "FAQ1.2: At what point do we know it's climate change?" has now be renamed to " FAQ 1.2: Where has climate change become most apparent? ")
32584					The IPCC Sixth Assessment is the first opportunity for the international scientific community to offer a thorough critical evaluation and assessment of what the negotiators agreed to in Paris and whether what is proposed will meet the Objective set in the underlying Framework Convention on Climate Change, namely to avoid "dangerous anthropogenic interference" with the climate system so that, as the objective further states, ecosystems can adjust, food production can continue, and a sustainable economy can prosper. This objective is why IPCC is called on for assessments and it needs to be speaking to this fundamental responsibility and not just accepting the sort of ad hoc used of scientific results to come up with the Paris goals of peak temperatures not to be exceeded and without being at all clear on whether the proposed 1.5 to 2 C levels were to be considered as persisting indefinitely--were this to happen, it is not at all clear the UNFCCC objective would be met given that paloeclimatic data suggest an equilibrium sea level sensitivity to changes in global average temperature of something like 20 METERS per degree C, which would require relocation of vast populations and cities around the world over the coming few centuries. I do not think that the scientific community can just accept Paris without making very clear its long-term consequences (just looking to 2100 would be irresponsible to future generations) and that meeting the UNFCCC objective likely would require getting back to less than 0.5 C global warming within the 21st century if tremendous loss of mass of the Greenland and Antarctic ice sheets is to be avoided (with reasonable likelihood). All the focus on change in global average temperature is really obscuring the implications for sea level rise impacts--much less for impacts from ocean acidification. It must be IPCC AR6's role to really lay out the situation--and the UNFCCC objective needs to be the baseline criterion--not the Paris goals. [Michael MacCracken, United States of America]	Taken into account. The scoping for WGI AR6 has responded to the need to provide target climate information for policymakers. Sea-level rise is assessed in Ch9. The whole value chain will emerge through the AR6 SYR.
33362					There should be consistency throughout the different chapters in the report with respect to all units of measurement. [Michael Schwabe, Uruguay]	Accepted. Units have been made consistent
33364					This meta analysis endeavours to synthesise an enormous, complex and growing data base building on the previous five reports in the context of the IPCC mission statement. As an earth scientist endeavouring to assimilate and distill the direction of the research and how this relates to my areas of expertise I would make the following observations: Earth is presently in an ice age or at least an interglacial and also for much of the past 500 million years has experienced much warmer temperatures than at present (+/_25 degrees C) as compared to present global temperature (+/- 16 degrees C) There is presently a clear warming trend which at least in part can be attributed to human activities. Further research into the paleo temperature trends and drivers with relevent comparisons maybe productive [Michael Schwabe, Uruguay]	Noted. A substantial assessment of this long-term context is undertaken in section 2.3.1 which has been restructured to better emphasise the long-term context of recently observed changes.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
53844					The new structure has already given benefits in terms of new approaches to the assessments and presentation of the various issues in a policy relevant and scientifically solid way. But there is an untapped potential for getting more out of this. In terms of integrating different lines of evidence – one of the main motivations for the new outline – the chapters still can develop this further. I think we have to work further to make the individual chapters reflect the overall idea of the outline and use the different lines of evidence in a more systematic and integrated manner. [Jan Fuglestvedt, Norway]	Noted with thanks. In the SOD, a visual abstract of the contents is included for the different chapters. This has greatly improved the overall structure and readability of the report. Different lines of evidence have been integrated to enhance policy relevant aspects of the assessments. For example, the assessment of past, present and future water cycle changes presented in Chapter 8 integrates multiple lines of evidence e.g., paleoclimate records, instrumental observations, results from CMIP5 and CMIP6 experiments (D&A and projections), published literature, IPCC AR5 and Special Reports, National Assessment Reports. Ch8 also includes robust assessments of policy relevant topics in water cycle such as the components of water cycle, regional monsoons, droughts and floods, ground water, precipitation, evapotranspiration, soil moisture, snow and glaciers, aerosol effects on precipitation, among others. These robust assessments have emerged through integration of multiple lines of evidence and cross-chapter coordination (i.e., close interaction among large-scale, process-oriented and regional chapters).
33366					The use of complex verbiage throughout the chapters of the report detracts from clarity and concise documentation.This is a common problem with many scientific papers and may demonstrate in part a lack of clear understanding on the part of the author(s) or a desire to confuse the reader. In this form of meta analysis reporting, the target audience should be considered. [Michael Schwabe, Uruguay]	Taken into account. We tried to clarify the text when preparing the SOD.
44140					The citations appear to be somewhat dated relative to the current literature. Of course there are very recently published materials cited, but in a number of cases evaluated important works from 2017 forward did not seem to be well represented. Also, there are clusters of articles cited with some repetition, which appear to represent particularly well-known works or articles from specific groups of authors. This latter situation necessarily results from the way science works, and thus is expectable to some degree, but it tends to come across more like an academic article than an authoritative summary, and should be attempted to be ameliorated to the greatest extent possible. [Eugene Wahl, United States of America]	Taken into account. As the report develops it moves more into an assessment form. We acknowldged that some chapters were still at the review phase in the FOD. Hopefully, the review and subsequent revisions have increased and diversified the amount of recent references, while also summarising more clearly the current state of knowledge.
50540					Please check terminology for 'glaciers' throughout. Here (Ch. 1, P35, L10) and elsewhere I also fiind 'mountain glaciers' and 'mountain glaciers and ice caps'. Both are a specific sub-type of a glacier (like valley glacier or cirque). Moreover, 'ice cap' is often confused with the polar ice cap (meaning either the sea ice cover or the ice sheets). To keep it simple and in line with the GCOS definition of the ECV, I suggest using just 'glacier' throughout (e.g. as in Ch1, P41, L4). See also Ch. 2, P62, L25. [Frank Paul, Switzerland]	Taken into account in the FGD. We no longer use the term 'ice cap' and Harmonisation of glacier text and numbers has been done as far as possible.
8060					I understand that the images and figures are yet to be added. However adding more images or graphs representing the statistics throughout the report would help with better visualization. [Jaee Nikam, India]	Taken into account. Figures were added to the end of the chapter drafts for pragmatic reasons during the draft compilation. We have tried to strike a good balance between overall length of the report and useful information brought by figures and the general rule is to include a figure only if it has added value.

Comment ID	From Page	From Line	To Page	To Line	Comment	Response
50812					The result of the scoping meeting in Addis leading to the subsequent restructuring of the WG1 was the identification of a strong need to combine lines of evidence about aspects of the climate system and hazards. While the outline of WG1 does reflect this and is designed for different lines of evidence to come together the individual chapters to a large degree do not assess these lines of evidence but focus to a large degree on models and projections, while observations are assessed separately and some lines of evidence are completely left out, e.g. evidence from the attribution literature in chapter 12. It would strengthen the whole report very much if individual chapters would reflect the overall structure better. To achieve that each chapter could frame their methodology section around the different lines of evidence, e.g. observations, model projections, attribution, process understanding and conceptual models, indigenous knowledge.. in each of these sections the main tools can be described & their strength and weaknesses. E.g. Model biases matter in a different way if you use a model to do ensemble projections of a particular hazard as if single model runs are undertaken to increase process understanding. In subsequent parts of the chapter these lines of evidence can be repeatedly referred to, highlighting sectors where particular strands of evidence are. missing or strong. This would not only allow for a much better overview of what we actually know where but also would increase transparency of how we come to make confidence statements. This will not be equally easy to implement in all chapters, but chapters 11, 12, 1, 2 and 5-9 this should be relatively straightforward to restructure along these lines and in turn make the whole report more coherent and also improve the handshake. [Friederike Otto, United Kingdom (of Great Britain and Northern Ireland)]	The Final Government Draft now includes Cross-chapter Box 10.3 which is focused on the assessment of multiple lines of evidence (observed trends, attribution, future projections, physical understanding) which underpins WGI examination of regional climate information. Chapter 10 also now includes Figure 10.4 which describes the treatment of regional climate information across WGI chapters and connections to WGI and WGII. Technical Summary Table 5 (in Section 4.3) also summarizes the observed trend, attribution, and projected changes for each regional CID, with a traceback table to allow readers to determine the text location for each assessment within the WGI chapters. The final government draft therefore more comprehensively address the multiple lines of evidence and makes it easier for readers to track each assessment across the chapters.
37260					The reorganisation of chapters in AR6 compared with AR5 works well at a high level, but it results in a great deal of repetition. The reader is helped out a little by Table 1.7 and cross-referencing within chapters (better in some than others), but it does get a bit tedious to read repeatedly much the same thing. More serious is the risk that the assessment does not come to the same conclusion in one place as it does in another, and that some quoted numbers differ from one chapter or section to another. Some reduction of repetition should be sought, and cross-chapter editorial control needs to be tight for later drafts. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Thanks. Cross-chapter coordination was more extensive for the SOD than for the FOD.
25998					Probabilistic language: many statements in the report, especially in the executive summary, are accompanied by expressions relating to probabilities. There are two kind of statements: one referring to likelyhood and another referring to confidence. In statistics both expressions are related to a probability, so that the use of two different scales was quite confusing for me (teacher of statistics and applied physics courses). Then I found some explanation of this two different scales on page 36 of the AR5 (fourth page of the technical summary). From this explanation I learned that the assessment of likelyhood in the report is a quantitative assessment whilst the assessment of confidence is more qualitative. This is rather confusing for me since a confidence (interval) in statistics is clearly defined by a probability and a range and therefor is 100% quantitative. I would recommend to replace the expressions about confidence with the expressions you show in AR5 Box TS.1, Figure 1: if you are not able to quantify the uncertainty of a statement (which should always be the first choice) comment on the “robustness of the evidence” or the “agreement of the results” instead of invoking the word “confidence” which is a clearly quantitative measure. [Marius Schaefer, Chile]	Noted
37262					The treatment of methane is a case in point. It is referred to in some places as a long-lived greenhouse gas but in others as a short-lived climate forcer. It is described as well mixed without explaining that this is not the case in the stratosphere. There are lengthy discussions of methane in both Chapter 5 and Chapter 6. Chapter 5 asessess as "likely" that the resumed growth of methane since 2007 is driven in a significant way by emissions from fossil fuels and agriculture, whereas Chapter 6 states that there is" low confidence (low agreement and moderate evidence) in the causes of [the] methane increase [since 2007] because of uncertainties in source and sink estimates". We are told in Chapter 1 that likelihood statements usually imply confidence is "high" or "very high". So the assessment in Chapter 6 seems to be at odds with that of Chapter 5. This needs to be resolved. Consideration should be given to dropping much of the methane-specific discussion in Chapter 6 in favour of cross-references to Chapter 5, although clearly methane needs to be discussed in Chapter 6 with the regard to its relationship with shorter-lived climate forcers. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Chapter 5 and 6 are now consistent and come together with confidence statements in the cross chapter Methane box which seats in chapter 5.

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8848					Figure quality: Please include in the pdf ALL figures in vector format as we did with almost all figures in AR5 WGI. This makes easy use and outreach possible. Rastered figures and graphics (bitmat, tiff, jpg, png) represent an unnecessary compromise and reduce the quality significantly! IPCC should maintain the highest standards also with respect to figure representation. [Thomas Stocker, Switzerland]	Noted. The quality of the figures has decreased during the compilation of the FOD, to keep the size of the chapter file to an acceptable level. Published report figures will be of high quality and available for download on the IPCC website.
37264					A more unified use of concepts and terminology is needed. The glossary will help (when it presumably becomes available), provided authors follow it. Chapter 1 does well in indicating that it is the change to the climate system as a whole that is being considered, but later in the report there are occasional lapses into the "statistics of weather" definition of climate, which results in ocean acidification (a change to the state of the oceanic component of the climate system) being referred to as a side effect of increasing carbon dioxide that is additional to climate change, rather than a facet of climate change. The term "global warming" is also used rather loosely in a few places. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. We have tried to coordinate the terminlogy used across the chapters
37266					The topic of the approach of the atmosphere to the 1.5ºC above pre-industrial level is not handled very clearly. There is reference in Chapter 4 to a paper by Smith et al.(2018) that estimates the probability that the 1.5ºC limit will be temporarily exceeded in the coming five years, yet no mention is made as far as I could find to observationally based evidence that the limit may already just have been exceeded in February 2016, as shown in Figure 1.2 of SR1.5 and discussed earlier in the peer-reviewed literature by Simmons et al. (2017. doi: 10.1002/qj.2949). Also, very early in Chapter 4 we read that the CMIP6 ensemble indicates that the 1.5ºC limit will be exceeded on average in 2025, earlier than the beginning of the range quoted in SR1.5. Yet the answer to FAQ 4.1 states that If the current rate continues, a warming of 1.5°C above the pre-industrial level is expected to be reached by around 2040, as already stated by the SR1.5. Fig. 1 of Box 4.1 shows a reasonable-looking initialised ensemble for 2019-2018, and numbers may also change as more CMIP6 results come in. More clarity is nevertheless needed in the discussion. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter 4 now provides more comprehensive assessment of global surface air temperature change based on multiple lines of evidence, combining new projections driven by the SSP scenarios with observational constrains on past simulated warming as well as the AR6-updated assessment of equilibrium climate sensitivity and transient climate response. Timing of 1.5 degree warming is assessed in 4.3.1, 4.3.4, 4.4.1, and Box 4.1.
37268					The distinction between changes in GSAT (global-mean surface air temperature) and GMST (global-mean surface temperature based on blending sea-surface and surface-air temperatures) is treated very poorly. The conventional near-global temperature datasets are datasets of GMST anomalies, but the way they blend SST and SAT anomalies differs from one dataset to another, and the definition given in Chapter 2 is inadequate. Chapter 2 and Chapter 3 both incorrectly quote reanalysis results for GSAT as results for GMST, and GSAT and GMST seem to be used interchangeably in later chapters. There is no reference to the published discussion of GSAT/GMST differences based on reanalyses. The differences between GMST and GSAT are smaller than the spread between different GMST datasets, and similar or smaller than the approximation made by taking 1850-1900 as the pre-industrial level rather than a period around 1750. Further details on these points are given in comments on individual chapters. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. This topic is now more fully addressed in Cross-Chapter Box 2.3 in the SOD.
37270					Another omission is reference to Hansen et al. (2010; doi: 10.1029/2010RG000345), who wrote in their description of the GISTEMP dataset: "We use ocean temperature change only in regions that are ice free all year ... because our data set is intended to be temperature change of surface air." and "Change of sea surface temperature (SST) should be a good approximation to change of SAT in ice-free ocean areas; climate model simulations [Hansen et al., 2007] suggest that long-term SAT change over ice-free ocean is only slightly larger than SST change". Hansen and colleagues thus view GISTEMP as a dataset of changes (or anomalies) in SAT. They also recognise that their dataset will slightly underestimate the change in GSAT, all other things being equal. This was not noted in AR5 as far as I can see, so should be noted in Chapter 2 in addition to more recent papers on this topic. Hansen et al.'s view is also that adopted in comparisons of the GMST datasets with the GSAT values from reanalysis: the GMST datasets were viewed as being intended to approximate GSAT. The Paris Agreement is unclear in its reference to "global average temperature", but the limit of 2ºC arose from model projections of GSAT not GMST. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Noted. The entire treatment of the GMST vs GSAT issue has been revised via inclusion of new cross-chapter box 2.3 which now in more detail discusses the many issues around non-equivalence between observations and projections and the implications thereof. Hansen et al., 2010 has been superseded by a new GISTEMP paper which is now cited in its stead in the main text.

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37272					In light of the preceding two comments, the simplest way of fixing this problem would be to treat the GMST datasets as approximate GSAT datasets, following the view of Hansen and colleagues. Reference could still be made the GMST/GSAT differences as one of the several sources of error in these datasets. This could be done in just one or two places; all other references would be to GSAT rather than GMST. Otherwise, a good deal of checking, correction and qualification is needed. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Noted. See response to 37270
37274					It is good to see Chapter 2 cautioning against use of earlier versions of certain SST products, and it is good to see in later chapters discussion on the blending of results from models of different capabilities or degrees of independence. But I do not see similar cautions or discussion regarding the results from reanalyses. Indeed, spread among a set of reanalyses is often used to indicate lack of confidence. This is reasonable if reanalyses of a particular generation and type of data use are compared. But there is a tendency for papers to mix results from different generations or categories of reanalysis. Newer reanalyses are carried out largely because they are expected to improve on earlier versions, so spread is to be expected when results from different generations of reanalyses are compared. Also, the often-mentioned sensitivity of reanalyses to inhomogeneity of the available observations depends on the quality of the assimilating model, and more generally of the background forecast: the better the background forecast, the less the change due to observational data that conflict with the background. So one would expect newer reanalyses to be less sensitive to changes in the observing system than older ones - even if this is not invariably the case. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter 1 involves a discussion of recent advances in reanalyses. Where chapter 2 uses reanalyses to derive its own estimates efforts have been made to use the latest products wherever possible. Also, the results based upon older versions attempts have been made to caveat suitably. However, reanalyses are used elsewhere within the report and further efforts may be required to ensure this is also applied elsewhere.
37276					A related issue arises when results are presented that use several of the conventional GMST datasets. This rarely takes account of the interdependences of the datasets. The latest versions (v5 and v4 respectively) of the NASA/GISS and NOAA datasets use the same NOAA SST analysis and a common NOAA set of station data. HadCRUT4 and the Cowtan and Way dataset do not differ where HadCRUT4 provides data values - only where HadCRUT4 cannot provide an analysis does the Cowtan and Way dataset provide something different. Failure to acknowledge the interdependences gives a false set of the robustness of results from these observationally based datasets. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. The dependencies are better articulated in the SOD
37278					Chapter 1 is admirably clear in stating that the pre-industrial period is taken to be that around 1750, and that changes in observationally based temperatures from the 1850-1900 average are used as an approximation for the change since the pre-industrial period, and are probably a slight underestimate. It is welcome that cross-chapter box 1.3 introduces the terms "pre-industrial baseline" for the period around 1750 and "early-industrial baseline" for 1850-1900. However, one reads in places in later chapters text such as "the pre-industrial level (1850-1900)", which is neither correct nor consistent with this terminology. This is something to look out for in later editing of the report. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. This issue was the subject of a substantial cross-chatter meeting at LAM3 and the outcomes of that meeting shall yield a more consistent treatment of this issue across the report.
37280					Also for the editing stage, the reference to past dates and periods needs some work as ka (or Ma) is commonly used to refer to a time period before the present (although there is at least one stray BP added), but ka (or Ma) is also used to denote a timescale of a thousand (or million years). One can work out from context what is meant, but this does not make for a smooth read. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Noted. We have tried to better standardise and improve this across the report especially via the addition of cross-chapter box 2.1
37282					Referencing the scientific literature rightly concentrates on papers published since AR5. But sections and chapters vary a bit in the extent to which they refer to papers dated prior to AR5. Clearly authors must have some freedom to refer to ealier papers as essential historical background or where this enhances appreciation of the point being made, but the balance across and within chapters could be better in this regard. [Adrian Simmons, United Kingdom (of Great Britain and Northern Ireland)]	Noted. This variation in citation of pre-AR5 literature was highlighted at LAM3 and efforts are made to be more consistent in approach across chapters. However, some variation is inevitable reflecting the different charges given to chapters

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31654					General comments on the review process: Add the possibility to use a web interface to read and comment the report with some usefull features as for example: Possibility to click on a citation and then a box on the right/left display the full citation with possibly a link to the journal review. Similar feature for a picture (no need to open twice the pdf) Add the page number in the top of the page as well (useful if screen not wide enough Pre-filling option comment files when selecting words/lines [Pierre Mathiot, United Kingdom (of Great Britain and Northern Ireland)]	Noted. Chapters are compiled as such for practical as well as resource capacity reasons during the drafting and reviewing process.
52908					The use of the term evaluation seems to vary across chapters. In my view (and this is how the term is used in Chapter 10), evaluation refers to a performance assessment. This is different from an assessment of projection uncertainties. Here, we should agree on a common usage. Currently, many evaluation sections (e.g, in Chapter 11) actually discuss projection uncertainties rather than model performance. [Douglas Maraun, Austria]	Taken into account. A discussion with Chapters 3, 11 and Atlas has been started to agree on a common definition of the terms evaluation and performance.
48564					Dear Authors, thank you very much for writing a very nice report. In my opinion it covers most of the topics however there are few places which needs small modification. I have provided my comments Chapterwise below: [Pushp Raj Tiwari, United Kingdom (of Great Britain and Northern Ireland)]	Thank you.
58046					Observed changes in ocean heat content are assessed in three separate chapters (2, 7 and 9), with little cross-referencing and slightly different assessments in 7 and the other chapters. Chapter 7 (pg 16, ln 7-8) 'There is medium confidence that global ocean warmed from the 1870s to 1971 and very high confidence that the global ocean warmed between 1971 to present'. Chapter 2 (pg 69, ln 29-30) 'It is virtually certain that the global ocean warmed substantially between 1971 and present' and Chapter 9 (pg 19, ln 15-17) 'It is likely that the global ocean warmed between the 1870s to 1971 (medium confidence) and virtually certain that the global ocean warmed between 1971 to present'. The authors should decide which chapter will make the primary assessment on this topic, and the other chapters should then just summarise that assessment. [Nathan Gillett, Canada]	Noted. Closer coordination across chapters has been established to ensure consistency across chapters.
36294					According to Mastrandrea et al. (2010) - Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties, 'Likelihood, as defined in Table 1, provides calibrated language for describing quantified uncertainty' and 'Likelihood may be based on statistical or modeling analyses, elicitation of expert views, or other quantitative analyses' i.e. likelihood language should be used to communicate quantified uncertainty where there is an underlying quantitative analysis. Currently in many places in the report likelihood language is used without a description of underlying quantitative analysis of the probability associated with assessment statements. For example, Ch 5, pg 7, ln 24-26 'Shelf systems, particularly upwelling systems, are likely susceptible to the combined and strengthening influence of ocean acidification and ocean de-oxygenation in the tropical and sub-tropical ocean interior.'; Ch 2, pg 7, ln 46-47: 'It is likely that there has been no significant trend in globally averaged streamflow over the last century.'; Ch 4, pg 7, ln 26-27: 'It is very likely that ENSO-related rainfall variability over the Nino3.4 region will increase significantly regardless of ENSO amplitude changes by the latter half of the 21st century (medium confidence)'. In such cases, the authors should either add information to the chapter on underlying quantitative analysis, or if none exists, based on Mastandrea et al., it would be more appropriate to use confidence qualifiers only. [Nathan Gillett, Canada]	Accepted. We have revised chapter for SOD and FGD to ensure proper use of uncertainty language.
56010					Please discuss the relevance emissions of molecular hydrogen on climate change. Hydrogen e.g. influences the lifetime of CH4 and O3 through consumption of OH radicals. Further, molecular hydrogen can change the amoung of stratospheric water vapor, which in turn influences polar stratospheric clouds and stratospheric ozone chemistry. If future energy systems, hydrogen is expected to play an important role, and thus the emissions (through losses) of molecular hydrogen might increase dramatically. [Urs Ruth, Germany]	Molecular hydrogen is beyond the scope of chapter 6 as none of the SSP projection incorporate molecular hydrogen emission projection. However the need to assess the consequence of massive technology deployment envisaged to mitigate climate change and in particular their consequence on atmospheric chemistry is mentioned as a future perspective at the end of the chapter (in its FGD version).

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13260					Checking Chapters 1, 2 and 5, I cannot see a definition of the numbers being signs ±, apart from Section 5.2.2. In other words, uncertainty quantities are not defined. This is very embarrassing since some communities use 1 sigma and some use 2 sigmas, while some papers may use other definitions. In the absence of any agreed definition beforehand, the authors should check the source of all their numbers beind ± and clearly define them. [Frederic Chevallier, France]	Accepted. We have made clear whether it is one or two sigmas, in some instances like carbon budget, we say we use one sigma only throughout.
52688					I am missing an integrated and in-depth discussion about how model performance in present climate can be linked to the credibility of future projections. I think we definitely need such a discussion in Chapter 1, such that we can refer to it later in other chapters (e.g., 4, 8, 10, 11, 12). This discussion should link to the discussion of adequacy for purpose in the philosophy of science literature. A key paper has been published by Wendy Parker in 2009. As Wendy is CA of chapter 1 already (in the context of values), an extension should be relatively easy. In Chapter 10 we already refer to such a section, maybe our section could provide some guidance (or at least serve as a starting point for discussions). Currently such a discussion is completely missing, apart form emergent constraints and vague statements. That is, the report currently provides no line of argument about the question why we have any trust in our projections, which are strong extrapolations beyond what we have experienced. I strongly urge Chapter 1, 4, 10 (and possibly others) and the bureau to have a cross chapter discussion on this issue at LAM3. [Douglas Maraun, Austria]	Taken into account. Fitness for purpose for projections of CMIP6 models is now assessed in Chapter 4.
52690					I often had the impression that the quality of individual papers had not been assessed, but this is crucial for the overall assessment and credibility of the whole report. In some cases I know that the methodology of papers is flawed, so they should either not be cited or – if they merit discussion - not being included in confidence statements. It does not make sense to weaken a confidence statement because evidence appears to be contradictory if we know that some of the evidence is wrong. We therefore should really read the papers, not just the abstracts. [Douglas Maraun, Austria]	Taken into account. Considered in drafting the SOD.
56532					The question of model evaulation is an important one, especially as it has no specific chapter in the AR^ structure. In several places in the cahpters I reviewed I saw some statements on model evaluation that were relevant to the models' reliability for specific topic being discussed. I think this worked well. Necessarily at this stage much of the literature discussed is based on CMIP5 models. That will still be the case in the final version of the chapter. Much literature on evaluation of the CMIP5 models has appeared since AR5. Indeed I would expect the majority of the modelling literature assessed in AR6 to be based on CMIP5 models. I therefore think it is important that subsequent versions of the report maintain a thorough evaluation discussion of the CMIP5 models on which many of the results are based, as well as bringing in the (early) CMIP6 resuts as they become available. [Richard Wood, United Kingdom (of Great Britain and Northern Ireland)]	Noted. This is exactly the approach taken across WGI AR6.
17884					Figures should have been presentend where discussed, not to jump back-and-forth. This is a general comment to most of the Document. Another general comment is that figure captions very often way too long. Science should be condensed; supplementary materials could go aside, not directly into the main body, especially not for Introductiory parts. [Branko Grisogono, Croatia]	1) Noted. Chapters are compiled as such for practical reasons during the drafting and reviewing process. 2) Re. the length of the captions this is taken into account. However it is not always easy to strike a balance between length and completeness of a caption.
46310					propose to add "Also, there is evidence that the increase in air temperature affects the operation of hydroelectric turbines and reduces the efficiency of transformers." [sadegh zeyaeyan, Iran]	Not applicable. This is not clear what parts of the report this comment refers to.
49126					I refer to Chapter 9, where a reference was made, pg 40 line 3, to section 2.3.2.1. Based on the cross-reference, the following observation is made: Since there are overlaps with the topics in Chapter 2 will all of the subject matter in the rest of the geographic/regional chapters, there should be reconciliation of the information in between Chapter 2 and the geographic/regional chapters to ensure that Chapter 2 is collecting information from the other chapters in oredr to assess global and large scale trends and comparison of changes noted by the geographic and regional chapters. [Zelina Zaiton Ibrahim, Malaysia]	Taken into account. References to other chapters and relevant sections incorporated as appropriate.

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45546					The definition of "equilibrium climate sensitivity" in Chapter 7 willl need attention from the broader authorship. The given definition is now based on a linear extrapolation from the behaviour seen in the first 150 years, but new Longrunmip GCM runs predict equilibia 10-20% higher than this linear extrapolation. The linear extrapolation was implicitly used in AR5, presenting somewhat of a conundrum. In the past people have conflated these two quantites, but that isn't really possible now. It might be best to avoid an exact definition of ECS, or to refer to "Effective Climate Sensitivity" (defined via the linear extrapolation). [Steven Sherwood, Australia]	Noted. The Report defines ECS exactly as the long-term response but also notes there are approximations to this.
42732					Figure 2.10 is an example, but many of the vertically stacked graphs in the report should have spacing adjusted - often x-axis labels are closer to the graph below than the axis it is labelling so the labels are easily confused for titles of the graphs below. [Stephanie Courtney, United States of America]	Taken into account. All figures have been revised with a view to the IPCC style guide which authors were reminded of at LAM3.
57586					propose to add "Also, there is evidence that the increase in air temperature affects the operation of hydroelectric turbines and reduces the efficiency of transformers." [Sahar Tajbakhsh Mosalman, Iran]	Not applicable. This is not clear what parts of the report this comment refers to.
54774					I really like the new way the report is organized, and I think it works very well. It is very nice to have model evaluation and attribution closely linked, and the watercycle chapter is also a nice addition. This new organization of course also means there is potential overlaps/conflicting assessments that need to be watched ourt for - i looked mostly at ch3, 7, 8, 11 and found a few instances that are tricky and could maybe use aa crosschapter group (this is probably already happening so i apologize if this addresses something well known. Also, will e.g. the palaeopeople know that ECS from palaeo is in chapter 7? this needs to be very well reviewed the conclusions are quite strong [Gabriele Hegerl, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Better signposting has been added for cross chapter considerations and these elements carefully reviewed for the SOD
54776					1) there is a very confident and detailed attribution of temperature trends to forcings in CH7 that appears stronger than what CH3 can do. This uses different assumptions than are usually used for these barcharts and I think This needs to be flagged / resolved.C20 [Gabriele Hegerl, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Chapter 3 and Chapter 7 attributions are made consistent for SOD and FGD
16122					Too much of repeated info, that unnecessarily extends the Report. [Branko Grisogono, Croatia]	Accepted. Report has been significant streamlined by removing redundancy.
54778					2) there are observed rainfall trends in ch2; attribution of rainfall and related in ch3; and also somewhat in ch7; and then rainfall extremes in ch11. [Gabriele Hegerl, United Kingdom (of Great Britain and Northern Ireland)]	Noted. No action requested
54780					3) chapter 11 is really nice and useful - there might be potential for overlaps and divergent assessments with WG2; for example flooding? [Gabriele Hegerl, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. We have established serveral cross-working group teams of authors to help address overlaps and inconsistencies.
16126					Too much talking about science behind, too little of the formal substance. Let the other Working Groups do politics, not the WG 1 already. [Branko Grisogono, Croatia]	Rejected. We see the point, but consider the current global context to be critical framing also for the particular questions asked and assessments made in WG1.
26878					The citing method to include the authors names and publication date inside the text makes reading the text very difficult. I would highly appreciate if the citing method were changed. Making the text more "readable" seems important to make the reports accessible to as many readers as possible. Example: Chapter 8, page 8-114 starting at line 36 -> very difficult to read. Text relating to content is much shorter than the text relating to the citation. [Thomas Ackermann, Germany]	Rejected. This citation method is standard in the literature of the climate sciences and is following past IPCC practice.
33278					For a report such as this would expect a more comprehensive glossary of terms, definitions and, abbreviations. [Michael Schwabe, Uruguay]	Noted. The glossary presented in the FOD was not a finalised list. It has been expanded in the SOD but and will continue to develop before the FGD is submitted.