SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
1664	1	0	0			Please also consider to include relevant findings from the SR15, for consistency among the IPCC products. [Aurora Stenmark, Norway]	Taken into account: SR 1.5 report is referred in section 1.1; 1.3; CCB1; section 1.6; section 1.9.1.2; 1.9.1.3 and section 1.10
2774	1	0	0			A lot of material has been gathered but I don't think it is presented well enough to capture the attention of the reader and with enough scientific accuracy. [Anne Guillaume, France]	Taken into account: The chapter has been revised.
2776	1	0	0			English is badly used. More than once, error in the use of the language is turning into a scientific error or into a statement that cannot be understood. I have the greatest doubt that editorial alone will be enough. [Anne Guillaume, France]	Taken into account: The chapter has been revised.
2778	1	0	0			This whole chapter need major restructuring and rewriting to put put forward what is important and to limit the content to what must be in an introductory chapter. Here, the reader is lost between definitions and results that one cannot understand (and that will be explained in the next chapters). In the present state, this chapter is all very confusing and undermining the strength of the incredible effort that has been made. It is very important that sentences be short and complex ideas identified to be treated accordingly. [Anne Guillaume, France]	Taken into account: The chapter has been extensively revised, and restructured in some places
2780	1	0	0			I have found the chapter title and many of the sections titles more off-putting than informative. About the content of the sections, one has to read several times nearly the same thing, not quite, as if sections were written by different people. These should identified and done once with greater scientific accuracy and in a form and in a language more precise and more appropriate for a reader. This is very important to get people to read such an important report and get the feeling that this is good science. I understand that this is an introduction to the report (and not a summary). Please make it an INTRODUCTION (avoiding text better placed in the next chapters) [Anne Guillaume, France]	Taken into account: The chapter subheadings have been partly revised. See table of contents.
2782	1	0	0			There are far too many sections and a lot of redundancies. I would suggest that Box 1., section 1.2 and section 1.3.1 and a few others pieces be merged in one section « Ocean, Cryosphere and Climate Change » for the physical sciences elements. Next a section such as « Interactions with Human and Nature ». And last, a section that gathers 1.7 and 1.8, insisting on the novelty to include Indigenous and local knowledge (this is part of the methodology too).This later section should also mention the previous IPCC reports (highlighting the « outside natural variability ») together with the many social concerns expressed by so many countries during previous IPCC Conference that resulted in the demand to produce THIS report. The « Why this special report? », line 1, is not quite that « The ocean and cryosphere play fundamental roles » as the opening phase reads but because the demand has built to ask for it. From the very beginning, the authors should define and insist on « outside natural variability » and on « urgency ». One may consider moving this later section higher to the beginning. [Anne Guillaume, France]	Taken into account: Duplication is removed (between box 1.1 and section 1.2.1) and made consistent with other chapters. Section headings were also changed.

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2784	1	0	0			This chapter should aim at becoming broadly accessible and should avoid using IPCC internal phrasing or at least introduce them with a clear definition. I would also urge the authors to pay great attention to the interpretation a reader may have based on everyday language practices. Example, « storyline » should be avoided in this introductory chapter : are we reading a story (i.e. fakenews) or a scientific report?; The use of technical terms should be standardized, with the easiest to be preferred. Example, acidification to be used and preferred to « Ph decreasing », « natural » to « unforced »… [Anne Guillaume, France]	Rejected: The term "storyline" was part of the approved outline for this special report and will be retained.
2786	1	0	0			About the use of « services ». This is introduced as early as page 5 line 5, without a proper definition. I would like to emphasis that it not only has an IPCC meaning, but it is a language that carries an ideological background (economic thinking, capitalistic view,…) that clashes with the aim, and novelty of this report, to bring in indigenous and local knowledge. Authors should be more aware of this in their writing. Extremely important in this first chapter. [Anne Guillaume, France]	Rejected: "Services" are extensively used in the natural and social sciences and does not always cayy an ideological conotation or an economic thinking. It was defined (for example ecosystem services) in IPCC AR5. We have also moved the section on ecosystem services framework to be it's own sub-section in 1.5.1, to make this concept more visible.
5066	1	0	0	0	0	General Comment: To use the abbreviation "IPCCAR5" instead of "AR5" to avoid any misunderstanding or conflict. [Essam Hassan Mohamed Ahmed, USA]	Taken into account: We have brought consistency of terms used.
5226	1	0	0			Chapter 1 reads well and provides a good introduction to SROCC, with some good Figures - thanks! [Pauline Midgley, Germany]	Thank you.
6750	1	0	0			Consistency of the "Oxford comma" - there are a few examples in sections 1.4-1.7 where one should be added to match the rest of the report. Pg 20, lines 1, 2, 6 and 40 for example. [APECS Group Review, Germany]	Taken into account: This is a good suggestion. We have tried to fix the problem in the entire document
11032	1	0	0			While this chapter represents Indigenous and Local Knowledge fairly (especially in section 1.7) it makes no direct reference to the action potential arising from Local and Indigenous autonomous governance norms and systems that generally are fully integrated with the respective ILK ways of knowing. Part of the difficulty of integrating ILK and Scientific Knowledge precisely arises from this difference in orientation, insofar as ILK is not necessarily any the less 'objective' than Scientific Knowledge but tends to be more interwoven with normative assumptions. See for example, Crate and Nuttall (2009). Also Ulloa (2010). Crate, S. A. and M. Nuttall, 2009: Anthropology and Climate Change: From Encounters to Actions. Left Coast Press, Walnut Creek. Ulloa Cubillos, A. (ed.), 2009: Perspectivas Culturales Del Clima. Ilsa, Universidad Nacional De Colombia, Bogotá, Colombia. ISBN: 978-958-719-735-8. [Thomas Heyd, Canada]	Taken into account: We have done significant rewriting for the SOD. Please see the revised sections 1.8.2 and 1.8.3 and CCB-3.
11746	1	0	0	0	0	It was convenient [Hanieh Zargarlellahi, Iran]	Rejected: comment unclear
17176	1	0	0			While the terms 'coastal' or 'low-lying costal areas' represents an aspect of islands, neither term sufficiently subsumes small island context when considering the potential scale of impacts (economic or otherwise) may, in some cases, affect the entire nation State, in the case of small island State. Suggest adding small isalnds context along the listing of low-lying coastal areas, polar and mountaneous areas. [Iulian Florin Vladu, Germany]	Accepted; Text changed in CCB 2 to include this comment.
18364	1	0	0			Please check: Few placeholders are there to be addressed in SOD [Suvadip Neogi, India]	Accepted: all placeholders have been completed or removed for the SOD

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18366	1	0	0			Please check: Style/format of sections/sub-sections, captions, tables, figures and citations/references as per the style guide of thspecial report SROCC [Suvadip Neogi, India]	Accepted. Changes done accordingly.
18368	1	0	0			Please check: This chapter contains little information on greenhouse gas emissions from permafrost thawing, contribution to global warming and positive feedback to climate change. This might be relevant and worth mentioning. [Suvadip Neogi, India]	Accepted: This has been developed as a case study for Cross Chapter Box 4 that is associated with chapter 1
18500	1	0	0	0	0	There seems to be a lot of repetition with pretty much the same statements repeated in different parts of Chapter 1.2 and to a degree in Box 1.1, e.g. Connection of ocean and land ice through snow melt, sea ice formation and deep circulation, etc. [Angelika Renner, Norway]	Accepted: text changed
19068	1	0	0			By focusing on oceans and cryosphere, this special report like almost no other deals with often irreversible impacts of climate change that already have or will almost certainly exceed the limits to adaptation. Massive change in marine ecosystems, mass bleaching of tropical corals, disappearing sea ice and glaciers, and rising sea levels threatening islands and low lying costs today often leave little to no room for adaptation. It is in this context of these risks that the concept of loss and damage has gained prominence in political and scientific circles (>160 papers dealing with Loss and Damage in SCOPUS listed journals as of June 29 2018). The special report on 1.5°C has included the concept and term. Clearly, a lot of additional work and clarification needs to be done for this concept to be advanced, but it seems inappropriate for this special report to ignore the issue pretty much altogether (with only one single sentence mentioning it in CC Box 1). The governmentally approved outline of the report calls for information on limits to adaptation, a concept linked to loss and damage, in Ch 01, 03,4 and 5. This has not been reflected in the outline of any of the chapters. As a suggestion, Ch 01 could include a box outlining the approach to limits to adaptation and loss and damage used throughout the report and each chapter include respective information in their ES. [Carl-Friedrich Schleussner, Germany]	Accepted -- Loss and damage has been integrated to now play a much stronger role in the framing of chapter 1 and the assessment of the other chapters, notably chapter 6.
19388	1	0	0			Ensure consistency of UK versus USA English spelling throughout the chapter / report [Michelle A. North, South Africa]	Accepted: Consistency checked.
21152	1	0	0			I found this chapter difficult to read because of the ambiguity in the language. A glossary is centrally important and should be applied throughout. For example, page 10 considers 'forcing variables'. In the first instance, a forcing variable relates to anthropogenic climate change while in the second instance it could be any variable that forces change in the climate system. This relates specifically then to the description of forced and unforced variability. This is very cumbersome language. In literature on hypothesis testing etc, it is simply distinguishing between two hypotheses - one with change and one without change (as illustrated in the figure). I suggest the language be made simpler to convey these simple principles. Tipping points is another term that could be replaced by thresholds becuase the examples given are not signs of the system tipping to a new state but that it (mean state or variability) may have passed beyond a point of what may be expected from variability in the absence of anthropogenic climate change. [Andrew Constable, Australia]	Taken into account: This is a very general comment and CLAs have taken this into account while revising the chapter.
21300	1	0	0			This is an outstanding report. One comment in passing is that references to AR 5, whereever appropriate, should be supplemented with references to more recent pertinent literature. [Sanjay Chaturvedi, India]	Taken into account: AR5 has been refereed now throughout the chapter - 55 places to be precise.

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22444	1	0	0			overall, be carefull fo the use "support" which often imply a financial support, a synonym might be better perceived and understood [Timothée Ourbak, France]	Taken into account: It has been taken into acount while editing the chapter.
22534	1	0	0			The chapter looks well organized and very informative. [Toshio Suga, Japan]	Thank you.
22946	1	0	0			generally chapter 1 seems to imply that ocean uptake rates have and will remain the same and we know that this isn't the case. E.g. see previous comment and example Watson et al, 2009 reference. For example the 'open ocean' is missing from the 'Risks to the natural system' which seems unusual as it implies that we don't need to worry about the state of the open ocean. it hard to discuss the need for governance (section 1.6) of the open ocean if there are no perceived risks. [Jamie Shutler, UK]	Taken into account - particuarly in sections 1.2, 1.4 and 1.8. We also collaborated with the chapter 5 team to give more weight to the ocean carbon uptake section in that chapter.
22948	1	0	0			fig 1.4: the satellite era and substantial growth in satellite platforms doesn' seem well captured here. Surely there should be a upward trend in total satellites as you reach into 2005. e.g. see figure 1 of Shutler et al., 2016 http://journals.sagepub.com/doi/abs/10.1177/0309133316638957?journalCode=ppga [Jamie Shutler, UK]	Taken into account: We have modified the way that remote sensing parameters are presented in Figure 1.3, but do not attempt to demonstrate the number of satellites through time.
22954	1	0	0			section 1.7.2.1 omits that observations are key for constraining and evaluating earth system model performance. It also omits that observations are key for model development [Jamie Shutler, UK]	Taken in to account - covered in section 1.8.1
22958	1	0	0			the use of the phrase 'climate model' throughout this chapter is a bit misleading. We are talkig about earth system models. Climate models were pre-2007 and are now outdated so I feel that this underplays their complexity and confuses pre2007 modelling with current methods [Jamie Shutler, UK]	Taken into account - particularly clarified in sections 1.8.1 and 1.9
22960	1	0	0			there seems to be inconsistent use and altering use of the phrase 'climate change' and 'anthropogenic climate change'. Can you check that we are consistent with the use of these phrases within this chapter? [Jamie Shutler, UK]	Noted
23148	1	0	0			Figure 1.2 has a spurious blank line and a dangling "and" on its right block. This figure could be more lucid generally. [Aimé Fournier, USA]	Taken into account -- the figure has been changed in the revision process
23348	1	0	0			The opening (p. 5, line 24) says that the Report: reports on specific aspects where knowledge has emerged since the IPCC Fifth Assessment Report (2013–2014; AR5)" , however, many statements in the chapter reder to AR5 and the references that are (much) older than the AR5. [Inga Koszalka, Germany]	Taken into accout: AR5 has been refered to at 55 places now. Please also refer to comment 21300.
23530	1	0	0			Please capitalise IPCC products and institutions consistently [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
23532	1	0	0			Please be consistent in the capitalisation of terms such as "Antarctic Ice Sheets" [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
23534	1	0	0			When referring to a species, please provide the species' scientific name at its first mention [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
23536	1	0	0			define all acronyms at first mention [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
23542	1	0	0			iplease adhere to the IPCC styleguide consistently when using numbers, mathematical operators, SI units etc. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
24316	1	0	0			The chapter needs bring out the storylines across chapter accompanied by prominant results from the other hapters [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: we have tried to make the overall SROCC storyline more prominent, but have not brought prominent results from the other SROCC chapters into chapter 1, so as to not pre-empt their findings.

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24318	1	0	0			Wording of headings needs work to clarify the content of sections [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: Wording and structure of sub-headings has been revised
24532	1	0	0			Avoid policy prescriptive language such as "need to" and "is critical" [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
24534	1	0	0			Executive summary should seek to convey more specific overarching messages that go across the the whole report and provide context, e.g. concerning the interaction between ocean and cryospere, relevance of both sectors for human sector, fraction of human population exposed or vulnerable, climate regulation, overarching links between ocean currents and biology on land and in the oceans, ecoysystem impacts etc. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: accepted, the ES and section 1.1 have been revised extensively to bring in the value propositions and urgency related to ocean and cryosphere change.
24536	1	0	0			many statements in the chapter would be much stronger if accompanied by the respective quantitative information, more specific than e.g. saying "billions of people" (l. 29, p. 17). [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: we have added more quantified information in the chapter revisions
24538	1	0	0			ocean and cryosphere changes should be quantified, where if not in this chapter from the point of view of summing the changes observed e,g. across all parts of the cryosphere, considering mass balances of ice sheets etc. (e.g. https://doi.org/10.1038/s41586-018-0179-y, Nature) [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: we removed mini-assessments from the chapter text, and instead presented quantified statements from the SPM of AR5 as a starting point for framing the need for SROCC. We have not attempted to synthesise the findings of the SROCC chapters in chapter 1 as we feel that this would detract from the assessments in those chapters
24542	1	0	0			definitions should be checked in whether clarity is maintained across discipliines and WGs, e.g the definition of natural systems will likely lead to misunderstandings and may reflect WG history more than usefulness. Same applies to definitions of risks and impacts where changes in the physical systems should not be called impacts and both terms should be applied to vulnerable systems only. It seems that some clarification is still needed. In many sections of the chapter the term "natural systems" is used with unclear meaning in whether it addresses physical systems or ecosystems. In many of these it would just be ecosystems. Suggest to consider abondoning the term natural systems in this report. [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account. The draft Glossary has been developed in parallel with the chapters, and all authors are working towards consistent use of definitions. Natural Systems specifically is now better defined in the chapter, and is part of the glossary.
24554	1	0	0			Cross-chapter boxes describe framing and interesting examples but could be more specific in their conclusions that might be relevant to be lifted to Executive Summary and SPM [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account, including strengthening messages from the CCBs in the ES
24556	1	0	0			The framing is quite comprehensive with a few exceptions addressed in further comments. Chapter 1 of the 1.5 report may be a good role model to illustrate how relevant finds of the framing chapter can become relevant for the SPM. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: It has been taken into account
17248	1	0	33		33	Reorder, imapcts on human health should come before impacts on infrastructure [Iulian Florin Vladu, Germany]	Accepted: Text has been revised.
22164	1	0	39		39	State instead of Government; see definition of governance p. 37 [Bleuenn Gaëlle Guilloux, Germany]	Accepted: Text has been revised.

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12032	1	1	0	72		It is the high speed and magnitude of radiative forcing change and resultant speed and magnitude of global temperature change relative to historic precedents in Paloe climate that constitute the gravity risk to humnan society and the ecology of the planet. This sentance needs inclusion otherwise the risk is not clear. It must also be illustrated with hard facts e.g. the mean annual CO2 increase to date is >70 time s faster than during the emergence from the last glacial minimum (a period where global average suface temperature rose from a mean of about 8C by about 5C to a mean of 13C in ten thousand years and which was acompanied by 120m in SLR to arrive at near present day levels. RCP8 is easly a warming over 50 times faster. The report is for policymakers and lay people. It is important to restate basics if one is to impart knowledge to enable understanding of the problem and so appreciate the risk and nuances around it's assessment. My comments will focus on this theme. The speed and magnitude measurement relative to Earth's history is relevant to almost every risk assessment in this report and should in my view be considered in every chapter summary. [Michael Casey, Germany]	Noted. Section 1.4 has been rewritten, including adding paleoclimate context, and findings of the recent 1.5° report added.
21024	1	1	0	54		I respect the effort that clearly went into crafting this chapter. But it's a tough read. This is a complex, wide ranging report. This chapter has too much detail on the Cryosphere and Earth system and not enough on the Framing and Context, ie not enough big picture about the report itself, conclusions, and the assumptions. MOST IMPORTANTLY, this chapter needs to explain that this report assumes--throughout--that current trends will continue and that adaptation efforts--currently in use and suggested for the future--will be required especially because of intertia in the system. I concur. But for a policymaker reading this report, I feel like this chapter needs to say "The Cryosphere is the most vulnerable part of the earth to warming; WE SEE THIS AND THIS HAPPENING and that means that WE NEED TO DO THIS AND THAT. AND BECAUSE THERE IS INERTIA, WE GOTTA DO THIS REGARDLESS of CO2 reductions… This intertia concept NEEDS to stated here and made as key point up front in the summary. ADAPTATION STRATEGIES ARE REQUIRED REGARDLESS OF ACTIONS ON CO2. [Thomas Wagner, USA]	Accepted: Text has been revised extensively.
21258	1	1	0	72		The Chapters gives a very good background as why and how this report is written it produces great emphasys in how models and dat are used to produce this model. It explains that this repor is focused on the knowledge achieved since AR5 and looks at the interactions between the Ocean and the Cryosphere. [Alejandro Souza, Mexico]	Thanks
22990	1	1	0	51		generally chapter 1 (and 5) seems to down play the role that the oceans play in sequestering carbon. Heat and pH seem to be the main messages. Whereas the oceans are the second largest carbon pool on earth (second to the Earth's crust) and in addition their annually absorb 25% of anthropogenic emssinos. The oceans contain ~38,000 Pg C and so exert a dominant control on atmospheric levels. This oceanic sink can be measured (but is highly variable), is a key component in balancing global carbon budgets and likely to decrease in the future (due to decreasing pH and rising water temperature). Surely this important role that the oceans play needs to be conveyed. . I would suggest that this key role is highlighted in this chapter. [Jamie Shutler, UK]	Taken into account: See also our response to comment #22946 by the same reviewer.

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1212	1	1	1	72	36	My overall impression is that this chapter is very uneven in its treatment of the oceans and the cryosphere; it tends to focus on direct ocean-cyrosphere connections and frequently ignores the terrestrial cryosphere and the importance of terrestrial FW exports to the oceans. In many places the references are rather dated with frequent reliance on AR5. More linking to material in other chapters would help with this problem. Some of the explanatory boxes (e.g. 1.1) are more authoritatively executed in other chapters so there needs to be some effort to consolidate material to avoid overlap. [Ross Brown, Canada]	Taken into account: the chapter structure has been revised to improve the presentation of material and reduce repetition. The chapter contines to present information from AR5 and SR1.5 as this is the starting point for SROCC and sets the scene for the assessments in the subsequent chapters.
6152	1	1	1	72	36	Overall there the chapter is not very focused with many repetitions across subsections. Also, it comes across as a weird mixture of textbook like explanations of the various systems and assessment results from later chapters. The chapter would be easier to read if it just 'framed' the report, i.e. focus on introducing what comes later and introducing relevant terminology and concepts, and the overall logic of the report. The current structure causes much of the repetition, for example, the fact that sea ice or glaciers melt and that this has a number of implications is repeated in variants many times across the chapter. Dozens of times there is general statements like 'the oceans and cyropshsere have changed. This dilutes the chapter and makes it hard to read. It looks like the different sections have been written by different authors independently without streamlining the final product and getting rid of the repetitons. Perhaps much of the assessment results and concrete examples of change and effects should be left for the following chapters and the summaries. A number of sentences seem policy-prescriptive. [Regine Hock, USA]	Taken into account: The new draft has taken this broad comment into account. The chapter text and structure has been revised extensively.
12090	1	1	1	72	70	I'm impressed by the attention to social science concepts and considerations in this report that had previously been lacking in treatnements of geophysical change. Some of this was covered in AR5 WG II and III reports, but not all of it. Specifically the thorough overview of the pros and cons of ES/NCP perspectives, the explanation of the drawbacks of "building resilience" etc. These themes have been discussed a little, but I'm happy to see them treated here side by side with the natural science. [Sarah Cooley, USA]	Thank you
13324	1	1	1	4	16	The executive summary reads well. What is missing though is the use of calibrated language. Suggest the authors revisit the executive summary and use calibrated language where applicable in order to drive the points home. [Debra Roberts and Durban Team, South Africa]	Taken into account: chapter 1 has continued to struggle with how to use calibrated language in the ES as we are not doing an assessment and do not want to pre-empt the assessments of the other SROCC chapters. We have however included more calibrated language within the chapter text (e.g. in presenting information from AR5 and SR1.5 that sets the stage for SROCC), and within the cross chapter boxes.
22376	1	1	1	76	36	Overall, I find the chapter to be exceptionally well-written and informative, with emphasis and strong wording where appropriate. I regret that time is too short for me to comment further, and I hope that my input proves useful. [Gary Lagerloef, USA]	Thank you!

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24688	1	1	1	72	36	Overall comment: This chapter is in very good shape. The most significant improvement I see would be to add a brief discussion addressing prior assessments in this area. There was an IPCC assessment of Arctic climate change over ten years ago (it was fairly brief, so it sets the stage for this bigger effort); there was an Arctic Monitoring Assessment Program effort that addressed Arctic climate change and there was the Arctic Climate Impact Assessment which was loosely affiliated with IPCC. If this is the first IPCC assessment of the Antarctic (I honestly don't know), it would be good to say so. [Elizabeth Weatherhead, USA]	Accepted: The CCB2 has taken this comment into account. Due to lack of space, we may not have done justice to this but it is accepted.
24692	1	1	1	72	36	This first chapter is also an appropriate place to discuss the other stresses on the Ocean and polar regions in order to put all issues into context. Pollution, and ozone depletion, are global (or near global issues) that are unique added stressors to the oceans and polar regions but are hardly mentioned. There are some good references, including assessments, that could be referenced, so the text doesn't have to go into too much detail. 1.4.2.2 might be an appropriate place for this. [Elizabeth Weatherhead, USA]	Accepted. Reference to the IPBES has been added to Section 1.4.2.
12002	1	1	7	11	28	There is a huge gap in the chapter caused by lack of data and analysis on the effects of other chemical agents known to erode deeply, some worse than CO2, the chemical and physical properties of seawaters besides the popular CO2. Few among such agents are heavy metals (in particulate or ionic forms), pesticides, plastics, fungicides, organic compounds and derivatives. Many of them come from the ocean economies. Examples include metallic compounds from deep-sea mining, and mine exploration, organic compounds and derivatives from oil and gas exploitation/exploration/processing and seaports daily activities. It is not unreasonable to argue, that large amounts of the latter can 1) reduce significantly oceans' abilities to absorb anthropomorphic CO2 emissions, 2) distort exchanges between oceans, cryosphere and atmosphere, 3) sway climate change to some extents, and 4) disturb growth both in the mainstream and in ocean economies. An analysis and discussion on how these changes are affecting Northern and Southern oceans and, particularly the related threats on the informal economies in the developing countries endowed with mineral resources is a big gap worth addressing. [Louis Mitondo Lubango, Ethiopia]	Taken into account: Chapter 1 does not assess (but rather provides a framework for the assessments in the remaining chaptes), but this comment has been passed to Chapter 5 for consideration.
16444	1	1	10	1	10	This clear and scientifically robust statement of the anthopogenic cause of climate change is an effective and necessary start to the chapter. Whatever edits you make to the chapter, retain this sentence. [Patrick Gonzalez, USA]	Noted. This sentence has been revised to highlight the fact that this is from AR5.
17178	1	1	30	1	30	Would eb helpful to explain "primary production" at this point. [Iulian Florin Vladu, Germany]	Rejected. For the sake of conciseness, and due to the tight length allocation, the author team decided against defining terms which are widely used.
98	1	1	39	1	42	topic should be changed to: topic should be changed to risk, natural system, human system; impact , natural system, human system; vulnerability, natural system,human system [Mostafa Jafari, Iran]	Rejected: comments not clear
100	1	1	39	1	42	risk [Mostafa Jafari, Iran]	Rejected: comments not clear
102	1	1	39	1	42	natural system [Mostafa Jafari, Iran]	Rejected: comments not clear
104	1	1	39	1	42	human system [Mostafa Jafari, Iran]	Rejected: comments not clear
106	1	1	39	1	42	impact [Mostafa Jafari, Iran]	Rejected: comments not clear
108	1	1	39	1	42	vulnerability [Mostafa Jafari, Iran]	Rejected: comments not clear

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118	1	1	39	1	42	topic should be changed to: topic should be changed to risk, natural system, human system; impact , natural system, human system; vulnerability, natural system,human system [Mostafa Jafari, Iran]	Rejected: comments not clear
110	1	1	43	1	45	topic should be changed to: for example changing in “production” is climate change consequence; [Mostafa Jafari, Iran]	Rejected: comments not clear
112	1	1	43	1	45	but “mitigation” and “adaptation” are our actions not climate change consequences [Mostafa Jafari, Iran]	Rejected: comments not clear
114	1	1	43	1	45	topic should be changed to: for example changing in “production” is climate change consequence; but “mitigation” and “adaptation” are our actions not climate change consequences [Mostafa Jafari, Iran]	Rejected: comments not clear
116	1	1	43	1	45	line from 43 to 45 [Mostafa Jafari, Iran]	Rejected: comments not clear
120	1	1	43	1	45	topic should be changed to: for example changing in “production” is climate change consequence; but “mitigation” and “adaptation” are our actions not climate change consequences [Mostafa Jafari, Iran]	Rejected: comments not clear
906	1	1	48	1	48	Add reference: André Berger,Qiuzhen Yin ,Hervé Nifenecker ,and Jean Poitou, 2017 Earth’s Future, 5, 811–822, doi:10.1002/2017EF000554 (Berger A. et al., 2017) [Herve Nifenecker, France]	Rejected: as per the IPCC guidelines, citations cannot be added to the ES.
6262	1	2	0	4		The executive summary provides a concrete list of items that are relevant to policy makers in considering Oceans policy. [Melinda Kimble, USA]	Noted.
544	1	3	0			After "ocean warming" add "and stratification" [William Clarke, Australia]	Rejected: this will be assessed in chapter 5. The AR5 SPM does not mention ocean stratification so we are restricted on what chapter 1 can present in framing this aspect of ocean change.
546	1	3	0			After "stabilized {1.3.1}" add "However, there are prospective climate restoration methods that might well restore the cryosphere and oceans in human time-scales that warrant investigation, provided they are acted on expeditiously and before too many more tipping points are passed." [William Clarke, Australia]	Rejected: assessment statements on this topic are outside of the scope of chapter 1 (which does not assess).
548	1	3	0			After "of people" add "and the biosphere" [William Clarke, Australia]	Rejected. This paragraph has been revised but the intent is to focus on humans. In the SOD, the next two paragraphs address natural systems.
550	1	3	0			After "efforts for" add "climate restoration, " [William Clarke, Australia]	Rejected. Mentioning mitigation and adaptation is the intent of this paragraph. More details on climate interventions are addressed later.
552	1	3	0			After "need to" add "reverse," [William Clarke, Australia]	It is not clear to which sentence the reviewer refers to. A search does not return any occurrence of "need to" in the executive summary.
554	1	3	0			After "solar radiation" add "controlling greenhouse gas concentrations, providing direct cooling," [William Clarke, Australia]	Noted. This paragraph has been revised and solar radiation omitted. Less CO2 does not "cool" , it decreases warming. These consideration do not belong to the executive summary.
556	1	3	0			After "institutional options," add "adequate restorative funding and" [William Clarke, Australia]	Taken into account: text revised
2788	1	3	0	4		To be entirely re-written after improvement to the rest [Anne Guillaume, France]	Noted. The executive summary has been extensively reivsed.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17682	1	3	0			Chapter 01 uses mostly no confidence language, but does so in some parts. This needs to be homogenized. Should a framing chapter do own assessments (or summarize others) about changes? If so, it needs to use confidence/uncertainty language. And the assessments need to be in line with the later assessment chapters. Best to just refer to these chapters? [Andreas Kääb, Norway]	Rejected. It is important to note that chapter 1 does not assess but frames the report. Nevertheless, in the main text of the SOD, we do provide some uncertainty language drawn from AR5 or the 1.5 °C report. We decided to provide no uncertainty language in the excecutive summary. Including language from AR5 would confuse the reader if the assessement changes in SROCC. Including language from chapters 2-6 would preempt their arguments without providing details of the assessment.
18602	1	3	0	4		This is a nice ES. It could be improved by adding confidence statement and more quantitiative assessment. At least for the quantitative statement, several valuable indication are available in the chapter and should be put upfront in the ES. For example how much surface ocean has warmed over the last century (decades), how much sea ice and icesheet have retreated and how much oxygen minimum zone have expanded as a results of climate change. [Roland Seferian, France]	Thanks.See reply to the previous comment (#17682).
21026	1	3	0	4		The Exec summary reads like a like a list of disconnected motherhood statements. I know these are hard to write, but maybe be more specific about the adaptation and responses suggestions and conclusions from throughout the report? It also doesn't say anything about the feasibility or current implementations of any of the adaptations. [Thomas Wagner, USA]	Taken into account: the executive summary has been extensively revised.
4650	1	3	1	4	19	The merging of WGI and WGII aspects in this report is incomplete, in that the bullet points in the overall executive summary and the chapter executive summaries tend to alternate between WGI aspects and WGII aspects, rather than synthesizing WGI aspects together with their WGII impacts. As I have been preparing for AR6, I have been examining and extracting only the WGI aspects of these bullets for updating and revision in Chapter 9. I imagined that this task would be very difficult due to the WGI&WGII sythesis in SROCC, instead it was very easy because the bullet points are rarely sythesized. I encourage the authors to revisit the executive summaries to see if better synthesis among the WGI and WGII aspects can be found. [Baylor Fox-Kemper, USA]	Taken into account: The structure of our ES largely follows the structure of the chapter text. This suggestion will be relevant to looking at how to combine information from all chapters to form the SPM.
6278	1	3	1	4	16	The exectuive summary is excellent! I think it covers everything that needs to be covered - not too much, not too little. My only suggestion regards line 3 on page 4: this may seem nitpicky, but to many people (including most disciplines in the sciences and engineering, as well as the general public) the word "data" is synonymous with "observational data", so the assertion on this line that climate models provide data may irk some readers, even though that use of the word is common in the climate science community - suggest using "information" instead. Apart from that - well done! [Sean Fleming, USA]	Taken into account: Thank you. We have added a section at the start of section 1.8 to indicate the broad scope of scientific knowledge
11776	1	3	1	4	16	little reference to the impact of climate change on biodiversity and ecosystem services - though there is a dedicated chapter in this Special Report. Would be good to highlight also here. Overall, also little reference to the importance of feedback processes between climate change & ecological processes [Hilde Eggermont, Belgium]	Taken into account: section 1.5.1 has been revised extensively to better frame the risks to natural systems in our chapter

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12768	1	3	1	4	19	This chapter doesn't seem to say anything about weather and climate prediction (i.e. days-months-seasons) as a tool for adapting to climate change, in particular extreme events. ENSO forecasting, for example, is now widely used to limit the imapcts of ENSO events. I think it is worth some discussion among the authors as to the importance of forecasting and prediction for adaptation planning. [Collins Matthew, UK]	Accepted: sentence add to section 1.8.1.4, and reference given to chapter 6.
13270	1	3	1	4	19	The executive summary is well written and comprehensive. [Katherine Bishop-Williams, Canada]	Thank you
18346	1	3	1	4	16	Kindly check the possibility whether IPCC confidence statements and uncertainty language can be added in the Executive Summary after bold ststements and concluding statements in each paragraph for justification. [Suvadip Neogi, India]	Rejected. It is important to note that chapter 1 does not assess but frames the report. Nevertheless, in the main text of the SOD, we do provide some uncertainty language drawn from AR5 or the 1.5 °C report. We decided to provide no uncertainty language in the excecutive summary, apart from that relating to the AR5 assessment of climate warming (which is not assessed in SROCC). Including language from AR5 would confuse the reader if the assessement changes in SROCC. Including language from chapters 2-6 would preempt their arguments without providing details of the assessment.
21246	1	3	1	4	16	The authors may consider including a brief motivation for this SR also in the ES. [Jan Fuglestvedt, Norway]	Accepted. In the SOD, the executive summary starts with a paragraph introducing the purpose of this report.
11438	1	3	2	3	4	This Special Report focuses on how climate change is altering the ocean and cryosphere (the frozen 4 parts of our planet) ADD: in extremely hazardous ways for our future security, which is already committed by today's atmospheric greenhouse gas concentrations to increase substantially in the future and to last on a millennial time frame. Because of climate system inertias all cryosphere and ocean impacts have to be assessed on at a least multi-century timeframe. (This report assesses past ocean and cryosphere changes mainly on decades to century scales). [Peter Carter, Canada]	Taken into account: these aspects are covered in other parts of the chapter and executive summary
658	1	3	3	4	16	Would it be possible to briefly address the topic of expected sealevel rise (in absolute values). This is considered important information as the risks associated with sealevel rise are in the focus of public discussions. Having said this, it is well understood that it is not really possible to provide one singel absolute value for the expected sealevel rise. Alternatively, this aspect could also be considered to be formulated as a FAQ. [Thomas Ackermann, Germany]	Rejected. Chapter 1 frames the report and does not make assessments. The author team decided against providing absolute values of sea-level rise to avoid preempting the findings of chapter 4.
12038	1	3	3	3	8	You might tie this into the % of humans inhabiting coastal and mountaneous regions. [Michael Casey, Germany]	Noted. It seem that this comments refers to page 5 rather than page 3. In the SOD, absolute values of people living in the regions covered by the report (Arctic, coastal and high-mountain areas) are mentioned.
8	1	3	5	3	7	Simplify the sentnece. Awoid the wording "storyline". [Daniel Farinotti, Switzerland]	Rejected. Chapter 1 has the specific mandate from the IPCC to provide the "Integrated storyline of the report".
6526	1	3	5	3	5	Use a different term than "storyline". Perhaps instead just state "This special report also covers…" [APECS Group Review, Germany]	Rejected. Chapter 1 has the specific mandate from the IPCC to provide the "Integrated storyline of the report".

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17652	1	3	5			is "respond" the right term? Oceans and cryopshere are also an active part of the climate system and parts of the change, not only passive responders. [Andreas Kääb, Norway]	Taken into account: this aspect is covered in the chapter text
23624	1	3	5	3	5	Responses are already happening [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: text revised
11440	1	3	7	3	8	…change, and scope for responding to future changes within relevant governance frameworks ADD: bearing in mind that increasing resilience and adaptation have to be accompanied by immediate rapid global emissions decline to be effective. [Peter Carter, Canada]	Rejected: this is covered in other parts of the chapter text
17186	1	3	7	3	8	Wording in brackets not needed [Iulian Florin Vladu, Germany]	Accepted
23332	1	3	7	3	7	What do you mean by “relevant” governance frameworks in this context? What the “relevance” refers to? Is response possible in the present governance frameworks? [Inga Koszalka, Germany]	Rejected: relevant is in reference to "ocean and cryosphere"
17180	1	3	8	3	8	There is no definition of what a SROCC is, suggest to add a footnote as the meaning it is mentioned until line 22 [Iulian Florin Vladu, Germany]	Accepted: SROCC is not used in ES, and is introduced at first usage in section 1.1
18434	1	3	8	3	8	The abbrevation SROCC might not yet be known at this stage in the text. [Anette Jönsson, Sweden]	Accepted: SROCC is not used in ES, and is introduced at first usage in section 1.1
11442	1	3	9	3	11	Human-induced greenhouse gas emissions are warming our climate and altering the ocean and cryosphere ADD: in multiple adverse degrading practically irreversible ways. [Peter Carter, Canada]	Taken into account: paragraph deleted
4024	1	3	10	3	24	More recent iterations of IPCC reports have been criticised for "cherry-picking" time slices of data (such as Satellite altimetry records which are only 25 years long) and other similar data sets which feed the narrative of the science around climate change but don't paint a sufficient contextual backdrop whereby anthropogenically induced impacts (from greenhouse gas emissions and accumulations) are superimposed upon larger natural processes (such as the Milankovitch cycling of glacial-interglacial and solar irradiation maximums and minimums). There are numerous references for these types of processes, but, more recent summary information on background natural processes can be found in Watson (2017) and on the influence of solar irradiation in McGrann et al 2018. I would suggest these sections coulsd be improved by a wider and more contextually accurate setting of the anthropogenic element and the broader, longer natural cyclical processes of climate change. References: McGrann et al., 2018. Sea Levels in a Changing Climate, International Journal of GEOMATE, March, 2018 Vol.14, Issue 43, pp.24-30 Geotec., Const. Mat. & Env., DOI: https://doi.org/10.21660/2018.43.3522, ISSN: 2186-2982 (Print), 2186-2990 (Online), Japan Watson, P.J., 2017. Sea-Level Fluctuations over the Last Millennium. In: C.W. Finkl, C. Makowski (eds.), Encyclopaedia of Coastal Sciences, pp. 1-5. Springer International Publishing, doi: 10.1007/978-3-319-48657-4_365-1. [Phil Watson, Australia]	Taken into account: paragraph deleted. New text on paleoclimate context in section 1.4
17654	1	3	10			How can climate "warm"? [Andreas Kääb, Norway]	Taken into account: paragraph deleted
17656	1	3	10			Did this report assess human-induced greenhouse gasses? [Andreas Kääb, Norway]	Taken into account: paragraph deleted

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17698	1	3	10	3	18	This firm conclusion appears not to be fully supported by the other chapters of the report. The other chapters appear to communicate uncertainties of a magnitude that does not warrant the firm statement expressed here [Hessel Voortman, Netherlands]	Taken into account: paragraph deleted
21248	1	3	10	3	18	I miss focus on rate of change in this para. [Jan Fuglestvedt, Norway]	Taken into account: paragraph deleted
23334	1	3	10	3	17	It should be mentioned that the human-induced changes superimpose on the natural changes (the altering of the ocean and cryosphere is not solely induced by human activity) [Inga Koszalka, Germany]	Taken into account: paragraph deleted
10	1	3	11	3	13	A reference time is missing: "The ocean has taken up more than 90% of the heat…" --> Since when? [Daniel Farinotti, Switzerland]	Taken into account: paragraph deleted
6518	1	3	11	3	12	I wonder that why people do not emphasize this point a lot to the general public. From the high school physics, we know water has a higher heat capacity (explained in this report on page 6 line 15). This will let the general public to sense the danger that we are facing and what all this fuss about melting ice on top of the water. (especially for the people who do not directly depend on the ocean and cryosphere). [Chamara Rajapakshe, Sri Lanka]	Taken into account: paragraph deleted, but concept better developed in Box 1.1 and section 1.2.1
6528	1	3	11	3	12	change wording to "…heat that has accumulated in the Earth system from rising atmospheric gas concentrations…" [APECS Group Review, Germany]	Taken into account: paragraph deleted
6530	1	3	11	3	11	The ocean has taken up more than 90% of the heat…..(Please mentione since when). [APECS Group Review, Germany]	Taken into account: paragraph deleted
6532	1	3	11	3	11	It woule be better to highlight this sentence as "90% of climate change is being ignored" [APECS Group Review, Germany]	Taken into account: paragraph deleted
11444	1	3	11	3	11	The ocean has taken up more than 90% of the heat accumulated in the Earth system ADD [not in report]: and ocean heat content is accelerating and going deeper (reference: NOAA Ocean heat and salt content, March 2018). [Peter Carter, Canada]	Taken into account: paragraph deleted
17184	1	3	11	3	11	There is no bibliographical reference to the source of information, e.g. on the 90% [Iulian Florin Vladu, Germany]	Rejected: This is IPCC style. The executive summaries do not contain references, but do give traceable accounts to the sections of text which describe the topics in more detail.
18146	1	3	11	3	11	Is there a reference (Chapter / paragraph) for this number (90%), plus confidence level? [Laurens Bouwer, Netherlands]	Taken into account: paragraph deleted
662	1	3	12	3	16	What is meant by "expansion"? Proposal: "expansion (increase in volumen). Do the factors - expansion - retreat of glaciers - melting ice shelves contribute in equal shares to sea level rise? The way the factors are listed in the executive summary could imply "equal shares". [Thomas Ackermann, Germany]	Taken into account: paragraph deleted
13112	1	3	12	3	12	you may want to consider deoxygenation here as well [Baerbel Hoenisch, USA]	Taken into account: added to new paragraph
16160	1	3	12	3	12	evolves' [Lynne Talley, USA]	Taken into account: paragraph deleted
18436	1	3	12	3	12	I would suggest using "thermal expansion" in the sentence, instead of just "expansion". [Anette Jönsson, Sweden]	Taken into account: paragraph deleted
11446	1	3	13	3	14	Dissolution of atmospheric CO2 in seawater is further causing ocean 14 acidification ADD [not in report], which is accelerating (reference: World Meteorological Organization, Monitoring carbon and ocean acidification, 2015). [Peter Carter, Canada]	Rejected. This item of the executive summary does not address changes in the rate of changes of any of the processes mentioned.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
15322	1	3	13	3	18	This seems to be to be too much in a assessment style, for Chapter 1 I do not anticipate such content [Samuel Morin, France]	Accepted: paragraph deleted
21540	1	3	13	3	13	Dissolution of increased atmospheric CO2' - added increase [Fiamma Straneo, USA]	Rejected. This item of the executive summary does not address changes in the rate of changes of any of the processes mentioned.
23128	1	3	13	3	13	"contributes to global sea level rise" Please refer to a table somewhere that ranks all such contributions. [Aimé Fournier, USA]	Taken into account: paragraph deleted
6534	1	3	14	3	16	This sentence is confusing ad shall be split into two seprate sentences. [APECS Group Review, Germany]	Taken into account: paragraph deleted
17658	1	3	15			better "mass loss" than "retreat"? [Andreas Kääb, Norway]	Taken into account: paragraph deleted
6124	1	3	16	3	16	Delete ice cap. The term is confusing and therefore AR5 has abondoned this term and uses exclusively the term 'glaciers and ice sheets'. This report should be consistent with the AR5 terminology. Ice caps are often understood by non-scientists as the Arctic sea-ice or as ice sheets. Also the morphological classification of glaciers into many different types is irrelevant here, except for the difference between ice sheets and all other glaciers (to be called glaciers. This should be changed throughout the chapter [Regine Hock, USA]	Accepted: we no longer use the term "ice cap" in chapter 1
11448	1	3	16	3	17	Ice loss also acts to amplify human-induced 17 climate warming by altering the capacity of environments to absorb heat. ADD [not stated in report]: Decline of Arctic sea ice extent and of sub-Arctic snow, is reducing Arctic albedo to leading by feedback to Arctic amplified warming. This increases the rate of Greenland glacial and ice sheet melting, and of permafrost thawing, which is releasing carbon dioxide, methane and nitrous oxide [not in report] emissions by feedback. Arctic summer sea ice melt may be abrupt [in report] and is irreversible. Permafrost thawing may be abrupt [in report] and is irreversible, and at some time it becomes self-reinforcing by generating its own heat [not in report]. At a global warming of 1.5°C, field research shows that large regions of Siberian permafrost will be in an irreversible thaw condition [not in report]. (reference: Anton Vaks, 2013) [Peter Carter, Canada]	Taken into account: paragraph deleted
16878	1	3	16	3	16	Perhaps "Snow and ice loss", rather than just "Ice loss", to be more complete. [Markku Rummukainen, Sweden]	Taken into account: paragraph deleted
23130	1	3	16	3	16	"Ice loss also acts to amplify" Mention effect on planetary albedo too [Aimé Fournier, USA]	Taken into account: paragraph deleted
11450	1	3	17	3	18	Ocean and cryosphere changes 18 result in hazards ADD: and are said to provide opportunities for people and ecosystems, [the IPCC should not be promoting fossil fuel-based economic so-called opportunities (as in teh report)] ADD: but the said opportunities are only economic, which will increase global greenhouse gas emissions, the rate of Arctic warming, Greenland ice sheet melt, and Arctic greenhouse gas feedback emissions, and the rate of Arctic ecological and socioeconomic degradation, and so are not opportunities in overall Arctic assessment {1.2 and 1.3}. [Peter Carter, Canada]	Taken into account: paragraph deleted
18148	1	3	17	3	17	"Absorb heat or reflect radiation". [Laurens Bouwer, Netherlands]	Taken into account: paragraph deleted

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18150	1	3	18	3	18	Please rephrase to "result in risks and some opportunities ..". [Laurens Bouwer, Netherlands]	Taken into account: paragraph deleted
1544	1	3	20	3	21	It is a little semantic, but it should either be “Important aspects of ocean and cryosphere change, including the size of MELTING OF polar ice sheets and sea level rise” or else “Important aspects of ocean and cryosphere change, including the size of polar ice sheets and sea level rise”. [Wolfgang Cramer, France]	Taken into account: paragraph deleted
2266	1	3	20	3	23	Though there may be a temperature threshold (tipping point) in the near-term that could spur runaway change—including for ice sheets and permafrost may be susceptible to abrupt change, which would lead to runaway climate change. (Solomon S., et al. (2009) Irreversible climate change due to carbon dioxide emissions, PROC. NAT’L. ACAD. SCI. 106(6):1704–1709; Drijfhout S., et al. (2015) Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models, PROC. NAT’L. ACAD. SCI. 112(43):E5777–E5786; O’Neill B. C., et al. (2017) IPCC reasons for concern regarding climate change risks, NATURE CLIMATE CHANGE 7:28–37; Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT’L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people’s burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616, 577; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.). [Kristin Campbell, USA]	Taken into account: some of these references added to chapter material
2268	1	3	20	3	23	Rates of change matter, both for when critical thresholds are crossed, but also for the amount and rate of committed change. (International Cryosphere Climate Initiative (2015) Thresholds and Closing Windows: Risks of Irreversible Cryosphere Climate Change, 6¬–7.) [Kristin Campbell, USA]	Taken into account: paragraph deleted
2392	1	3	20	3	23	Though there may be a temperature threshold (tipping point) in the near-term that could spur runaway change—including for ice sheets and permafrost may be susceptible to abrupt change, which would lead to runaway climate change. (Solomon S., et al. (2009) Irreversible climate change due to carbon dioxide emissions, PROC. NAT’L. ACAD. SCI. 106(6):1704–1709; Drijfhout S., et al. (2015) Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models, PROC. NAT’L. ACAD. SCI. 112(43):E5777–E5786; O’Neill B. C., et al. (2017) IPCC reasons for concern regarding climate change risks, NATURE CLIMATE CHANGE 7:28–37; Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT’L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people’s burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616, 577; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.). [Durwood Zaelke, USA]	Taken into account: some of these references added to chapter material

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2394	1	3	20	3	23	Rates of change matter, both for when critical thresholds are crossed, but also for the amount and rate of committed change. (International Cryosphere Climate Initiative (2015) Thresholds and Closing Windows: Risks of Irreversible Cryosphere Climate Change, 6¬–7.) [Durwood Zaelke, USA]	Taken into account: paragraph deleted
6536	1	3	20	3	20	I think this sentence shall be written as "Important aspects of ocean and cryosphere change, including the reduction in size of polar ice sheets and sea level rise, may be irreversible on human time-scales." [APECS Group Review, Germany]	Taken into account: paragraph deleted
11452	1	3	20	3	21	Important aspects of ocean and cryosphere change, including the size of polar ice sheets and sea level 21 rise, ADD: at already committed global warming, decline and virtual loss of Arctic summer sea ice extent and permafrost thaw REMOVE: may be ADD: are irreversible on human time-scales. ADD: The Arctic has switched from carbon sink to carbon source [essential and not in report]. (Reference is NOAA Arctic Report Card 2016 Report Highlights 'Thawing permafrost releases carbon into the atmosphere whereas greening tundra absorbs atmospheric tundra. Overall the tundra is presently releasing net carbon into the atmosphere.') [Peter Carter, Canada]	Taken into account: paragraph deleted
12034	1	3	20	3	23	The phrase "slow to respond" is inappropriate. "slow to respond when measured in typical human policy timescales" is more accurate. We have changed the forcing incredibly fast. We would warm the planet at least 20 times faster under 1.5c to 2C scenario and over 50 times faster under 4c scenarios than when compared to transitions from depth of last Ice age to the Holocene (and other periods in paleoclimate). The Ice Sheets, Glaciers and Sea Ice are responding quite rapidly. The only thing that will happen 'slowly' is the equilibrium SLR outcome albeit much faster than in paleoclimate precedents due to the much faster heat uptake in the ocean. There is no statement that in paleoclimate sea level has risen in the order of meters per century on occasion. Why is this absent? Given models are imperfect statements of fact about occurrences in the past from processes we do not fully understand give boundaries that help give context to model results. This is especially important because we are warming the planet (ocean) dozens of times faster than it has previously warmed in Earth's history . [Michael Casey, Germany]	Taken into account: paragraph deleted
12036	1	3	20	3	23	Please state the reason the changes are irreversible is due to the accumulated heat content in the ocean, diverse feedback mechanisms effecting carbon sinks and the persistence of fossil CO2 in the atmosphere and surface sinks. Some effort needs to be made to illustrate the enormous level of incremental energy being taken up and stored by the ocean. This is the core of the issue for SLR and Climate. [Michael Casey, Germany]	Taken into account: sections 1.2 and 1.3 have been extensively revised to clarify these important points.
12762	1	3	20	3	23	Cross reference to chapter 6 [Collins Matthew, UK]	Taken into account: the relevant section of chapter 1 provides this cross-reference

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12890	1	3	20	3	23	Though there may be a temperature threshold (tipping point) in the near-term that could spur runaway change—including for ice sheets and permafrost may be susceptible to abrupt change, which would lead to runaway climate change. (Solomon S., et al. (2009) Irreversible climate change due to carbon dioxide emissions, PROC. NAT'L. ACAD. SCI. 106(6):1704–1709; Drijfhout S., et al. (2015) Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models, PROC. NAT'L. ACAD. SCI. 112(43):E5777–E5786; O'Neill B. C., et al. (2017) IPCC reasons for concern regarding climate change risks, NATURE CLIMATE CHANGE 7:28–37; Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616, 577; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.). [Gabrielle Dreyfus, USA]	Taken into account: some of these references added to chapter material
12892	1	3	20	3	23	Rates of change matter, both for when critical thresholds are crossed, but also for the amount and rate of committed change. (International Cryosphere Climate Initiative (2015) Thresholds and Closing Windows: Risks of Irreversible Cryosphere Climate Change, 6¬–7.) [Gabrielle Dreyfus, USA]	Taken into account: paragraph deleted
15324	1	3	20	3	20	I suggest replacing "size" by something else, like "extent and volume", and add a reference here to "mountain glaciers" which also exhibit irrversible changes upon human timescales [Samuel Morin, France]	Taken into account: paragraph deleted
11454	1	3	21	3	23	These elements are slow to respond to anthropogenic 22 driven changes in radiative forcing, but REMOVE: are expected to ADD: will continue to change for centuries or more after the 23 forcing is stabilized {1.3.1}. [Peter Carter, Canada]	Taken into account: paragraph deleted
17188	1	3	21	3	21	"human time-scales" needs to be defined here to add clarity. [Iulian Florin Vladu, Germany]	Taken into account: paragraph deleted
18820	1	3	21	3	21	What are human time scales? In terms of irreversibility this should be clearly defined. [Frank Pattyn, Belgium]	Taken into account: paragraph deleted
23132	1	3	21	3	21	"human time-scales" perhaps "human time-scales to time-scales of millenial" or similar. [Aimé Fournier, USA]	Taken into account: paragraph deleted
23336	1	3	21	3	21	"may be" - shouldn't it be expressed in terms in the IPCC likelihood/confidence scale, otherwise how is to be understood? [Inga Koszalka, Germany]	Taken into account: paragraph deleted
23338	1	3	21	3	21	"human time-scales" undefined. Are these "centuries or more" as implied by the next sentence? Otherwise should it be defined in terms [Inga Koszalka, Germany]	Taken into account: paragraph deleted
24694	1	3	21	3	21	The phrase "on human time-scales" is used here and other places in the draft. I suggest replacing this vague phrase with more precise wording, including the nicely used wording on line 22 "for centuries or more. [Elizabeth Weatherhead, USA]	Taken into account: paragraph deleted
13326	1	3	22	3	22	Radiative forcing' is a specific term needs to be explained in exec summ. [Debra Roberts and Durban Team, South Africa]	Taken into account: paragraph deleted
18568	1	3	22	3	24	replace "centuries or more" to "many millennia" -- for example, Clark et al. 2016 Nature Climate Change state, "policy decisions made in the next few years to decades will have profound impacts on global climate, ecosystems and human societies — not just for this century, but for the next ten millennia and beyond." [Alan Mix, USA]	Taken into account: paragraph deleted

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
21256	1	3	22	3	22	Delete "changes in " since radiative forcing captures changes in energ balance [Jan Fuglestvedt, Norway]	Taken into account: paragraph deleted
15326	1	3	23	3	23	The term "forcing" here is a bit too jargon for an executive summary. [Samuel Morin, France]	Taken into account: paragraph deleted
11456	1	3	24	3	25	The ocean and cryosphere, and the ecosystems they support, are essential for humans. ADD: Worst-case scenarios are essential for risk assessment. Worst-case multiple cascading polar (mainly Arctic) and ocean impacts are a long-term, extreme, zero-tolerance risk and potentially an existential threat to life and the human population globally. [Peter Carter, Canada]	Taken into account: see final ES paragraph
12	1	3	25	3	25	The content of heading (bold text) does not really match the rest of the paragraph (L. 25-30): The heading states that the ocean and cryosphere are essential for humans, whilst the text highlights the threats related to their changes. [Daniel Farinotti, Switzerland]	Taken into account: new paragraph on importance of ocean and cryosphere for people has been added near start of ES
6090	1	3	25	3	39	Stating "humans" here does imply that these changes are important for the globe. But, I think it would be clearer if you could directly state the "global importance" of the ocean and cryosphere. The ocean and cryosphere is important human sysetms globally, and especially for those people residing in high mountain areas, polar regions, low lying islands, adn coastal settelmentes adn cities. [Patrick Taylor, USA]	Taken into account: new paragraph on importance of ocean and cryosphere for people has been added near start of ES
11000	1	3	25	3	28	To the list " for livelihoods, culture, health, and wellbeing, " add "and the ongoing habitability of these regions" [Ben Orlove, USA]	Taken into account: new paragraph on importance of ocean and cryosphere for people has been added near start of ES
12276	1	3	25	3	29	Being a little picky the reason low lying islands (and indeed anyone near sea level) are vulnerable is not because they "depend on ocean and/or cryosphere resources". If this is the main place where you highlight who is vulnerable in the summary then you should add, after "wellbeing" "as well as those living close to sea level" [Eric Wolff, UK]	Accepted: text revised extensively, including better description of vulnerability (here and in the chapter text) and new ES paragraph on numbers of people who live in close contact with the ocean and/or cryosphere
13328	1	3	25	3	30	This is too vague. People in coastal cities and settlements are hugely at risk, they shouldn't be mentioned last, and actual figures would help put things into context. [Debra Roberts and Durban Team, South Africa]	Accepted: a new paragraph on the importance of ocean and cryosphere to people has been added near the start of the executive summary
18570	1	3	25	3	37	two paragraphs address both cryosphere and ocean and seem redundant. Consider splitting into para 1 cryosphere and para 2 sealevel, for clarity and depth of treatment of each -- the impacts from each is different and will affect different people, so it makes sense to give each one a paragraph [Alan Mix, USA]	Accepted: these two paragraphs have been combined
4686	1	3	26	3	27	"...resources for FOOD, livelihoods, health and wellbeing..." [Manuel Barange, Italy]	Taken into account: paragraph text revised extensively
6538	1	3	27	3	27	The word wellbeing shall be spelled as "well-being" [APECS Group Review, Germany]	Taken into account: paragraph text revised extensively
4688	1	3	29	3	30	"...change is also INFLUENCED BY THEIR social.../... demographic CONTEXT" [Manuel Barange, Italy]	Taken into account: paragraph text revised extensively
17174	1	3	29	3	29	The vulnerability of people, changed to The vulnerability of communities (or societies) [Jiahong Wen, China]	Taken into account: paragraph text revised extensively
17190	1	3	29	3	29	and indigenous peoples that rely on oceans the cryosphere for their livelihoods, food security and cultural identity [Iulian Florin Vladu, Germany]	Taken into account: paragraph text revised extensively
18152	1	3	29	3	29	"vulnerability and adaptaive capacity of people..". [Laurens Bouwer, Netherlands]	Accepted: "adaptive capacity" added
14	1	3	32	3	34	Try to shorten the (very long) sentence. [Daniel Farinotti, Switzerland]	Taken into account: paragraph text revised extensively

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18438	1	3	32	3	37	Is it possible to simplify this section by using other words? [Anette Jönsson, Sweden]	Taken into account: paragraph text revised extensively
23340	1	3	32	3	32	Suggest to remove the word “related” [Inga Koszalka, Germany]	Accepted: text changed
23342	1	3	32	3	32	I would suggest, for the sake of clarity, to change the wording “compound the environmental risks” into “aggrevate(or exacerbate or intensify) the environmental risks”, because of the alternate meaning of the verb “compound” [Inga Koszalka, Germany]	Taken into account: paragraph text revised extensively
24698	1	3	32	3	37	This entire summary statement (Lines 32-37) is a bit more prescriptive than is found in most IPCC documents and in the rest of this document. [Elizabeth Weatherhead, USA]	Accepted: paragraph text revised extensively
6540	1	3	33	3	33	The word "humans" shall be replaced by "human" [APECS Group Review, Germany]	Accepted: text changed
1546	1	3	34	3	34	Speaking about “Charting climate resilient development pathways” is significantly different from the actual topic of this paragraph. I suggest to turn this into a separate paragraph. [Wolfgang Cramer, France]	Accepted: paragraph text revsied extensively
11458	1	3	34	3	35	Charting climate resilient development pathways, which combine efforts for climate 35 change mitigation and adaptation, will therefore be needed to enable sustainable development, ADD: bearing mind that increasing resilience and adaptation have to be accompanied by immediate mitigation by rapid global emissions decline to be effective. [Peter Carter, Canada]	Taken into account: we have not included this in the executive summary, but the need for urgent mitiation and emission reductions is discussed in the chapter text in a number of places
11778	1	3	34	3	35	need clearer reference to the use of ecosystem-based approaches for climate change adaptation and mitigation [Hilde Eggermont, Belgium]	Taken into account: this can not be accommodated in the executive summary, but is covered in the chapter text
18154	1	3	35	3	35	"will therefore be needed" This is policy prescriptive; please explain that this is needed in case policymakers want to reach a certain goal. [Laurens Bouwer, Netherlands]	Accepted: wording revised
24696	1	3	35	3	36	“Decisions for profound economic and institutional transformation..” is vague and the wording is slightly loaded. [Elizabeth Weatherhead, USA]	Accepted: wording revised
11460	1	3	36	3	36	Decisions for 36 profound economic and institutional transformations are necessary to initiate and pursue such pathways {1.4; 37 Cross-Chapter Box 1}. ADD [not in report]: Simple market failure corrections that are universally supported, including -- on an immediate basis -- termination of fossil fuel subsidies, charging large central polluters the full cost of their pollution, and zero future discounting, provide huge and immediate acting mitigative benefits. For ecological and economic catastrophic risk aversion and prevention, cost benefit analyses [as included in the report for decision making] cannot be allowed to obstruct immediate global emissions mitigation. [Peter Carter, Canada]	Rejected: this is outside of our scope, but some of this was covered in SR1.5
15328	1	3	36	3	36	The term "necessary" appears to be too policy-prescriptive [Samuel Morin, France]	Accepted: wording revised
18156	1	3	36	3	36	Again, this is policy prescriptive. [Laurens Bouwer, Netherlands]	Accepted: wording revised
1548	1	3	39	3	39	“Societies need to mitigate and adapt to climate change..” is unnecessary policy-prescriptive language. It is also has no bearing on this particular report. The rest of this paragraph contains useful information which somehow gets neutralized by the misleading opening phrase. [Wolfgang Cramer, France]	Accepted: text revised

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2270	1	3	39	3	45	Mitigation strategies that reduce warming in the near-term are especially crucial because they slow the rate of warming and delay the onset of 1.5 ºC. SLCPs mitigate in the near-term through global and local measures, with local measures having a direct impact on the Arctic region especially, and many of these measures can be implemented immediately. (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Shindell D., et al. (2012) Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security, SCIENCE 335(6065):183–189; UNEP (2011) NEAR-TERM CLIMATE PROTECTION AND CLEAN AIR BENEFITS: ACTIONS FOR CONTROLLING SHORT-LIVED CLIMATE FORCERS, xi–xii; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017; Molina M., et al. (2009) Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO2 emissions, PROC. NAT'L. ACAD. SCI. 106(49):20616–20621; World Bank & International Cryosphere Climate Initiative (2013) ON THIN ICE: HOW CUTTING POLLUTION CAN SLOW WARMING AND SAVE LIVES; International Energy Agency (IEA) (2016) WORLD ENERGY OUTLOOK SPECIAL REPORT: ENERGY AND AIR POLLUTION; Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA.) [Kristin Campbell, USA]	Noted. This comment is relevant to the Special Report of Global Warlming of 1.5°C and is mostly outside the scope of the present report . However, the point on black carbon and air quality in general is well taken. A sentence and a reference have been added in section 1.5 but does not need to be elevated to the executive summary.
2272	1	3	39	3	45	Local action may not be sufficient, but it is necessary to address human-level impacts and build support for action. [Kristin Campbell, USA]	Noted.
2396	1	3	39	3	45	Mitigation strategies that reduce warming in the near-term are especially crucial because they slow the rate of warming and delay the onset of 1.5 ºC. SLCPs mitigate in the near-term through global and local measures, with local measures having a direct impact on the Arctic region especially, and many of these measures can be implemented immediately. (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Shindell D., et al. (2012) Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security, SCIENCE 335(6065):183–189; UNEP (2011) NEAR-TERM CLIMATE PROTECTION AND CLEAN AIR BENEFITS: ACTIONS FOR CONTROLLING SHORT-LIVED CLIMATE FORCERS, xi–xii; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017; Molina M., et al. (2009) Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO2 emissions, PROC. NAT'L. ACAD. SCI. 106(49):20616–20621; World Bank & International Cryosphere Climate Initiative (2013) ON THIN ICE: HOW CUTTING POLLUTION CAN SLOW WARMING AND SAVE LIVES; International Energy Agency (IEA) (2016) WORLD ENERGY OUTLOOK SPECIAL REPORT: ENERGY AND AIR POLLUTION; Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA.) [Durwood Zaelke, USA]	See reply to the same comment above (#2270)
2398	1	3	39	3	45	Local action may not be sufficient, but it is necessary to address human-level impacts and build support for action. [Durwood Zaelke, USA]	Noted.
4690	1	3	39	3	45	This paragraphs groups mitigation, ecological adaptation and societal adaptation. I feel it would be more logical to separate adaptation from mitigation, in a separate paragraph. [Manuel Barange, Italy]	Rejected. The number of pages allocated to the chapter do not allow to have several entries on this topic in the executive summary.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
5068	1	3	39	3	39	As the Adaptation is the 1st priority for the developing countries, so I guse it could be good to modify the statement to "Socities need to Adapt and Mitigate to climate change and its effects on natural and human systems". [Essam Hassan Mohamed Ahmed, USA]	Rejected. Both mitigation and adaptation are needed, perhaps mitigation first considering that adaptation would not be possible or effective or too costly without mitigation.
6126	1	3	39	3	39	Sentece is policy-descriptive [Regine Hock, USA]	Accepted: text revised.
11462	1	3	39	3	39	Societies need to mitigate and adapt to climate change and its effects on natural and human systems.ADD: The readily available essential, indispensable mitigative measure is the immediate and rapid global decline of emissions aimed to be "near zero" as in IPCC AR5 (by 2050) for all long-lived greenhouse gases. [Reference in report is Cai et al., 2016.] EXPLANATION AND REFERENCES: This catastrophic risk avoidance imperative and least-cost mitigation response of immediate global emissions decline (or emissions peak by 2020) to target a global warming limit of 2°C and now the preferred 1.5°C is included in many assessment reports including IPCC AR5, UN Climate Secretariat May 2016 INDC update, UNEP GAP Report, International Energy Agency 2016 Energy Climate Change and Environment, Climate Action Tracker, Climate Interactive Scoreboard, and Climate Analytics. The only emissions mitigation described in the report is 'reducing emissions', which is no mitigation unless it leads to 'near zero' emissions (IPCC AR5) and is now little to no mitigation unless the global emissions decline is immediate. [Peter Carter, Canada]	Rejected. This is far too detailed for an executive summary. Besides, it is mostly out of the scope of the present report. This is covered in the Special Report on Global Warming of 1.5°C.
12894	1	3	39	3	45	Mitigation strategies that reduce warming in the near-term are especially crucial because they slow the rate of warming and delay the onset of 1.5 ºC. SLCPs mitigate in the near-term through global and local measures, with local measures having a direct impact on the Arctic region especially, and many of these measures can be implemented immediately. (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Shindell D., et al. (2012) Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security, SCIENCE 335(6065):183–189; UNEP (2011) NEAR-TERM CLIMATE PROTECTION AND CLEAN AIR BENEFITS: ACTIONS FOR CONTROLLING SHORT-LIVED CLIMATE FORCERS, xi–xii; Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017; Molina M., et al. (2009) Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO2 emissions, PROC. NAT'L. ACAD. SCI. 106(49):20616–20621; World Bank & International Cryosphere Climate Initiative (2013) ON THIN ICE: HOW CUTTING POLLUTION CAN SLOW WARMING AND SAVE LIVES; International Energy Agency (IEA) (2016) WORLD ENERGY OUTLOOK SPECIAL REPORT: ENERGY AND AIR POLLUTION; Arctic Monitoring and Assessment Programme (AMAP) (2017) ADAPTATION ACTIONS FOR A CHANGING ARCTIC: PERSPECTIVES FROM THE BARENTS AREA.) [Gabrielle Dreyfus, USA]	See reply to the same comment above (#2270)
12896	1	3	39	3	45	Local action may not be sufficient, but it is necessary to address human-level impacts and build support for action. [Gabrielle Dreyfus, USA]	Noted.
18158	1	3	39	3	39	Again, this is policy prescriptive. Please explain that adaptation and mitigation are needed, in case cryosphere and oacean hazards/risks are to be reduced or minimised. In general, I wonder whether this sentence has a lot of meaning for SROCC. [Laurens Bouwer, Netherlands]	Accepted: text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18572	1	3	39	3	45	This paragraph combined mitigation, adaptation, and geoengineering into a single thought. Consider splitting into three paragraphs. Miitigation remains the first and best option, but we are running out of time and are consuming any remaining carbon budget. Adaptation will likely be needed because we have delayed action to the point that impacts will be significant. Geoengineering is worth studying, but is a long-shot because of poorly known side effects. Flesh out into three paragraphs., [Alan Mix, USA]	Rejected. The number of pages allocated to the chapter do not allow to have several entries on this topic in the executive summary.
22440	1	3	39	3	39	The phrase as it stands is confusing: "mitigate and adapt to climate and its effects"... there is a redundancy here. [Timothée Ourbak, France]	Accepted: text revised.
24700	1	3	39	3	45	Consider breaking mitigation and adaptation into two separate bullets. [Elizabeth Weatherhead, USA]	Accepted: text revised.
11464	1	3	40	3	41	40 Measures to reduce the impact of climate change on the ocean and cryosphere include: addressing the causes 41 of climate change, REMOVE: managing solar radiation.Explanation: Including solar radiation management is a major error because it has no lasting benefit yet has highly hazardous impacts globally and has no benefit to increasing ocean heat content, ocean acidification and ocean deoxygenation. The one possible exception is for regional Arctic cooling (not in report so consider including). [Peter Carter, Canada]	Accepted as per the scoping document of SROCC.
11486	1	3	40	3	42	The order of the list of mitigation and adaptation measures should reflect priorities of recommendation or be competely neutral with alphabetical order or state "in no particular order". As it currently starts, it may imply an order of importance as addressing the cause of cliamte change, followed by mangaing solar radiation, then supporting biological and ecological adapation, and enhancing societal adaptation when it can be argued that geoengineering efforts are to be assessed by the SR1.5. Generally naming a specific measure of managing solar radiation is not on the same scale of detail as the other measures named here and should be removed [Taehyun Park, Republic of Korea]	There was no intended heierachy among the measures. Nevertheless, SRM will be moved last in the SOD. No specific measure of managing solar radiation was mentioned, which makes the rest of the comment unclear. In any case, it is now specifically mentioned that SRM is not covered in this report.
16	1	3	41	3	41	"managing solar radiation" Urgh. Really? This reads like IPCC would advocate for geoengineering here. I think this is a highly dangerous (and possibly irresponsible) statement. I see that my fear is dismissed later, but here, a very wrong impression may arise. [Daniel Farinotti, Switzerland]	Noted. Who says that the IPCC "advocates for geoengineering"? Certainly not this chapter. The goal here is to set the landscape of measures discussed in the literature. The text is careful not to be policy-prescriptive. SRM has been moved to the end of the sentence and it is specifically mentioned that theses technqiues are not covered in this report.
1480	1	3	41	3	43	one cannot manage solar radiation. Minimalization concept should be applied to avoid lengthy sentences due to which the reader is lost and the meaningfulness of what is being said is lost also. [Danyal Aziz, Pakistan]	Noted. SRM is a term widely used in the scientific literature. Since the IPCC assesses the literature, it is fine to use this expression.
10650	1	3	41	3	41	Managing solar radiation' - an geoengineering approach has a strong negative impact on natural and human systems. To propose it as a best solution for nature and people is not evironmentally friendly. This solution in decision-making is very risky [Oxana Lipka, Russian Federation]	Noted. Who says that the text "proposes SRM as the best solution"? Certainly not this chapter. The goal here is to set the landscape of measures discussed in the literature. The text is careful not to be policy-prescriptive. SRM has been moved to the end of the sentence and it is specifically mentioned that theses technqiues are not covered in this report.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12278	1	3	41	3	41	Putting solar radiation management second in line is a little bizarre. Even if geoengineering is seen as a solution, greenhouse gas removal (as envisaged under negative emissions at Paris) is surely wiorth a mention ahead of more exotic technologies. [Eric Wolff, UK]	Accepted: text revised. SRM is now last in the list and it is specifically mentioned that theses technqiues are not covered in this report.
18160	1	3	41	3	41	I wonder why managing solar raditioation is singled out from all other mitigation measures. What is the specific resaon to do so in this SROCC report? Please explain. [Laurens Bouwer, Netherlands]	Noted. SRM is now last in the list and it is specifically mentioned that theses technqiues are not covered in this report.
22442	1	3	41	3	41	SRM techniques, see what S.R 1.5 is saying, there may be no need to include such a reference here, ot there is a risk of contraduction with SR 1.5, on my view. [Timothée Ourbak, France]	Noted. SRM is not covered in SROCC and the reader is referred to the SR15 report (see section 1.5 of the present chapter). SRM is now last in the list and it is specifically mentioned that theses technqiues are not covered in this report.
23134	1	3	41	3	42	"enhancing societal adaptation" perhaps "enhancing societal recognition and adaptation" or similar. [Aimé Fournier, USA]	Rejected. It appears that societal recognition is not covered in the present chapter nor in the subequent ones, it seems. In any case, this is not for the executive summary.
24702	1	3	41	3	41	"…addressing the cause of climate change" seems like it is code for "minimize emissions of CO2/methane." If so, perhaps say that more directly. [Elizabeth Weatherhead, USA]	Noted. This is the executive summary, hence the conciseness. Full explanation can be found in section 1.5 and Fig. 1.3.
4004	1	3	42	3	43	"The effectiveness of specific global measures to address climate change remains highly uncertain, with the exception greenhouse gas emission reductions." An "of" needs to be added before "greenhouse gas emissions". Also, I think it would be better to reverse the order of this sentence, opening with "With the exception of greenhouse gas emission reductions, ..." so it does not come off as a sort of "aside" note. [Sarah Doherty, USA]	Accepted: text revised.
15330	1	3	42	3	45	This seems to be too policy-prescriptive and too much framed as an assessment, which Chapter 1 is not meant for. [Samuel Morin, France]	Accepted: text revised.
17194	1	3	42	3	44	The term ''global measures'' in this context is too generic. Need further specificity/qualification to substantiate the message of this setence. Meaning of 'the overarching global problem' unclear. [Iulian Florin Vladu, Germany]	Noted. This is the executive summary, hence the conciseness. Full explanation can be found in section 1.5 and Fig. 1.3.
18162	1	3	42	3	42	What specific global measures are meant here? This is very unspecific. [Laurens Bouwer, Netherlands]	Noted. It is unspecific because chapter 1 does not make and assessment. It frames the report.
23344	1	3	42	3	42	"The effectiveness of specific global measures to address climate change remains highly Uncertain" - this refers to the geoingeneering techniques which are not addressed in the report and are unsufficiently referenced in sect. 1.5 [Inga Koszalka, Germany]	Accepted: text revised.
5180	1	3	43	3	43	"with the exception greenhouse …" should be "with the exception of greenhouse …" [Pauline Midgley, Germany]	Accepted: text revised.
6086	1	3	43	3	44	I'm would be concerned to stating so certaintly that Local measures provide "low-regret options" without mentioning the potential for unintendend consequences to neighbors or neighboring communities (e.g., from buidling soft and hard measures to protect property from sea level rise.) It seems that the need for coorperation to should be highlighted. [Patrick Taylor, USA]	Accepted: text revised.
6542	1	3	43	3	43	I don't understand what the authors meant by "low regret options". Perhaps something along the lines of "low risk" or "straightforward"? [APECS Group Review, Germany]	Accepted: text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
11466	1	3	43	3	43	The effectiveness of specific global measures to address climate change remains highly 43 uncertain, ADD: with the definite exception of mitigation by immediate rapid greenhouse gas emission reductions leading to near zero emissions of long lived greenhouse gases which is certain to lead to huge benefits in all ways. Note Uncertain here is a major error. [Peter Carter, Canada]	Accepted: text revised.
12068	1	3	43	3	45	I'm happy to see this statement so clearly made, and so early and prominently in the report. It's a key idea. [Sarah Cooley, USA]	Noted.
12280	1	3	43	3	43	"with the exception of" [Eric Wolff, UK]	Accepted: text revised.
12764	1	3	43	3	43	Local measures' is a bit vague, I think. It brings to mind re-using my shopping bags. An example may be useful here. [Collins Matthew, UK]	Accepted: text revised.
14122	1	3	43			…with the exception of greenhouse gas… [Christopher Fogwill, UK]	Accepted: text revised.
16158	1	3	43	3	43	mising word 'of' greenhouse… [Lynne Talley, USA]	Accepted: text revised.
18164	1	3	43	3	43	Which local measures? And adaptation or mitigation? [Laurens Bouwer, Netherlands]	Both.
18440	1	3	43	3	43	The expression "low-regret option" is probably not known for all readers. Maybe this should be explained in a footnote or similar. [Anette Jönsson, Sweden]	Accepted: text revised.
21292	1	3	43			Please add <of> after <exception> [Sanjay Chaturvedi, India]	Accepted: text revised.
21318	1	3	43	3	43	add "of" to "with the exception of greenhouse gas emmissions" [Philippus Wester, Nepal]	Accepted: text revised.
23136	1	3	43	3	43	"with the exception greenhouse gas emission reductions" perhaps "except that reducing greenhouse gas emissions would certainly be effective" [Aimé Fournier, USA]	Accepted: text revised.
11780	1	3	44	3	45	need clearer reference to the use of ecosystem-based approaches for climate change adaptation and mitigation [Hilde Eggermont, Belgium]	Rejected. This is the executive summary, hence the conciseness. Even in section 1.5 space is at premium. Note however that figure 1.3 mentions which chapters cover each measure.
11468	1	3	45	3	45	The greatest benefit is likely to 45 be derived from the combination of global and local measures Add: including making environmental governance dominant, and applying the sustainable development principles agreed to under the 1992 UN Earth Summit reaffirmed at the 2012 Rio +20 UN conference (pollution prevention, polluter pays, precautionary principle, full cost accounting, and no externalizing of socioenvironmental environmental costs), and involvement of traditional indigenous governance. [Peter Carter, Canada]	Rejected. This is the executive summary, hence the conciseness.
17324	1	3	46	3	47	This entire ExecSum is excellent! What I am missing however is a lifting forward of some of the information on the impact of early mitigation mentioned elsewhere in the Report, as well as AR5 and anticipted in the 1.5 Degree Report. Suggest placeholder wording along the lines of the following (first sentence bolded): Early and significant mitigation has the potential to slow or lessen at least some of the impacts on oceans and cryosphere. This particularly applies to certain mountain glacier systems, Arctic sea ice, permafrost and levels of ocean acidification and eutrophication. It may also constrain ice sheet response and feedbacks, though this is less certain especially on longer timescales based on paleoclimactic observations. Overshoot scenarios may be especially problematic for these systems. [Pamela Pearson, USA]	Noted. Note that this is the executive summary, hence the conciseness. Even in section 1.5 space is at premium. Note that this is partly covered in the sentence added at the end of section 1.5.1.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4692	1	3	47	3	52	This paragraph provides no messages other than international cooperation is needed.There is no governance vision or understanding. As ocean matters are governed by a plethora of international agreements already, do we not have anything new to say on governance? [Manuel Barange, Italy]	Taken into account; text has been revised; see governance section 1.7
17192	1	3	47	3	52	This para may benefit from emphasis on national-level measures, given the importance of NDCs [Iulian Florin Vladu, Germany]	Taken into account: In the body text - section 1.7, we have taken this into account.
18166	1	3	47	3	47	Is critical for what? [Laurens Bouwer, Netherlands]	Accepted - text revised
17182	1	3	48	3	48	with the exeption of green.... [Iulian Florin Vladu, Germany]	Comment not clear
12070	1	3	49	3	49	Not sure if "a range of legal frameworks… institutions" includes NO governance also, as we see in ABNJ. [Sarah Cooley, USA]	Taken into account - text revised
22446	1	3	50	3	50	Not sure the wording "space" is the more apropriate, maybe "opportunities", or "solutions"? [Timothée Ourbak, France]	Taken into account - text revised
23626	1	3	50	3	50	Provides space, spatially or temporally? [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account - text revised
16880	1	3	51	3	52	Do the case studies "offer possibilities" for this? Do they, rather, highlight possibilities, provide examples, or suchlike? [Markku Rummukainen, Sweden]	Noted - Yes they do, please read CCB 2
4026	1	3	54	4	5	It is essential to keep calibrating model outputs against continually improving data outputs and substantial efforts have been made in this regard since AR5 in the sea level area (Slangen et al., 2017; Meyssingnac et al., 2017; Watson 2018). References: Slangen, A.B., Meyssignac, B., Agosta, C., Champollion, N., Church, J.A., Fettweis, X., Ligtenberg, S.R., Marzeion, B., Melet, A., Palmer, M.D. and Richter, K., 2017. Evaluating Model Simulations of Twentieth-Century Sea Level Rise. Part I: Global Mean Sea Level Change. Journal of Climate, 30(21), pp.8539-8563. Meyssignac, B., Slangen, A.A., Melet, A., Church, J.A., Fettweis, X., Marzeion, B., Agosta, C., Ligtenberg, S.R.M., Spada, G., Richter, K. and Palmer, M.D., 2017. Evaluating Model Simulations of Twentieth-Century Sea-Level Rise. Part II: Regional Sea-Level Changes. Journal of Climate, 30(21), pp.8565-8593. Watson, P.J., 2018. How Well Do AR5 Sea Surface-Height Model Projections Match Observational Rates of Sea-Level Rise at the Regional Scale? Journal of Marine Science and Engineering, 6(1), p.11. [Phil Watson, Australia]	Noted: references here are relevant to chapter 4, but we have added text to 1.8.1.3 to mention the importance of testing model output agains other data sources.
24704	1	3	54	3	57	Observations and models are called out directly, but research belongs in this bullet as well. [Elizabeth Weatherhead, USA]	Taken into account: this executive summary point focuses on scientific data, but the introduction to section 1.8 has been made more inclusive of other types of scientific knowledge.
24706	1	3	54	3	56	The bolded sentence is covering a number of points. Consider breaking into two or more sentences or rewording. [Elizabeth Weatherhead, USA]	Accepted: bold text shortened
6544	1	3	56	3	56	The word "remote sensing" shall be replaced by " remotely sensed observations" [APECS Group Review, Germany]	Taken into account: text revised extensively

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
11002	1	3	56	3	57	Add "These observations are compkemeneted by indigenous and local knowledge" [Ben Orlove, USA]	Rejected: we feel that this is better in the following paragraph on IK and LK
11470	1	3	56	3	56	54 Observations and models are the foundation for assessing past, current and possible future changes in 55 the ocean and cryosphere, and their maintenance and extension is key to inform and support decision56 making, ADD: noting that when observed impacts and trends are more adverse than model projections (as is the case) decision-making will be based on observations. [Peter Carter, Canada]	Rejected: outside of content for chapter text that supports this executive summary point.
22448	1	3	57	3	57	is there a specific reason you are refering to "last century", the sentence is also true for the last years until now. [Timothée Ourbak, France]	Accepted: text removed
558	1	4	0			After "that informs" add "restoration, mitigation and" [William Clarke, Australia]	Rejected: "restoration and mitigation" are not in our scope.
11476	1	4	0	4		There are essential framing and context factors that require to be added. These are (1) current atmospheric greenhouse gas concentrations and rates of increase particularly the unprecedented data on atmospheric carbon dioxide (WMO Greenhouse Gas Bulletin Nov 2017) and (2) global emissions, (3) INDCs published projections of an increase in global emissions based on current United Nations filed INDC's (intended nationally determined contributions). Also (4) current levels and rapid rate of increase in ocean acidification. ocean heat content and deoxygenation. (5) Worst case cryosphere and ocean impacts scenarios are not included in the report and need to be as the priority in any risk assessment. These are impacts of enormous, catastrophic, irreversible magnitude with the rapidly increasing likelihoods, and therefore very high risk. Worst-case cryosphere scenario is the multiple inter-reinforcing Arctic amplifying feedback back processes (referred to in the 2001 IPCC assessment under singularities as runaway carbon dynamic) and often referred to simply as runaway (not in the report). The sources of these feedbacks are enormous and include albedo loss feedback of Arctic summer sea ice decline, albedo feedback of sub Arctic snow cover decline, methane emissions increase from warming subarctic wetlands, methane and carbon dioxide and nitrous oxide (not included in the report) emissions from thawing permafrost, and subsea floor methane emissions from Arctic continental shelves.There are more potential feedback processes included in O'Connor et al, 2010, Possible role of wetlands, permafrost, and methane hydrates in the methane cycle under future climate change: A review. In the case of subsea methane over the very long term, methane venting to the atmosphere is expected. However this is policy relevant now because the increased release of subsea floor methane with ocean warming will increase Arctic ocean acidifcation and deoxygenation. The worst-case ocean scenario is the synergistic interaction (IPCC AR5 but not in report) of increasing ocean heat content, ocean acidification (which is accelerating WMO 2015) and ocean deoxygenation. The worst-case global and planetary scenario, which is an existential threat, is of course the combination of these Arctic and ocean worst-case impacts. Any delay past the immediate global emissions decline for mitigation will rapidly increase all these enormous risks and the existential threat to the future, which is wrong in every sense. [Peter Carter, Canada]	Taken into account: many of these aspects are outside of the scope of SROCC, but were covered in SR1.5. Linking risk assessment with uncertainty assessments, including low likelihood/hig impact event, has been added to the text.
18	1	4	1	4	1	"in many ocean and cryosphere 1 components" --> should read "in the ocean and the cryosphere" (or provide an explanation for what "components" are differentiated in the ocean) [Daniel Farinotti, Switzerland]	Accepted: text revised
20	1	4	1	4	3	simplify the sentence, or split it in two messages [Daniel Farinotti, Switzerland]	Taken into account: text revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
164	1	4	1	4	5	The Executive Summary fails to mention and detail the pre-industrial climate historical context. A large number of palaeoclimate reconstructions have been published which document significant natural variability both for the oceans and cryosphere on decadal to millennial time scales. This enlarges the short observational period enormously by adding crucial palaeoclimatic context. It is in the spirit of full transparency that this enormous natural variability has to be acknowledged, together with the fact that climate models still struggle to fully replicate it. It must not be concealed that the poor hindcast model performance is a matter of concern and decreases confidence into model skill and future prognosis capability. [Sebastian Luening, Portugal]	Rejected: we have added more paleoclimate information into the main chapter text (e.g. section 1.4, extended section 1.8.1.2), but do not feel that this information is required in the executive summary
1550	1	4	3	4	5	The phrase “Climate models provide the only available data for assessing future climate change under different plausible greenhouse gas emission trajectories and scenarios of socio-economic growth and development” makes in itself not much sense. It is also unnecessarily categorical and finally has no bearing on this Special Report. I think it can safely be deleted. [Wolfgang Cramer, France]	Accepted: text revised
12458	1	4	3	4	5	statement is misleading as there are other ways besides climate modeling for assessing future climate change. Assessment drawing upon Indigenous or local knowledge, or qualitative scenarios modeling offer alternative ways to ensivision what a future climate disrupted world might look like. Climate models are important, but one of only a suite of tools. [James Ford, Canada]	Accepted: text revised
12766	1	4	3	5	5	Climate models also provide the framework for assessing the drivers of observed changes (e.g. detetction and attribution). I wonder if it should be pointed out here that models are not perfect and, therefore, projections are uncertain but, nevertheless, there is some basic physics at play which gives us some confidence? [Collins Matthew, UK]	Taken into account: we haven't included this in the executive summary, but the text on models in section 1.8.1 has been revised
15448	1	4	3	4	4	I suggest to modify the sentence: "Climate models provide the only available data for assessing future climate change under different plausible greenhouse gas emission trajectories…", by "Climate models are the best available scientific tool for assessing future climate change..." or "Climate models provide the best available way for assessing future climate change...". The reason for this is that the data generated by climate models are not equivalent to the data obtained empirically or experimentally. What I am trying to underline is that data obtained from climate models are not "real" data. [Hernan Sala, Argentina]	Accepted: text revised
23138	1	4	3	4	3	"only available data" should be "only available tool" [Aimé Fournier, USA]	Accepted: text revised
24708	1	4	3	3	5	“Climate models provide the only available data for assessing future climate…”. This is only true if “climate models” includes approaches that are not generally considered climate models, such as statistical models (e.g. Salawitch’s book), extrapolation (Charleston city planning), weather generators (Mears, et al.) with additive sea level rise, etc. Perhaps what the authors want to express is the value of climate models. [Elizabeth Weatherhead, USA]	Accepted: text revised
12072	1	4	4	4	4	Change "data" to "framework"? Because the trends and mechanisms are important too, but "data" isn't commonly used to describe those. [Sarah Cooley, USA]	Accepted: text revised

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
1552	1	4	7	4	7	“Indigenous and local knowledge is used by human populations” - what are “human populations”? Do they include IPCC authors? This sounds like they do not, and the wording oddly gives the impression that authors are creating an artificial distance between themselves and those “populations”, leading to the conclusion that IPCC authors indeed do NOT consider indigenous and local knowledge as valid information sources. [Wolfgang Cramer, France]	Accepted – text revised
1554	1	4	7	4	10	“… respond to and coordinate governance for the ocean and cryosphere”. For once, this is unclear, is it about responding to givernance? or respond to what? Overall, I have to confess that I find this entire paragraph confusing and opening more questions than answering any. This probably needs a full reconsideration and authors have to clarify for themselves whether they consider indigenous and local knowledge to be valid information or not. [Wolfgang Cramer, France]	Accepted – text revised
4694	1	4	7	4	10	As I will mention later, I feel the chapter is defensive in relation to Indigenous and Local knowledge, attempting to be politically correct at the expense of valuing scientific evidence. Balance is needed, and this includes placing scientific evidence at the front of any conclusions [Manuel Barange, Italy]	Rejected – no scientific evidence/publication provided to support changes suggested by the reviewer. Balance means considering all knowledge systems.
6028	1	4	7	4	8	Very glad to see that mention of Indigenous Knowledge is included in the Exec. Summary. However, it is crucial that the two knowledge systems (i.e. Indigenous Knowledge and local knowledge) are not lumped together or mixed up. They are very different and distinct from one another. Indigenous knowledge is based on a specific culture and knowledge system, has its validation process and is passed forward from generation to generation, often thousands of years old. Local knowledge is aquired due to experiences and observations made by living in a specific place, but is not necessarily based on a knowledge system or a specific culture. These terms cannot be used interchangeably and lumping them here together would encourage readers to make the assumption that they are one in the same or at least very similar. Please therefore refer to Indigenous knowledge and local knowledge separately. The Inuit Circumpolar Council has a specific definition for Indigenous knowledge that we would be happy to provide. [Joanna Petrasek Macdonald, Canada]	Accepted – text revised. We have separated Indigneous Knowledge and Local Knowledge
11004	1	4	7	4	10	Add a mention of observations, if it doesn't appear in the previous point about observations. The point about "holistic understandings" doesn't really indicate the importance of ILK for study of sea ice, permafrost, glaciers and coastal processes. [Ben Orlove, USA]	Accepted – text revised
12074	1	4	7	4	7	Change "is used" to "must be used" [Sarah Cooley, USA]	Rejected. The reviewer misunderstands our intent. We are talking about the fact that people use IK and LK. We are not being prescriptive and saying that they must be used.
17198	1	4	7	4	10	Referring to the consideration of indigenous and traditional knowledge "alongside scientific knowledge" is outdated, and may even be seen as offensive to some groups/countries. Certain aspects of indigenous knowledge are widely considered a form of scientific knowledge in themselves. The reference should be to a "braiding" or weaving" of different forms of scientific knowledge, incuding traditional knowledge. This was also noted at the IPCC-Cities 2018 conference. [Iulian Florin Vladu, Germany]	Rejected – no longer relevant since wording is changed.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17200	1	4	7	4	10	It is important to also highlight that, in addition to aiding holistic understandings and the develop of effective response/policies, use of indigenous and local knowledge alsoguides the implementation of responses, and when options exists, helps choose preferred ways forward that suit the local context. [Iulian Florin Vladu, Germany]	Rejected – no longer relevant since with the rewrite the wording is changed and addresses it
17700	1	4	7	4	10	Recognise that indigenous knowledge possesses uncertainties of a completely different nature than uncertainties in (e.g.) observation data or modelled data. See Kahnemann (Thinking fast and slow) for an overview of the ability of people to recognise risks and uncertainties [Hessel Voortman, Netherlands]	Taken into consdieration: We have revised the text and inserted the reference- thank you!
24710	1	4	7	4	10	Possibly adjust the wording here: “Indigenous and local knowledge is used by human populations to observe…” Perhaps the authors want to express, “Indigenous and local knowledge offers observations and insights…” or some other concept such as “Indigenous and local knowledge can be useful because of the holistic approach to the environment.” I’m not sure, but current wording is a bit awkward. [Elizabeth Weatherhead, USA]	Taken into account - text revised along with other comments of the same nature
13330	1	4	8	4	8	How can we establish when the point of complete use of indigeneous knowledge in climate change assessment is attained? Suggest the authors considering highlighting the limited use of IK to avoid ambiguity. [Debra Roberts and Durban Team, South Africa]	Taken into account - text revised
14124	1	4	8			utilized [if using US English as in previous reports; if using British English there are similar numbers of 'z's that need removing and 'u's that need adding throughout the report!] [Christopher Fogwill, UK]	Rejected: UK spellings are used
17196	1	4	8	4	8	The meaning of "Iincompletely utilised" is not clear. Perhaps reformulate. [Iulian Florin Vladu, Germany]	Accepted: text removed
1482	1	4	12	4	12	ocean and cryosphere changes. [Danyal Aziz, Pakistan]	Taken into account: text revised to make messages clearer
1556	1	4	12	4	12	“Certainty in assessments of ocean and cryosphere change evolve…” - this would have to be “evolves”, but more generally, I find it rather unclear what “evolving certainty” would actually mean. Do the authors say that, at some point, we “know enough” and then, and only then, decisions become possible? This would be a rather naive view since the relative level of “certainty” needed will depend on the nature of the studied system and particularly the previously made risk assessment. Here, too, a full consideration of this paragraph will be necessary. [Wolfgang Cramer, France]	Taken into account: text revised to make messages clearer

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4028	1	4	12	4	16	I think it is also important in this key summary point to note that certainty in assessment (particularly regarding ocean components) will evolve as a result of improving both modelling capacities (Slangen et al., 2017; Meyssingnac et al., 2017) and time series analysis techniques that remove contamination associated with internal climate modes (Watson, 2016,2017, 2018a,b). References: Meyssignac, B., Slangen, A.A., Melet, A., Church, J.A., Fettweis, X., Marzeion, B., Agosta, C., Ligtenberg, S.R.M., Spada, G., Richter, K. and Palmer, M.D., 2017. Evaluating Model Simulations of Twentieth-Century Sea-Level Rise. Part II: Regional Sea-Level Changes. Journal of Climate, 30(21), pp.8565-8593. Slangen, A.B., Meyssignac, B., Agosta, C., Champollion, N., Church, J.A., Fettweis, X., Ligtenberg, S.R., Marzeion, B., Melet, A., Palmer, M.D. and Richter, K., 2017. Evaluating Model Simulations of Twentieth-Century Sea Level Rise. Part I: Global Mean Sea Level Change. Journal of Climate, 30(21), pp.8539-8563. Watson, P.J., 2016. Acceleration in U.S. mean sea level? A new insight using improved tools. Journal of Coastal Research. Volume 32, Issue 6, pp. 1247 – 1261. Coconut Creek (Florida), ISSN 0749-0208. DOI: 10.2112/JCOASTRES-D-16-00086.1. Watson, P.J., 2017. Acceleration in European mean sea level? A new insight using improved tools. Journal of Coastal Research. Volume 33, Issue 1, pp. 23 – 38. Coconut Creek (Florida), ISSN 0749-0208. DOI: 10.2112/JCOASTRES-D-16-00134.1. Watson, P.J., 2018a. Improved Techniques to Estimate Mean Sea Level, Velocity and Acceleration from Long Ocean Water Level Time Series to Augment Sea Level (and Climate Change) Research. Doctoral dissertation, PhD thesis, School of Civil and Environmental Engineering, University of New South Wales, Australia. Watson, P.J., 2018b. How Well Do AR5 Sea Surface-Height Model Projections Match Observational Rates of Sea-Level Rise at the Regional Scale? Journal of Marine Science and Engineering, 6(1), p.11. [Phil Watson, Australia]	Taken into account: these details can't be covered in detail in chapter 1, but this comment has been passed to Chapter 4 for consideration.
6088	1	4	12	4	16	Consider raising the mention of rise assessment to the bolded statement. I think that the support for using risk assessment to deal with uncertainy is really the key message here. [Patrick Taylor, USA]	Accepted: change made and revisions in the chapter (see 1.4 and 1.9.3) have emphasised the importance of providing information that is relevant for risk reduction planning.
11472	1	4	12	4	12	11 12 indigenous peoples are more vulnerable to global climate change impacts including particularly certain impacts on the cryo-sphere and the oceans, ADD: so their human and indigenous rights have to be considered as a priority in policy-making. [Peter Carter, Canada]	Rejected: we have worked extensively to bring IK and LK into SROCC, but have not made the suggested change to the ES text.
12076	1	4	12	4	12	Change "evolve" to "evolves" [Sarah Cooley, USA]	Accepted
12282	1	4	12	4	12	"Certainty....changes" [Eric Wolff, UK]	Accepted
18168	1	4	12	4	16	I am not sure if I can follow these arguments. If changes (including impacts) are highly uncertain (cf. Cross Chapter Box 4 in this Chapter), then how do we know they are catatrophic if they are not managed. I would suggest rewriting this entire paragraph, whihc seems to aim at deep uncertainty, but could do a better job in reflecting the excellent discussion laid out in Cross Chapter Box 4. [Laurens Bouwer, Netherlands]	Taken into account: paragraph is not just about deep uncertainty, text revised accordingly.
18574	1	4	12	4	16	consider risk framework rather than uncertainty framework [Alan Mix, USA]	Accepted: change made and revisions in the chapter (see 1.4 and 1.9.3) have emphasised the importance of providing information that is relevant for risk reduction planning.
21296	1	4	12			Replace <evolve> with <evolves> [Sanjay Chaturvedi, India]	Accepted: text revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23140	1	4	12	4	12	"evolve" should be "increases" [Aimé Fournier, USA]	Rejected: new information does not always increase certainty (see example in CCB-4)
24712	1	4	13	4	14	Great sentiment: “Some aspects of the rate, timing, … remain deeply uncertain, but comprehensive risk …” Possibly the authors might want to break this into two sentences, though. [Elizabeth Weatherhead, USA]	Taken into account: phrasing revised.
22	1	4	14	4	14	remove "deeply" (or point to the place in which the concept of "deep uncertainty" is introduced/discussed) [Daniel Farinotti, Switzerland]	Rejected: Cross-Chapter Box 4 deals with deep uncertainty
6546	1	4	14	4	14	The word "comprehensive" shall be replaced by "a comprehensive" [APECS Group Review, Germany]	Taken into account: phrasing revised.
16882	1	4	15	4	15	Suggest "... can address ALSO highly uncertain...". This would emphasise that comprehensive risk management can of course address (also) less uncertain changes. [Markku Rummukainen, Sweden]	Taken into account: phrasing revised.
11474	1	4	16	4	16	but comprehensive risk 15 assessment that informs adaptation planning can address highly uncertain changes that would have 16 catastrophic consequences ADD: if immediate emissions mitigation is not the priority and not managed. ADD: In the case of many massively catastrophic and irreversible impacts on the cryosphere and oceans, comprehensive risk assessment determines the imperative of immediate rapid decline in global emissions leading to near zero emissions of long lived greenhouse gases, which is indispensable management. Because of the enormous and existential threat magnitude of these impacts, this holds notwithstanding the current incomplete and inadequate economic cost benefit analyses. Note Table 6.1 in the report contains the multiple catastrophic and irreversible impacts. In respect of risk assessment, in this respect the report has redefined risk assessment in a confusing and potentially misleading way (as in the report: REMOVE: Risk is a product of the interaction between a hazard and a likely exposed and vulnerable element.The standard risk assessment definition that has been endorsed by previous IPCC assessments, which is the product of the magnitude of an impact and his likelihood must replace this inadequate risk assessment in the report. the report has redefined risk assessment in a confusing and potentially misleading way. The standard risk assessment definition that has been endorsed by previous IPCC assessments which is ADD: the product of the magnitude of an impact and his likelihood must replace this inadequate risk definition in the report. Also risk assessment must priorize the very worst-case impacts scenarios (not done in the report). This is Arctic multi-feedback cascading runaway and oceans triple impact threat collpase. [Peter Carter, Canada]	Taken into account: Suggested additions to text have not been made, but text throughout the chapter has been revised to give more emphasis to assessment findings on the need for urgent mitigation efforts to reduce risks and aid adaptation.
560	1	5	0			After "means that" add "restoration, mitigation and" [William Clarke, Australia]	Taken into account: text revised extensively. We don't add "restoration" and "mitigation" as this is not a specific focus of our scope for framing.
562	1	5	0			After "Box 1);" add "restoration, mitigation," [William Clarke, Australia]	Taken into account: text revised extensively. We don't add "restoration" and "mitigation" as this is not a specific focus of our scope for framing.
6264	1	5	0	7		Definitional elements relating to the ocean, ocean circulation, and the cryrosphere are comprehensively treated and helps the nonscience reader understand their relevance in the context of the Earth System [Melinda Kimble, USA]	Noted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
24	1	5	1	5	1	Although catchy, the title "Why this Special Report?" seems misleading: The following two pages do not provide a clear answer to the question, but rather explain the importance of the oceans and the cryosphere, and provide some basic definition. "Introduction" would be a much fairer title. [Daniel Farinotti, Switzerland]	Taken into account: Structure and content of section 1.1 extensively revised
23346	1	5	1	13	20	General comment: The sections 1.1-1.3 need major improvements regarding homogenization, consistency, grammar and wording. [Inga Koszalka, Germany]	Accepted: Sections 1.1 to 1.4 have been throughly revised to improve clarity and structure, and remove duplication
21538	1	5	3	5	20	Consider starting out this section answering the proposed question: "Why this Special Report?" For example, start out this section with "Earth's ocean and cryosphere are changing in response to climate change and more rapidly than previously forecast (in certain aspects)...and the impacts of these changes are far-reaching--economy, human health, cultural preservation and livelihoods." Follow this with "This means that adaptation strategies of people and economies to ocean and cryosphere change must be nimble and effective, presenting special challenges to cultures highly adapted to the polar, montane and coastal environments of past centuries and millennia." Then, finally, go into the reasoning with "The ocean and cryosphere play fundamental roles in the Earth system. The ocean represents the vast.... water, resources and identity, and are exposed to hazards related to it." I believe this rearrangement of this section will capture more audience wondering why there is this special report. [Tseng Rose, USA]	Taken into account: Structure and content of section 1.1 extensively revised
4006	1	5	4	5	4	"and cryosphere" --> "and the cryosphere" [Sarah Doherty, USA]	Taken into account: text extensively revised
6128	1	5	4	5	4	cryosphere is more than the frozen water elevament on Earth; it also includes frozen ground (which includes permafrost) which can occur without water [Regine Hock, USA]	Accepted: text revised
1214	1	5	5	5	5	The oceans are more than regulators of precipitation, they are the main moisture source for the global hydrological cycle... suggest rewording to reflect this. [Ross Brown, Canada]	Accepted: text revised, and further detail also added to revised section 1.2.1
11006	1	5	6	5	7	To the list " for livelihoods, food security and cultural identity, " add "and the ongoing habitability of these regions" [Ben Orlove, USA]	Taken into account: text extensively revised
23356	1	5	7			Please provide more recent and more comprehensive references [Inga Koszalka, Germany]	Accepted: text extensively revised and referenced
23628	1	5	7	5	7	This follows on from a list of benefits, suggest starting sentence with 'However, ' to distinguish the switch in focus [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: text extensively revised
4568	1	5	8	5	8	STating that a high fraction of the world's inhabitants live less tan 200 m above sea level sounds not very meaningfull for this report: Thus large cities like Moscow (144m above sea-level), Chicago (176 m above sea level) are certainly not much more concerned by the ocean warming and sea level rise than cities like Denver (1609 m abocve sea-level). The distance to the ocean would be a more relevant criterion. [Jean Poitou, France]	Accepted: information updated with newer references, and better define usage of coastal terms
4696	1	5	8	5	8	"...200m above SEA LEVEL (Crossland..." [Manuel Barange, Italy]	Accepted: information updated with newer references, and better define usage of coastal terms
6548	1	5	8	5	8	Is there a more up-to-date reference that could be used instead of Crossland et al. (2005)? If coastal population is predicted to increase so dramatically between 2000 and 2050, it seems likely that the percentage of the global population living <200m above sea level is higher now than it was appx 15 years ago. It would be interesting to see a more recent estimate. [APECS Group Review, Germany]	Accepted: information updated with newer references

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6550	1	5	8	5	8	"More than 45% of the global population currently lives….". The Crossland et al. 2005 reference represent the period upto 2005. Authors shall clarify clearly what do they mean by saying " currently", whether before 2005 or the year 2018. [APECS Group Review, Germany]	Accepted: information updated with newer references
11488	1	5	8	5	8	"currently lives on land less than 200m above the ocean" is citing a study from 2005.This is unlikely to reflect the current state of population distrubution around the coasts and authors should reconsider wording to better reflect this [Taehyun Park, Republic of Korea]	Accepted: information updated with newer references
19098	1	5	8	5	8	Crossland seems like an old reference, perhaps add http://iopscience.iop.org/article/10.1088/1748-9326/11/3/034010#erlaa182as2 [Anna Zivian, USA]	Accepted: thank you, this reference was very useful in revising our text.
23630	1	5	8	5	8	Is this the population along the coastline?? There is land that is less than 200m above ocean which is far inland [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: we have been more specific on our use of coastal population information
1216	1	5	10	5	12	Awkward construction that reads as though the Arctic is entirely terrestrial; the majority of Arctic communities are located in coastal regions with strong sensitivities to ocean and ice changes. [Ross Brown, Canada]	Accepted: text revised extensively
13332	1	5	10	5	12	For a balanced presentation, suggest that the authors also include the projected population growth in cryospheric regions (if any) as a warmer willl have implications for population distribution in these regions. [Debra Roberts and Durban Team, South Africa]	Taken into account: population information added to Arctic and high mountain areas (but not for projections). Will continue to work with chapters 2 and 3 on this.
6030	1	5	12	5	12	In addition to food, water, resources, and identity, 'health and wellbeing' as well as 'livelihoods' should be included in this list. [Joanna Petrasek Macdonald, Canada]	Accepted: text revised extensively
22930	1	5	12			the word 'montagne' appears multiple times in the chapter where the word 'mountain' should appear (montagne is french for mountain) [Jamie Shutler, UK]	Accepted: text changed
1218	1	5	14	5	14	Suggest the phrase "are changing in response to climate change" be modified to read "are responding to a wide range of environmental forcings linked to climate change" [Ross Brown, Canada]	Taken into account: text revised extensively
1756	1	5	14	5	15	Suggest adding a refefernce Fyke J.G., O.V. Sergienko, J.T.M. Lenaerts, M. Löfverström, and S. Price. (2018), An overview of interactions and feedbacks between ice sheets and the Earth system, Rev. Geophys., 56. https://doi.org/10.1029/2018RG000600 [Olga Sergienko, USA]	Taken into account: reference more relevant to chapter 3 assessment
1484	1	5	15	5	16	reference is required. [Danyal Aziz, Pakistan]	Accepted: references added throughout section
16046	1	5	15	5	20	Slow changes mean there is time to plan adaptation strategies, which may be implemented gradually, but without that planning and that gradual implementation, 'tipping points' of gradual changes could be experienced as shocks. [Nathan Ross, New Zealand]	Taken into account: text revised extensively to highlight urgency, irreversibility and tipping elements
19276	1	5	15	5	15	Delete "regional to global" [Michelle A. North, South Africa]	Accepted: text removed
23632	1	5	15	5	16	Add examples of the elements here [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: text added
21138	1	5	17	5	18	the term "timescales relevant to human societies" is poorly expressed. Presumably this means in the order of decades. The order of magnitude of years is recommended to be expressed here to make it clear what is meant. On first reading, my interpretations was in centuries, which is clearly not what is meant. [Andrew Constable, Australia]	Rejected: we feel that the meaning is clear without restricting the time scale. Section 1.3 deals further with timescales.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23142	1	5	17	5	18	"timescales relevant to human societies" append "and longer timescales". [Aimé Fournier, USA]	Rejected: considered this but decided it wasn't needed here. Section 1.3 talks about lonter term committed change.
1220	1	5	18	5	20	The sentence is somewhat overstated… mountain and polar regions are characterized by strong natural climate variability which means the people there have, by necessity, already developed nimble and effective adaptation strategies to survive. I think what you are trying to say is that the pace of projected change may be greater than current capacities to adapt. [Ross Brown, Canada]	Accepted: we have been more specific that this sentence is about transformative adaptation , and have added adaptive capacities.
12078	1	5	18	5	18	This phrasing "adaptation strategies of people and economies to ocean and cryosphere change must be nimble and effective, presenting special challenges to cultures highly adapted to the polar, montane and coastal environments of past centuries and millennia" is actually kind of offensive and paternalistic: it implies that cultures living in polar, montane and coastal environments (which are often indigenous communities) won't be as nimble or effective at adapting as other communities less tied to the land or located elsewhere. However, indigenous populations and those tightly tied to environmental resources are accustomed to good/bad years and adapting to them -- within specific bounds. Find another way to express the idea that communities tightly dependent on natural resources will be experiencing variability outside the range they are accustomed to handling and that is what poses problems, not their geography or cultural characteristics per se. [Sarah Cooley, USA]	Accepted: we have been more specific that this sentence is about transformative adaptation.
21140	1	5	18	5	19	the phrase "adaptation strategies of people and economies to ocean and cryosphere change must be nimble and effective" implies a 'reactive management approach' i.e. wait until change is detected and then react. I would suggest this be made very clear that approaches should be proactive and minimise societal disruption in adapting to what future is unfolding. This will be an important guide in developing advice in the future. A reactive approach will be too late in most cases. [Andrew Constable, Australia]	Taken into account: additional sentence on reducing and avoiding risks added
1558	1	5	19	5	19	“must be nimble” - “must” could come across as policy-prescriptive, but what means “nimble”? [Wolfgang Cramer, France]	Taken into account: "must" removed.
18170	1	5	19	5	19	"and effective to minimise risk". [Laurens Bouwer, Netherlands]	Taken into account: risk added to preceeding sentence
23538	1	5	19	5	20	Please include ecosystems in this parapgraph [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: ecosystems has been added to revised paragraph
19274	1	5	20	5	20	Delete "of past centuries and millenia" [Michelle A. North, South Africa]	Taken in to account: text extensively revised
21482	1	5	20	5	20	"montane" should be corrected to "mountain" [Layeghi Behzad, Iran]	Accepted: text changed
2908	1	5	22	5	35	Mention how this relates to AR6? [Robert Kopp, USA]	Accepted: information has been added to section 1.6 and 1.10 to highlight gaps in SROCC that will be covered in AR6
3962	1	5	22	5	35	It might be a good idea to also put the report in the context of the AR6 report [Helene Hewitt, UK]	Accepted: information has been added to section 1.6 and 1.10 to highlight gaps in SROCC that will be covered in AR6

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10634	1	5	22	5	25	The first draft of the report reads reasonably well. However, inevitably there are significant omissions, in particular discussion of linkages between the ocean and cryosphere and other elements of the climate system. The report aims (p. 1-5 lines 22-25) to recognise 'the interconnectivity of the ocean and cryosphere in the Earth system, in their responses to climate change, …. It reports on specific aspects where knowledge has emerged since the IPCC Fifth Assessment Report .' Despite this goal, the report reads at times as if the ocean and cryosphere vary in isolation from the wider system as physical exchanges across the air-sea and air-sea-ice interfaces are barely discussed. This issue needs to be addressed in the next draft. Specific points of concern based on my own area of expertise are listed below. [Simon Josey, UK]	Thank you for this comment. Please refer to responses to comments 10636, 10638 and 10640 below.
10636	1	5	22	5	25	A particular example is provided by heat exchanges across the air-sea interface which are barely discussed. Several studies since AR5 suggest that global mean net heat flux can now be determined at an accuracy sufficient to consider variations in heat uptake by the oceans (Liang and Yu,2016; Liu et al., 2017; Ponte and Piecuch, 2018). Can the panel please assess these papers and provide an informed assessment regarding their significance/accuracy? Note this is not a case of cite my own work as I am not an author on these publications. However, some coverage of this topic should form part of the assessment if the stated aim to recognize interconnectivity is to be achieved. Liang, X., & Yu, L. (2016). Variations of the global net air-sea heat flux during the "hiatusperiod" (2001–10). Journal of Climate, 29(10), 3647–3660. https://doi.org/10.1175/JCLI-D-15-0626.1 Liu, C., R. P. Allan, M. Mayer, P. Hyder, N. G. Loeb, C. D. Roberts, M. Valdivieso, J. M. Edwards, and P.-L. Vidale (2017), Evaluation of satellite and reanalysis based global net surface energy flux and uncertainty estimates, J. Geophys. Res. Atmos., 122, 6250–6272, doi:10.1002/2017JD026616 Ponte and C. G. Piecuch. (2018) Mechanisms Controlling Global Mean Sea Surface Temperature Determined From a State Estimate. Geophysical Research Letters 45:7, 3221-3227. [Simon Josey, UK]	Taken into account: chapter 1 is unable to assess the literature on specific topics, but we have passed these references to Chapters 3 and 5 of SROCC
10638	1	5	22	5	25	Another topic that has been omitted is the relationship via surface freshwater fluxes between changing ocean salinity and potential strengthening of the global hydrological cycle. Again, a significant literature (e.g. papers led by Skliris, Vinogradova, Zika) has developed on this topic since AR5 and needs to be assessed inclusing claims that intensification of surface freshwater flux has now been robustly identified in the sub-tropical gyres. [Simon Josey, UK]	Taken into account: chapter 1 is unable to assess the literature on specific topics, but we have passed these references on to Chapter 5 of SROCC
10640	1	5	22	5	25	A third example is how have polar air-sea-ice fluxes changed particularly in response to sea ice reductions (Taylor et al., 2018)? This topic has also not been assessed and needs to be. Taylor, B.M. Hegyi, R.C. Boeke, L.N. Boisvert, 2018 : On the increasing importance of air-sea exchanges in a thawing Arctic: a review,Atmosphere, 9 (2018), pp. 1-39, 10.3390/atmos9020041 [Simon Josey, UK]	Taken into account: chapter 1 is unable to assess the literature on specific topics, but we have passed this reference on to Chapter 3 of SROCC
10642	1	5	22	5	25	One way to cover the interconnectivity provided by air-sea and air-sea-ice exchanges would be via a 'box' on this topic, so I urge the panel to give this some consideration. Otherwise, the different aspects of this interconnectivity noted above could be covered within the relevant chapters (Chapters 3, 5 and/or 6) where most appropriate. [Simon Josey, UK]	Taken into account: section 1.2.1 covers this and has been extensively revised, as has Box 1.1 figure 1.

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21028	1	5	22		27	These lines descibe the meat of the report. It needs come right up front in this section and the summary. [Thomas Wagner, USA]	Taken into account: section 1.1 revised and extended
22236	1	5	22	5	22	Perhaps not overly important, but should this report be abbreviated SROCCC, rather than SROCC? It's the "Special Report on the Oceans and Cryosphere in a Changing Climate" . . . So which of those final 3 "Cs" in the title of the report is left out of the acronym? [Andra Garner, USA]	Rejected: yes, probably, but SROCC is the acronym already approved and in use so this can not be changed.
4030	1	5	24	5	25	I suspect there are a few very relevant published works that have not been considered (yet) in the narrative around this SR that have been published and well cited since AR5. These are detailed in prior comments (above) and have considerable relevancy in Chapter 4 where I have expanded upon some of these thoughts. In particular, issues concerning improved time series analysis techniques to detect changes and remove the contamination of internal climate modes (and other influences) from long MSL time series records; techniques to measure acceleration in MSL records; and approaches to compare the observational records (tide gauges) to AR5 projection outputs at the regional scale. [Phil Watson, Australia]	Noted: reference information passed to chapter 4 for consideration
6552	1	5	27	5	28	This sentence is out of place. I suggest moving it to Page 5 Line 24, before the sentence that starts with "It reports on specific aspects..." If moved there, then the concurrent special reports are highlighted much more effectively. [APECS Group Review, Germany]	Accepted: text revised
15332	1	5	28	5	28	"products to be produced" does not seem elegantly written [Samuel Morin, France]	Accepted: text revised
19278	1	5	28	5	28	Delete "to be" (from the line "represents one of the products to be produced by the..." [Michelle A. North, South Africa]	Accepted: text removed
23540	1	5	28	5	35	SRCCL (next statement) is ‘concurrent’; SR1.5 will be “recent” by the time SROCC is published. Please include when these will be available SR15 (due October 2018) and SRCCL (due August 2019) [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: text revised
21398	1	5	29	5	32	For accuracy suggest either ending the sentence at “1.5C,” or directly quoting Article 2 of the Paris Agreement, rather than paraphrasing the legal instrument. [Alice Alpert, USA]	Accepted: text revised
12460	1	5	30	5	32	sea ice change is also identfied as highly sensitive in the 1.5SR [James Ford, Canada]	Accepted, text in this section revised extensively
23350	1	5	34	5	34	suggest to remove “with elements of” (spurious) [Inga Koszalka, Germany]	Accepted: text removed
13224	1	5	36	5	38	Proposed to insert a figure of the overall conceptual framework of the issues to be addressed in the SR. After the figure, then the layout of the report may be described as in page 5, lines 38 to 44 [Zelina Zaiton Ibrahim, Malaysia]	Rejected: we considered this option but decided that it did not fit well with the structure of the report
18172	1	5	39	5	39	Replace "hazards" with "risks". [Laurens Bouwer, Netherlands]	Reject: hazard is the correct term, consistent with framework presented in CCB-1
13334	1	5	42	5	42	Add 'climate' before 'change' [Debra Roberts and Durban Team, South Africa]	Taken into account: text revised
17328	1	5	47	7	22	Box is really excellent, kudos! [Pamela Pearson, USA]	Thank you
12040	1	5	49	6	32	Please emphasis heat storage as this is integrally linked to melting of Antarcta and Greenland in contact with ocean. Please state the total amount of Carbon Stored in the Ocean realative to that in the atmosphere. [Michael Casey, Germany]	Taken in account: revised text in section 1.2
1486	1	5	52	5	52	exact coverage and reference is required. [Danyal Aziz, Pakistan]	Accepted - text has been revised and reference added

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17372	1	5	52	6	3	Be more explicit that coastal zone includes the intertidal zone of open coastlines and estuaries. Check for use of terminologies - global ocean (excludes coast?), ocean water (does this include estuarine waters for instance?). Add intertidal areas (open coasts and estuaries) to description as these are within scope. Being clear with descriptions and subheadings in the reports is very useful. I find that when poeple use the term "oceans" they automatically think offshore/deep water so afew twinks will help coastal managers and communities find the information most relevant to them. I like the use of terms elsewhere in the report - "coastal ocean" and "open ocean" (same chapter pages 15-17). [Helen Kettles, New Zealand]	Rejected - addressed in glossary
1488	1	5	54	5	54	what is meant by southern oceans? Please elaborate. [Danyal Aziz, Pakistan]	Rejected - out of the scope for this chapter
23352	1	5	54	5	54	“associated seas” - you mean: “marginal seas”? [Inga Koszalka, Germany]	Rejected - part of the sentence removed
22934	1	6	0			referring soley to thermo-haline circulation is rather outdated. Large scale circulation is now known to be driven by thermo-haline and surface wind. See Togweiller and Russel 2008 (https://www.nature.com/articles/nature06590) [Jamie Shutler, UK]	Accepted- text modified in box 1
23354	1	6	2	6	2	remove “Features of” [Inga Koszalka, Germany]	Accepted
13336	1	6	5	6	10	Is this classifcation generally accepted in the literature? If classification for the purposes of this report, it must be stated as such. [Debra Roberts and Durban Team, South Africa]	Accepted: we have clarified this text
15334	1	6	5	6	5	The reference to the depth of the Marianna trench seems irrelevant and not adding useful information within the scope of this report. [Samuel Morin, France]	accepted
18576	1	6	5	6	5	Says avg depth of the ocean is 3800. Imore recent estimate is 3682 (Charette M.A., and W.H.F. Smith, 2010, The volume of Earth's Ocean, Oceanography 23/2, 112-114. A detail but should be right. [Alan Mix, USA]	accepted
1774	1	6	6	6	6	Although the atmosphere is in direct contact with the surface ot the ocean, ocean thermal energy available in the upper ocean provides the rquired energy to the surface . Hence considering the ocean heat content is equally important, besides SST. [Meer Ali, India]	revised - information on heat exchange and ocean heat content delivered in section 1.2
2790	1	6	6	6	7	WRONG, one cannot say « The surface of the ocean...with the atmosphere, and the LAYER BELOW IS WELL MIXED. » It is not, as major oceanic currents show. [Anne Guillaume, France]	accepted - text modified accordingly
18486	1	6	6	6	6	"The surface of the ocean is in direct contact with the atmosphere" - unless covered by sea ice! That should maybe be mentioned since this report is explicitly about the ocean and the cryosphere? [Angelika Renner, Norway]	accepted
22522	1	6	6	6	8	While the surface mixed layer is mixed by wind during warm seasons, the deep wintertime mixed layer is mostly mixed by buoyancy dorcing. [Toshio Suga, Japan]	accepted
22524	1	6	8	6	10	The relationship between "upper ocean" mentuioned here and "surface ocean" show in Box 1.1, Figure 1 is not clear. [Toshio Suga, Japan]	revised - text modified in box 1 and in figure 1
22344	1	6	9	6	9	depth; where sunlight penetrates... --> depth, where sunlight penetrates... [semicolon ; --> comma ,] [Handa Yang, USA]	accepted
1776	1	6	12	6	13	Besides temperature and salinity, pressure is also used in the estimation of density. [Meer Ali, India]	accepted

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6554	1	6	12	6	12	The paragraph that starts on this line addresses oceanic circulation, which is a complex idea that is difficult to visualize. An illustration that shows this process (or a reference to an illustration later in the report that the reader can refer to) would be very helpful for many readers. [APECS Group Review, Germany]	revised - circulation now indicated in fig. 1 (schematic representation), and more information can be found in the glossary and in other chapters (5, 6)
16162	1	6	14	6	14	you'll get accurate pushback on this phrase 'driven by density differences'. "Driven' suggests that the magnitude of the overturn is directly associated with t density differences but it is more complex, also involving wind forcing and turbulent diffusivity. While it is accurate that of course it wouldn ot exist without density differences, it is not driven only by them. [Lynne Talley, USA]	revised - text in box 1 has been considerbale changed
17202	1	6	14	6	42	No location of less dense water [Iulian Florin Vladu, Germany]	rejected - full description of water mass description out of the scope of this chapter
18488	1	6	14	6	15	dense waters are also formed by interaction with ice shelves, which is hardly mentioned anywhere, here or in Chapter 3 [Angelika Renner, Norway]	Accepted - text has been revised - dense water formation not mentioned here
6520	1	6	15	6	18	This high heat capacity is one of the reason that why the ocean absorbs more than 90% of the heat due to the rising greenhouse gas concentrations (kind of described on page 11 line 3). This “90%” and “high heat capacity” connection can easily comprehend, based on high school physics. I personally believe we should emphasize this type of easily comprehensible scientific facts (connections) frequently. (Actually, this is explained on page 7 line 31 to 33) [Chamara Rajapakshe, Sri Lanka]	accepted - more general statement now
16164	1	6	15	6	15	a little misleading to say 'saline' since the most saline aters are in the subtrpical upper ocean where evaporation is large. The polar waters are cold and dense, and ever-so-slightly and very importantly brine-enriched. I suggest 'cold, brine-enriched waters' [Lynne Talley, USA]	revised - more general statement now
22346	1	6	15	6	18	Add short explanation that high heat capacity results in long response time [Handa Yang, USA]	Rejected -text generalized, heat capacity not added
23358	1	6	15	6	16	To general a statement. Could be more specific: “Seawater has heat capacity four times larger than the air” [Inga Koszalka, Germany]	Rejected - text generalized, heat capacity not added
6556	1	6	18	6	18	Th word "time scales" shall be mentioned as " time-scales" [APECS Group Review, Germany]	accepted -text revised
18490	1	6	18	6	18	are currents really caused by eddies? [Angelika Renner, Norway]	accepted -text revised
21484	1	6	18	5	18	eddies are produced by main forces in the ocean an can not produce currents. [Layeghi Behzad, Iran]	accepted -text revised
23360	1	6	18	6	18	“Ocean currents caused by winds, tides, eddies and density are responsible”: this statement makes no sense. Please reword. [Inga Koszalka, Germany]	accepted -text revised
18348	1	6	19	6	19	Kindly specify biogeochemical substances in brackets. [Suvadip Neogi, India]	accepted -text revised
1222	1	6	22	6	23	This definition overlooks the large river basins contributing FW to the Arctic Ocean [Ross Brown, Canada]	Rejected - chapter gives only a rough outline
2910	1	6	22	6	32	reads weirdly that there is no preview of chapter 2 here [Robert Kopp, USA]	Rejected - not the scope of this box.
4032	1	6	22	6	32	I would be taking the opportunity in each Chapter to providing perhaps a short narrative (maybe even in a summary box) alluding to key areas of further research required. [Phil Watson, Australia]	Rejected - this is framing chapter and does not assess research findings

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6092	1	6	22	6	32	I have not gotten through the entire report yet, but here it is mentioned that Chapter 5 does not include the polar ocean because it is discussed in Chapter 3. My questions is where are the interactiosn between the Polar and Global Ocean discussed? If interactions between these two are not addressed, I think they should be. [Patrick Taylor, USA]	rejected - deleted this section as it is better described in 1.9
12284	1	6	22			I see it often but have no idea why people capitalise Polar Regions. Should be "polar regions", just as "ocean" unless you are referring to a specific geographical name. [Eric Wolff, UK]	accepted
13226	1	6	22	6	22	Chapter 3 is introduced but there has been no mention of Chapter 2. This will leave the reader wondering where Chapter 2 sits in the context of the whole report. I understand that this is due to the sub-topic being Ocean, while Chapter 2 is on High Mountain Aeas. However, if Ocean is the first topic of consideration, then it should form the content of Chapter 2. That is, the sequence of topics discussed in Chapter 1 is not consistent with the sequence in the SR. In order to indicate the purpose of the sequence of chapters, this is the reason I suggest that a figure of the overarching framework of the issues to be addressed be placed in section 1.1. See Comment 2. [Zelina Zaiton Ibrahim, Malaysia]	Accepted - revised text on chapter storyline now in chapter 1.9, and new text in section 1.1 to introduce chapters in order
18492	1	6	22	6	24	Explain what Arctic large marine ecosystems are (at least add the reference as it is done in Chapter 3. Since this will not be clear or known to many readers, it should be stated more explicitly which regions that includes. In particular. Whether that includes sub-Arctic regions/seas as for example the Barents Sea. [Angelika Renner, Norway]	Taken into account - revised text now in chapter 1.9
19280	1	6	22	6	32	This paragraph repeats what is written in section 1.9, without section 1.9's clarity. Consider removing or rewriting to improve the clarity (I thought the chapter order didn't make sense after reading this paragraph, but section 1.9 made the order seem more logical). [Michelle A. North, South Africa]	Taken into account - revised text now in chapter 1.9
23362	1	6	22	6	24	“the Polar Regions, which are flexibly defined as encompassing the Arctic Ocean and areas within the Arctic large marine ecosystem in the Northern Hemisphere” - this is a very vague definition of the Northrn Polar Region which might make it difficult to quantify the changes. Maybe a more common definition in terms of the Polar Circle (incl. Nordic Seas)? [Inga Koszalka, Germany]	Taken into account - revised text now in chapter 1.9
18442	1	6	23	6	23	I would suggest removing the word "flexible" and e.g. refrasing as "which here are defined as". [Anette Jönsson, Sweden]	Taken into account - revised text now in chapter 1.9
10784	1	6	27	16	27	there is an important intermediate scale here. The inter-annual, large spatial scale sea level fluctuations introduced by ENSO and Indian Ocean dipole scale ocean dynamics [Thomas Spencer, UK]	Taken into account - revised text now in chapter 1.9
12286	1	6	27			There seems to be inconsistency: you have obviously decided you like the idea of one ocean but now several times you start talking about the "oceans". I don't care either way but randomly swapping usage grates. [Eric Wolff, UK]	Taken into account - revised text now in chapter 1.9
14126	1	6	28			Chapter 3 [Christopher Fogwill, UK]	Taken into account - revised text now in chapter 1.9
15450	1	6	28	6	28	Replace "chapter 3" by "Chapter 3" (with capital letter) [Hernan Sala, Argentina]	Taken into account - revised text now in chapter 1.9
16166	1	6	28	6	28	semi-colon is not the correct punctuation, replace with comma [Lynne Talley, USA]	Taken into account - revised text now in chapter 1.9

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13338	1	6	29	6	29	Please explain 'blue carbon' [Debra Roberts and Durban Team, South Africa]	Taken into account - revised text now in chapter 1.9
18174	1	6	31	6	31	Please rephrase to "contribute to extreme events and abrupt changes, including ..". [Laurens Bouwer, Netherlands]	Taken into account - revised text now in chapter 1.9
12822	1	6	34			1-5 on Oceans starts "The global ocean covers more than 70% of the Earth surface." What is the equivalent (range) for cryosphere - how much of the earth does it cover? There is later 10% of Earth's land area is covered with glacial ice but is there something like "almost a third of our planet experiences a winter freeze"? [Stephen Cornelius, UK]	agreed - text revised
1224	1	6	35	6	36	I suggest you use the exisiting definition of the cryosphere from AR5 with the addition of ice caps which are mentioned in line 50. "All regions on and beneath the surface of the Earth and ocean where water is in solid form, including sea ice, lake ice, river ice, snow cover, glaciers [and ice caps], ice sheets, and frozen ground (which includes permafrost)." IPCC WGII AR5 2014 [Ross Brown, Canada]	Rejected - in AR5 we did not include the term ice caps in the definition
2792	1	6	35	6	37	The first phrase is a good example of what needs to be rewritten : « components of the Earth System », what? Is this how you would speak to your kids? « Cryosphere is common?? in the polar region etc… » Any way a far too long sentence with too many items that blurs the subject better than enlightening it. [Anne Guillaume, France]	agreed - paragraph was revised
12288	1	6	35			I'm being very picky but is the ice on the East Antarctic plateau "glacier ice". I think not. I would suggest "land ice including ice sheets and glaciers" [Eric Wolff, UK]	agreed - paragraph was revised
12290	1	6	36	6	37	Lots of weird and incorrect capitalisation here! I won't comment again but in my mind this needs a global edit or else a justification for why random words are upper case. [Eric Wolff, UK]	agreed - paragraph was revised
15336	1	6	36	6	36	"glacier ice" is ambiguous (because glaciers also include some snow on top of their ice component). I suggest replacing "glacier ice" by "glaciers", or (less relevant) replacing "glacier ice" by "glacier ice and snow" [Samuel Morin, France]	agreed - paragraph was revised
16360	1	6	36	6	36	"Cryosphere is common in the Polar Regions..." This is not grammatically correct. Suggest rewording this as: "Cryospheric components are common in the Polar Regions…" [Inga Smith, New Zealand]	agreed - paragraph was revised
2756	1	6	37	6	38	Not low latitude glaciers are included here? Chapter 2 includes Low Latitudes as one glacier region, in Table 2.1 [Javier Martin-Vide, Spain]	agreed - paragraph was revised
13228	1	6	37	6	37	Here, Chapter 3 is also mentioned before Chapter 2. Refer to Comment 4. [Zelina Zaiton Ibrahim, Malaysia]	noted - text was revised
15338	1	6	37	6	37	"tropical" must be added to "mid-latitude" and "sub-arctic" [Samuel Morin, France]	noted - rext revised
16168	1	6	37	6	37	same comment: replace semi-colon with comma [Lynne Talley, USA]	noted - text revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
15340	1	6	38	6	38	I suggest replacing "are persistent feature" by a terminology consistent with the definition for High Mountains adopted in Chapter 2, i.e. "This chapter adopts the definition of high mountain regions as “mountain areas where seasonal or perennial cryosphere is present and poses a potential and serious risk to society related to water scarcity and disaster resilience” as resolved by the 69th Executive Council of the World Meteorological Organisation (WMO) in 2017." [Samuel Morin, France]	noted - text revised
2274	1	6	39	6	40	Permafrost outside of the poles and high mountain regions not included; if not discussed in detail, a mention of the presence and extent of permafrost regions outside of the poles and high mountains should be included. [Kristin Campbell, USA]	agreed - sentence was removed
2400	1	6	39	6	40	Permafrost outside of the poles and high mountain regions not included; if not discussed in detail, a mention of the presence and extent of permafrost regions outside of the poles and high mountains should be included. [Durwood Zaelke, USA]	agreed - sentence was removed
6348	1	6	39	6	40	Here it is said that permafrost won't be addressed in the Special Report; however, at page 7, line 10, it looks like permafrost is going to be addressed finally. [François Massonnet, Belgium]	agreed - sentence was removed
10652	1	6	39	6	40	A missing of permafrost and snow outside of polar and high mountain areas is a huge gap of the report. Changes in snow cover and ammount have large impacts on weather-related economy sectors like agriculture, forestry, human heals and construction. Decision-makers need this information for planning and future development. But permafrost depergelation has a dramatic impact on landscapes, vegetation, lakes and rivers, infrastructure. The main part of permafrost out polar regions are peatland. Permafrost degradation causes huge methane and CO2 emissions, which are also not assessed and underestimated in the report. To add this information is critically important. [Oxana Lipka, Russian Federation]	agreed - sentence was removed
11072	1	6	39	6	40	SROCCC do not take into consideration permafrost (dry) and seasonal snow outside polar or high mountain regions. Why not? [Lucas Ruiz, Argentina]	agreed - sentence was removed
12350	1	6	39	6	40	If elements that are not assessed in this report are assesed in another Report, it could be briefly mentioned here. [Sylvain Ouillon, France]	agreed - sentence was removed
12898	1	6	39	6	40	Permafrost outside of the poles and high mountain regions not included; if not discussed in detail, a mention of the presence and extent of permafrost regions outside of the poles and high mountains should be included. [Gabrielle Dreyfus, USA]	agreed - sentence was removed
13340	1	6	39	6	40	One would expect a justification on the exclusion of such as permafrost and snow outside of polar and high mountain areas in 1.5. A sentence should suffice. [Debra Roberts and Durban Team, South Africa]	agreed - sentence was removed
13342	1	6	39	6	40	Studies such as,,,? Provide some references. [Debra Roberts and Durban Team, South Africa]	agreed - sentence was removed
18444	1	6	39	6	40	This sentence suggest that permafrost is not assessed in the report, but is found e.g. in Chapter 3 and 4. If the meaning of the sentence is that permafrost outside polar and high mountains not is assessed it is not clear. Does permafrost exist outside these areas? [Anette Jönsson, Sweden]	agreed - sentence was removed

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23364	1	6	39	6	40	“Some elements of the cryosphere are not assessed in this Special Report, such as permafrost” - is it true? The changes of permafrost are explicitly mentioned in the Report Ch. 1 several times. See for example, page 7, lines 10-15. [Inga Koszalka, Germany]	agreed - sentence was removed
26	1	6	40	6	40	The fact that permafrost is (apparently) completely omitted from the report comes as a surprise, and is very unexpected in light of the report's title ("on the Ocean and the Cryosphere" very much suggest that the cryosphere is addressed as a whole). The decision seems also dangerous to some degree, as the report could be dismissed as being incomplete. Is there really no way of rectifying this, i.e. to add information on permafrost at this stage? Moreover, how is the statement to be understood when considering that permafrost is mentioned again at e.g. page 7, lines 10-15, and in several further occasions? [Daniel Farinotti, Switzerland]	agreed - sentence was removed
15342	1	6	40	6	40	I suggest adding "seasonal" before "snow" here. [Samuel Morin, France]	agreed - sentence was removed
17660	1	6	40			perhaps give some examples for where we find permafrost outside polar and high-mountain areas. [Andreas Kääb, Norway]	agreed - sentence was removed
23366	1	6	42	6	59	Please define the “ice sheets” (and “smaller”) [Inga Koszalka, Germany]	agreed - text generalized
14128	1	6	43			...into the West Antarctic, East Antarctic, and Antarctic Peninsula ice sheets... [Christopher Fogwill, UK]	agreed - text generalized
14130	1	6	44			Mountains [Christopher Fogwill, UK]	done
15344	1	6	44	6	44	I think the wording "that compresses over time" will require some further discussion with Chapter 2 and Chapter 3 authors. Not only compaction is the process conducive to the transformation of snow to ice over polar ice sheets. [Samuel Morin, France]	agree - text generalized
12292	1	6	45	6	46	Your description does not cover land-terminating ice sheets, such as much of west and south Greenland. This could be fixed by editing to "ice and/or meltwater is discharged" [Eric Wolff, UK]	agreed - text generalized
21542	1	6	45	6	46	Suggested rewording: They flow outward from a high central ice plateau and, if marine terminating, ice is discharged into the ocean in the form of icebergs, meltwater or through the formation of floating ice shelves. [Fiamma Straneo, USA]	agreed text generalized
6560	1	6	46	6	46	The word fast flowing shall be written as " fast-flowing". [APECS Group Review, Germany]	noted
1758	1	6	47	6	47	"expected" -> "thought" [Olga Sergienko, USA]	agreed -text revised
11786	1	6	47	6	48	While the text says "such as" it would be good to not propagate the myth that this is the main one or most important marine grounded ice sheet - the ice volume vulnerable in East Antarctica is more substantial for instance. Add "and vast regions of East Antarctic Ice Sheet" [King Matt, Australia]	agreed -text revised
17662	1	6	47			"expected". Isn't this already an assessment, instead of framing? [Andreas Kääb, Norway]	agreed -text revised
2794	1	6	48			A reference is missing for « Marine-based ice sheets... are expected to rapid and potentially irreversible... » [Anne Guillaume, France]	agreed -text revised
18446	1	6	48	6	48	I suggest using an easier word than "susceptible" if possible. [Anette Jönsson, Sweden]	agreed -text revised
6130	1	6	50	6	50	Consistent with AR5 the term ice cap should be avoided. The term glacier includes ice caps [Regine Hock, USA]	done

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6138	1	6	50	6	50	remove 'temperature' [Regine Hock, USA]	term not found in text
15346	1	6	50	6	50	I wonder whether the term "ice caps" is to be used in the report. To me, either we're talking about an ice sheet (Antarctica, Greenland), or we're talking about glaciers. I'm not sure the term "ice cap" remains state of the art. This can be discussed with Chapter 2 and Chapter 3 authors. [Samuel Morin, France]	agreed - Ice cap removed
19144	1	6	50			The definition of glaciers and ice-caps is too generic since not all land ice smaller than na ice-cheet are glaciers or ice-caps. I would suggest writting: "Glaciers and ice-caps are masses of ice originating in land that deform under their own weight, which are normally larger than 0.1 km2 and smaller than 50,000 km2" [Goncalo Vieira, Portugal]	agreed - Ice cap removed
6132	1	6	51	6	52	There are no ice sheets in the high mountain areas as defined in chapter 2: Perhaps better: Ice sheets and glaciers (Chapters 2 and 3) that lose more ice … [Regine Hock, USA]	agreed - Ice cap removed
15348	1	6	51	6	51	I wonder whether the term "ice caps" is to be used in the report. To me, either we're talking about an ice sheet (Antarctica, Greenland), or we're talking about glaciers. I'm not sure the term "ice cap" remains state of the art. This can be discussed with Chapter 2 and Chapter 3 authors. [Samuel Morin, France]	agreed - Ice cap removed
23368	1	6	52	6	52	“loose” not “lose” [Inga Koszalka, Germany]	done
17664	1	6	53			except glaciers in endorheic basins, eg. Tibet [Andreas Kääb, Norway]	declined - too specific
1226	1	6	54	6	54	Reorder phrase to improve readability "… are also a critical source of freshwater for downstream communities" [Ross Brown, Canada]	agreed -text revised
23370	1	6	54	6	54	What do you mean by “downstream communities” in this context? The communities within the “watershed”, maybe simply “communities dependent on water resources” [Inga Koszalka, Germany]	agreed -text revised
1760	1	6	56	7	2	The paragraph is ambiguous. Suggest to replace it with something like "Ice shelves and ice tongues are extensions of marine-based ice sheets and outlet glaciers that float in the surrounding ocean. The transition between the grounded part of an ice sheet and an ice shelf is called the grounding line or grounding zone. The ice-shelf mass balance is determined by the net surface accumulation/ablation (melting), sub-aquatic accumulation/ablation (sub-ice shelf refreezing/melting) and the ice flux from the grounded part of an ice sheet. Although the ice-shelf mass balance, i.e. loss of ice due to surface and sub-aquatic melting does not directly contribute to sea level rise, laterally confined ice shelves have dynamic effects on ice flow upstream of the grounding line because they exhibit backstress that determines the rate of ice discharge from the grounded ice sheet." [Olga Sergienko, USA]	agreed -text revised
6134	1	6	56	6	56	delete 'glaciers and ice caps. Today essentially only ice sheets have ice shelves. Marine-terminating glaciers may have floating tongues. [Regine Hock, USA]	done
22238	1	6	56	7	5	There may be some ambiguity in the definitions of ice shelves ("extension of ice sheets, glaciers, and ice caps, where ice flow reaches the polar oceans"), and sea ice, which it is noted ("may be . . . A motionless sheet attached to the coast"). I suggest adding some clarification of what would constitute the difference between "land-fast ice" and an ice shelf. [Andra Garner, USA]	agreed -text revised

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23372	1	6	57	7	2	The sentence should be edited for English. For example, please remove “help to”, “vulnerable to melting of their surface by warm air temperatures” → “vulnerable to surface melt due to warm air temperatures ” [Inga Koszalka, Germany]	agreed -text revised
18604	1	7	0	7		Figure 1 box: this is an oversimplified view of the ocean and cryosphere. For example it gives the impression that heat and CO2 uptake by the ocean is ruled by the same suited of processes and as such excluded the role of biology (which is tighly related to nutrient availability and oxygen produciton/consumtion). Besides, it shows the river as a conduit for linking land icea cryosphere and oceans but this topics is not covered in the chapter. A more complete and quantitative view of the various cycle (energy, water and carbon) might be very helpful. [Roland Seferian, France]	agreed -figure revised
22932	1	7	0			figure 1 is missing any information or indication of the deep ocean storage and movement of carbon, so this diagram is really flows and exchanges between the main biospheres and is missing a major component . The oceans are the second largest carbon pool on Earth, second only to the Earth's crust and so it would be useful for this diagram to reflect that this deep ocean component exists, as it helps to further illustrate the importance of the oceans within the global carbon cycle. [Jamie Shutler, UK]	agreed -figure revised
15944	1	7	2	7	2	"..as well surface and deep ocean.." should be "..as well as surface and deep ocean.." [Tim Riding, New Zealand]	agreed - text generalized
1490	1	7	4	7	11	two consecutive areas. Reference is required. [Danyal Aziz, Pakistan]	declined - no reference added
12462	1	7	4	7	8	Sea ice is also essential for transport and as a platform for harvesting activities. See paper by Eicken et al 2009 which argues that sea ice is a key ecosytem service [James Ford, Canada]	agreed - text revised
18494	1	7	4	7	4	this is not correct, sea ice can form also below the sea surface, as observed e.g. In the Roos Sea with platelets forming at several tens of meters of depth. Suggest to rephrase that sea ice is formed by freezing sea water. [Angelika Renner, Norway]	agreed - text revised
19146	1	7	4			Consider changing to: Sea ice forms from freezing of the sea surface and by snow accumulating over it, [Goncalo Vieira, Portugal]	agreed - text revised
20940	1	7	4	7	4	Sea ice may also form at depth: platelet ice forms in supercooled ice shelf water rising from beneath ice shelf cavities, cf. Langhorne, P. J., et al. (2015), Observed platelet ice distributions in Antarctic sea ice: An index for ocean-ice shelf heat flux, Geophys. Res. Lett., 42, 5442–5451, doi:10.1002/2015GL064508. [Claudio Richter, Germany]	agreed - text revised
23374	1	7	4	7	8	In the spirit of keeping the sect. 1.1 simple, please mention here that melting of sea ice do not contribute to sea level rise (at least, not at the first order) [Inga Koszalka, Germany]	declined - we kept it simple and did not add this
6094	1	7	5	7	8	In addition to the modification of surface warming via albedo effects, it is important to state here that sea ice provides an insulation effect that influences the exchange of mass, momentum, and energy between the Polar Ocean and atmosphere. This role of sea ice is critical and fundamenatl, therefore it should be mentioned here. [Patrick Taylor, USA]	done
18448	1	7	5	7	8	You might consider to add the effect that the underlying water absorbs energy from the sun when ice disappear. [Anette Jönsson, Sweden]	done

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18496	1	7	5	7	5	land-fast ice is not necessarily motionless! There can be dynamic deformation in landfast ice as well. [Angelika Renner, Norway]	declined - too specific
1228	1	7	6	7	8	add point that sea ice has a major impact in limiting heat and moisture fluxes from the ocean to the atmosphere [Ross Brown, Canada]	done
6562	1	7	6	7	7	The way this is written is incorrect. Sea ice does not affect climate change through the amplification of surface warming via albedo effects - the LACK of sea ice (i.e. open ocean) does this. [APECS Group Review, Germany]	agreed - text revised
14132	1	7	6			colon instead of semicolon [Christopher Fogwill, UK]	agreed - text revised
16170	1	7	7	7	8	Could explain brine rejection briefly here, rather than just 'dense water formation', to support statement on p. 6, line 15 [Lynne Talley, USA]	agreed - text revised
18498	1	7	7	7	7	here and throughout the chapter: it is not only the albedo feedback that is relevant for climate change - a major aspect in the Arctic is enhanced heat exchange between ocean and atmosphere through leads and thinner ice, and momentum exchanges. [Angelika Renner, Norway]	agreed - text revised
22348	1	7	7	7	7	Add (reflectivity) to albedo to clarify for general audience [Handa Yang, USA]	agreed - text revised
17206	1	7	11	7	11	Because snow and ice are very reflective (,) they [Iulian Florin Vladu, Germany]	agreed - text revised
19148	1	7	11	7	12	Submarine permafrost also occurs in the Antarctic, although probably not on continental shelves (geologically) but under sea water. There are report of methane leaks near Marambio, off-shore, but scarce publications. I would suggest phrasing as: "and also, offshore as submarine permafrost in the Arctic and Southern Oceans". [Goncalo Vieira, Portugal]	agreed - text revised
17666	1	7	13			permafrost "thaws" [Andreas Kääb, Norway]	agreed - text revised
19150	1	7	14			The decay of permafrost causes hazards also on polar regions, such as the Arctic and Antarctic, especially due to subsidence and damage to infrastructure, such as buildings, airports, roads, etc. This may also affect Antarctica and the research stations existing there. Please rephrase. [Goncalo Vieira, Portugal]	agreed - text revised
15350	1	7	15	7	15	There is a need for a paragraph here on defining seasonal snow and the related processes, in a manner parallel to ice sheets, glaciers, sea ice and permafrost. If need be, authors from Chapter 2 and Chapter 3 could contribute material for such a paragraph. [Samuel Morin, France]	rejected - snow is mentioned in box and in figure, but a definition of seasonal snow is not given due to space limitations and because this aspect of cryosphere is commonly known.
6032	1	7	16	7	17	Re. Figure 1 in Box 1.1: the human interaction and component, specifically in the Arctic, within these cycles is unclear. Are the buildings supposed to depict Southern cities? Why is there not any indication of communities in the mountains or close to the sea ice? Suggestion to remove the buildings (and just keep the factory-type building if this is to make the point about human caused GHGs). [Joanna Petrasek Macdonald, Canada]	agreed - figure revised
13232	1	7	16			Box 1.1, Figure 1 illustrates the key components, however, there is some disconnect between the terms used in the figure and in the text as well as in the Chapter/section headings. There is no term 'high mountain'; ' polar region'. There is nothing wrong with the figure but it cannot be used as a figure of the framework for the SR. Also the issues of sea-level rise, acidification, etc, are not included. [Zelina Zaiton Ibrahim, Malaysia]	agreed - figure revised
13344	1	7	16	7	17	Is there any meaning in the colour of the arrows used in Box 1.1, Figure 1?, If no, suggest you stick to one colour that will be visible in all the different backgrounds. [Debra Roberts and Durban Team, South Africa]	agreed - figure revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16834	1	7	16	7	17	The figure shows 3 interactions between ocean and land. Two of those are depicted with the (chemical) abbreviation or connotation (CO2 and OHC), one is not. I suggest to add the chemical abbreviation for the third as well: add "H2O". [Diana Reckien, Germany]	agreed - figure revised
17374	1	7	16	7	22	Add estuaries to diagram instead of river. [Helen Kettles, New Zealand]	Rejected - we mean river and not estuaries
11834	1	7	17	7	17	Fig 1 is missing solid Earth processes - particularly Vertical Land Movement (including, but not only, GIA). The small island sites will have separate geophysical processes which govern its vertical motion which are different to GIA (otherwise they would have subsided with the ocean floor due to GIA). There will be localised effects near the city etc. due to changes in river discharge [King Matt, Australia]	rejected - vertical Land Movements (while important) are difficult to convey in this figure
12294	1	7	17			Box 1.1 is generally OK but at face value it seems to imply that permafrost is the only source of CO2 that the oceans take up. I think the graphic element for the 3 cycles needs rethinking. [Eric Wolff, UK]	agreed - figure revised
17204	1	7	17	7	17	Suggest to move Figure 1 BOX 1.1 right after section 1.2.1 as the first reference to the Figure is on line 22 [Iulian Florin Vladu, Germany]	agreed - figure revised
18450	1	7	17	7	17	Box1.1, Figure 1 is a bit too schematic and add very little to the understanding of the text. It should be made with more details if it should be of value. Maybe one figure/cycle or by making different sized arrows with text might be clarifying. Many references are made to this Figure in the text. [Anette Jönsson, Sweden]	agreed - figure revised
13114	1	7	18	7	20	I am not quite sure how to fix this, but I don't think the figure is very intuitive and even though it may be difficult to change the figure, the caption needs more information. The ocean circulation arrows are too small, the symbols for ocean CO2 and heat uptake need explanation; the position of the terrestrial carbon cycle exchange branch between permafrost and riverbeds is a bit confusing. Maybe wiggly lines in orange (heat) and blue (cold Temperatures) would help to better symbolize the heat exchange; some clouds with rain drops and snowflakes the water cycle; trees absorbing CO2, factories releasing CO2. I see that you wanted to simplify this figure but I think it went too far. The island is cute but not necessary; removing it would simplify depiction of ocean circulation. [Baerbel Hoenisch, USA]	agreed - figure revised
17668	1	7	18			the placement of the label "permafrost" much deeper than the glaciers might be misleadingly suggest vertical zonation, which is not necessary true. [Andreas Kääb, Norway]	agreed - figure revised
1230	1	7	19	7	29	In Figure 1 the water cycle seems to be missing a mechanism label (EVAP/COND???). The water and energy cycles are linked through evaporation/condensation but this is not shown. [Ross Brown, Canada]	agreed - figure revised
14134	1	7	20			carbon dioxide [Christopher Fogwill, UK]	agreed - figure revised
23544	1	7	20	7	20	should read ‘carbon dioxide (CO2)’ [Hans-Otto Poertner and WGII TSU, Germany]	agreed - figure revised
664	1	7	29	7	29	The term "primary production" may be unclear to the reader. Proposal: provide a short explanation on what exactly is meant by this term and what physical and ecological processes are included when refering to primary production. [Thomas Ackermann, Germany]	Taken into account, covered in section 1.2.1

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
1560	1	7	29	7	30	“provides roughly half of the primary production on Earth (Field et al., 1998)” (the same wording occurs also elsewhere) - “production” needs to be qualified and explained for the non-expert reader. It also needs to be put in context with biomass and respiration. [Wolfgang Cramer, France]	Taken into account, covered in section 1.2.1
1778	1	7	29	7	34	It may be worth mentioning that the ocean heat energy influences the atmospheric processes like cyclones and monsoons. [Meer Ali, India]	Taken into account: we can not assess this aspect in chapter 1, but this is assessed in chapter 6 of SROCC
23102	1	7	29			it should be specified that it's only liquid water. Indeed there is about the equivalent of one ocean in earth's crust in the form of hydroxides groups (OH) in mineral like olivine and serpentine. It's supposed that 98% of this water would come back to the surface, and a steady state would be achieved between water in earth's crust and the one coming from subduction zones . Without this massive feedback from the water in crust, water from the oceans would disappeared in less than 100 millions years. Ref : P. Cartigny "Origine(s) de l'eau sur Terre" , contributor to "L'eau à découvert", CNRS Editions, 2015 [Jacques Beall, France]	Rejected - outside the scope of the chapter
28	1	7	30	7	30	"primary production" of what? [Daniel Farinotti, Switzerland]	Taken into account, covered in section 1.2.1
2796	1	7	30			Define « Primary production », or use a more everyday term and the same in the whole chapter [Anne Guillaume, France]	Taken into account, covered in section 1.2.1
22350	1	7	30	7	31	Again, clarify that high specific heat capacity results in long response time for general audience [Handa Yang, USA]	Taken into account, covered in section 1.3.2
22526	1	7	30	7	31	Is "specific heat capacity" appropriate here? "Heat capacity" seems more appropriate in the context of this sentence. [Toshio Suga, Japan]	Taken into account, covered in section 1.2.1
30	1	7	31	7	33	See previous comment: The baseline for the stated 90% figure is missing. [Daniel Farinotti, Switzerland]	Taken into account, covered in section 1.3.2.1
6564	1	7	31	7	32	Change to “…have enabled the ocean to store more than 90% of the extra thermal energy…” The excessive use of brackets makes the text choppy and hard to read, particularly for non-native English speakers. [APECS Group Review, Germany]	Taken into account - implemented in section 1.3
13014	1	7	31	7	33	In addition, heat is efficiently transported vertically in the ocean (more than on land in any case) [Gerhard Krinner, France]	accepted
23376	1	7	31	7	31	Please mention that 4 x the air heat capacity. [Inga Koszalka, Germany]	accepted (now box 1)
22982	1	7	33	7	34	This sentence about the oceans in incomplete and misleading. I suggest that you correct it to say: The oceans are the second largest pool of carbon, second only to the Earth's crust. They curerntly hold 38,000 Pg C, an amount that is increasing as they annually absorb approximately 25% of anthropogenic CO2 emissions. [Jamie Shutler, UK]	Accepted. Rather than making an assessment, the SOD frame the issue
23378	1	7	33	7	34	Please confront this sentence with that on p. 12 lines 4-5 (same reference). Maybe both are correct but it could be good to pick up one period of reference or explicitly mention both otherwise it is confusing. [Inga Koszalka, Germany]	Taken into account - part of this information had been moved to section 1.3
6096	1	7	35	7	36	Considering starting a new paragraph at "Ocean circulation redistributes…" [Patrick Taylor, USA]	Rejected - text had been changed and does not apply anymore
22984	1	7	35	7	36	this sentence seems to focus on just heat and ignore carbon. Suggest that you correct it to say: Ocean circulation redistributes heat, and freshwater.. …cooling of the overlying atmosphere whilst at the same time transporting carbon and locking it away for hundreds of years. [Jamie Shutler, UK]	Taken into account - text changed in section 1.2

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12352	1	7	36	7	36	"local" or "regional"? I would suggest: "regional weather and climate with local effects" [Sylvain Ouillon, France]	Taken into account - text revised
13230	1	7	50			Reference to Figure 1 should be made early in Box 1.1, instead of on page 8, line 37. [Zelina Zaiton Ibrahim, Malaysia]	taken into account
22936	1	8	0			section 1.2.2 has no mention of carbon. Cold water absorbs more carbon, ice alters air-sea CO2 exchange processes, cold water helps to create deep water flows that takes CO2 from the surface and locks it away in the deep ocean. This is all missing from this section [Jamie Shutler, UK]	taken into account
6566	1	8	1	8	7	This section would be greatly enhanced by a picture/figure that illustrates ocean circulation (this would also help with the other section that discusses ocean circulation on page 6). This is a very hard process to envision, but understanding it is critical in order to understand how the oceans store excess heat, how the oceans interconnect, and the influence of the oceans on air temperatures over continental land masses. I think a diagram would greatly help readers who are unfamiliar with the process. [APECS Group Review, Germany]	taken into account - shematic representation of circulation is now indicated in fig.1. A more detailed specific figure is however out of the scope for the framing chapter
18606	1	8	1	8	7	I am a bit puzzled here. While the introduction clearly state that this report provides an update since AR5. This section refers to publications that were taken into account during AR5. They do not provide a different knowledge from what has been assessed since AR5. With that being said, several recent studies such as Froelicher et al. 2015, Sallée et al. 2013, Bopp et al. 2015; Devries et al. 2017 could be used as suitable reference for heat and carbon. [Roland Seferian, France]	taken into account - assessment approaches are removed from chapter 1, and text is accordingly modified.
22528	1	8	1	8	7	It would be usefule to define "suerace ocean", "deep ocean", "intermediate layer", "deep layer", "subsurafce layers" and also "upper ocean" somewhere in this chapter. [Toshio Suga, Japan]	taken into account - tesxt edited for more clarifications
6350	1	8	2	8	2	The term "meridional overturning circulation" is introduced for the first time here, and previously the term "thermohaline circulation" was introduced. It would be useful for the unfamiliar reader to explain between the two [François Massonnet, Belgium]	taken into account - text revised, and term is also given in Glossary
12296	1	8	2			"as well as surface" [Eric Wolff, UK]	rejected - text is revised and does not apply anymore
19282	1	8	2	8	2	Include another 'as', so that it reads, "as well as surface and deep ocean..." [Michelle A. North, South Africa]	rejected - text is revised and does not apply anymore
22352	1	8	2	8	2	as well surface and deep ocean --> as well as surface and deep ocean? [Handa Yang, USA]	rejected - text is revised and does not apply anymore

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16362	1	8	4	8	4	"Sea ice forms from freezing of the sea surface" This is not correct, as some sea ice forms at depth (see Langhorne et al., 2015; Mager et al., 2013). Suggest rewording this as: "Sea ice forms from freezing of sea water" References: Langhorne, P.J., Hughes, K.G., Gough, A.J., Smith, I.J., Williams, M.J.M., Robinson, N.J., Stevens, C.L., Rack, W., Price, D., Leonard, G.H., Mahoney, A.R., Haas, C., and Haskell, T.G. (2015). Observed platelet ice distributions in Antarctic sea ice: an index for ocean - ice shelf heat flux. Geophysical Research Letters, 42(13): 5442-5451, doi: 10.1002/2015GL064508. Mager, S.M., Smith, I.J., Kempema, E.W., Thomson, B.J., and Leonard, G.H. (2013). Anchor ice in polar regions. Progress in Physical Geography, 37: 468-483, doi: 10.1177/0309133313479815. [Inga Smith, New Zealand]	agreed - text revised
16364	1	8	4	8	5	"Sea ice may be discontinuous pieces moved on the ocean surface by wind and currents, or a motionless sheet attached to the coast (land-fast ice). " This is not quite complete or correct. Suggest rewording this as: "Sea ice may be discontinuous pieces moved on the ocean surface by wind and currents (pack ice), or a motionless sheet attached to the coast or to ice shelves (fast ice). " [Inga Smith, New Zealand]	agreed - text revised
16366	1	8	5	8	8	"Sea ice provides many critical functions in the Earth system; providing essential habitat for polar species, affecting climate change through amplification of surface warming via albedo effects, driving global deep ocean circulation via dense water formation, and providing livelihoods for people in the Arctic. " An important function has been missed out here. Suggest rewording this as: "Sea ice provides many critical functions in the Earth system; providing essential habitat for polar species, affecting climate change through amplification of surface warming via albedo effects, driving global deep ocean circulation via dense water formation, providing an insulating layer that regulates heat transfer between the ocean and atmosphere, and providing livelihoods for people in the Arctic. " [Inga Smith, New Zealand]	accepted - we added some of these functions
22354	1	8	6	8	6	"timescales" was written as "time-scales" in executive summary. Please make consistent. [Handa Yang, USA]	rejected - text is revised and does not apply anymore

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
13346	1	8	7	8	7	Perhaps a brief discussion on ocean circulation and nutrient distribution and the implication of this for the marine ecosystem? Also, consider making reference to section on upwelling. [Debra Roberts and Durban Team, South Africa]	taken into account - text revised
2658	1	8	9	8	17	More descriptions should be provided about the effect of ice cover changes on radiation reflection and global warming. Also, It should also be explained about the numerical value of changing the Earth albedo due to ice cover changes. [Mohammad Javad Zareian, Iran]	Rejected, not part of framing changper
2798	1	8	9			« Glacial ice » ?? [Anne Guillaume, France]	Accepted - Text revised in section 1.2
6568	1	8	9	8	11	This sentence can be shortened as "Presently, 10% of Earth's land area is covered with glacial ice, including mountain glaciers, ice caps, and the ice sheets of Greenland and Antarctica, which together account for about two-thirds of Earth's freshwater (Durack et al., 2016). [APECS Group Review, Germany]	Accepted - Text revised in section 1.2
16884	1	8	12	8	12	Perhaps semantics, but the reflection of sunlight by ice and snow does not really "cool" the planet (in the same sense than outgoing long-wave radiation), but rather keeps it some of the incoming energy from warming the planet - keeps the planet cooler than it otherwise would be. [Markku Rummukainen, Sweden]	Accepted - Text revised in section 1.2
17670	1	8	12			the albedo effect is introduced here before sea ice and snow are introduced. The previous sentence mentions only land surface ice. [Andreas Kääb, Norway]	Accepted - Text revised in section 1.2
1232	1	8	14	8	17	What about natural variability e.g. little ice age? It would be useful to point out that the cryosphere varies at different time scales e.g. seasonal snow and ice are fast responders cf glaciers and ice sheets. [Ross Brown, Canada]	agred - good point, we added some elsewhere
19284	1	8	15	8	15	Change to: "including the seasonal growth and decay of vast areas of Polar sea ice…" and delete "that covers vast areas of polar ocean in winter…" [Michelle A. North, South Africa]	agreed - text revised
32	1	8	16	8	16	"snow cover in high mountain areas" --> The importance of the snow cover is given by the fact that it covers large part of the norther hemisphere in winter, not by its coverage of high mountain areas! [Daniel Farinotti, Switzerland]	rejected - this report is not about mid-latitude snow cover, but I agree that it is important
6136	1	8	19	8	46	The paragraph above 1.2.2 is largely about Interactions between ocean and cryosphere and therefore should better be moved down. This would also avoid some repetitation between this paragraph and the first under 1.2.2 (e.g. lines 27-29 and lines 37-38. In addition Lines 40-43 are not abouit interaction but rather characteristic snd would better fit under 1.2.1 [Regine Hock, USA]	agreed - this paragrph has been revised
6266	1	8	19		33	Interactive role of oceans & cryosphere in absorbing anthropogenice CO_2 is not well-appreciated by public. Changes in precipitation and acceleration of the global water cycle directly correlate to climatic shifts in some regions. [Melinda Kimble, USA]	agreed - this has been added in the discussion about ocean interactionis
12080	1	8	20	8	20	Change to "biogeochemically important substances". All substances are biogeochemical….? [Sarah Cooley, USA]	taken into accoiunt - text revised
12354	1	8	20	8	20	"biogeochemical substances (in particular carbon, nitrogen…)": "biogeochemical substances" or "elements" or "essential elements"? [Sylvain Ouillon, France]	taken into account, text revised
6352	1	8	22	8	22	The "set in motion" is a little bit ambiguous, especially because we are not talking about dynamics and transfers of momentum. Consider something else. [François Massonnet, Belgium]	accepted
23380	1	8	22	8	22	Please delete "in motion" [Inga Koszalka, Germany]	accepted
14136	1	8	26			melts ice [Christopher Fogwill, UK]	accepted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2686	1	8	29	8	31	A part of rain water and snow water can direclty fall onto ocean surface, not necessarily via lands or ice and snow on the land. [Kentaro Hayashi, Japan]	taken into account - text revised
15352	1	8	29	8	29	I don't understand what is meant by "the land, cryosphere and the ocean", because I don't know of any cryospheric elements that are neither on land nor on the ocean. Sea-ice sits on the ocean,, the seasonal snowpack, mountain glaciers, and permafrost, sit on land, and polar ice sheets sit both on land and the associated ice shelves sit on the ocean. [Samuel Morin, France]	taken into account - text revised for more clarification
15354	1	8	29	8	31	The wording for this sentence is a bit weird. What is "rain and snow water input to the land and cryosphere" ? Is seasonal snow belonging to land or cryosphere ? I suggest rephrasing this sentence. [Samuel Morin, France]	taken into account - text revised for more clarification
18350	1	8	32	8	33	Kindly demistify how primary production fuels intense geochemical transformation processes. [Suvadip Neogi, India]	taken into account - more info on primary production is added
18910	1	8	32	8	33	This sentence should be moved just after the word 'organic matter' (page 8, line 27) so that description for primary production in this paragraph becomes compact and simple. [Tsuneo Ono, Japan]	taken into account - text revised for more clarification
908	1	8	35	8	35	Why not interaction with the atmophere? For continental ice caps atmosphere is a necessary intermediary. See (Andre Berger, 2017) [Herve Nifenecker, France]	rejected - out of the scope for this chapter (ocean-cryosphere interaction only
13234	1	8	37			Reference to Figure 1 should be made early in Box 1.1, instead of on page 8, line 37. [Zelina Zaiton Ibrahim, Malaysia]	taken into account
17672	1	8	37			the first sentence duplicates previous sentences [Andreas Kääb, Norway]	taken into account
18502	1	8	37	8	46	contribution of ice shelves to dense water formation (through cooling) is missing and should be included [Angelika Renner, Norway]	Accepted - Text revised
23256	1	8	37	8	57	The summary of SLR and origins. The executive summary or framing here yields a perception that ice sheet collapse and melting is the predominant force. It would be helpful to take the conclusions in Chapter 5 on other important processes such as thermal expansion. Also the >66m GSLR catches eyes quickly. Yet more important is the rate of SLR that defines adaptation options. See Chapter 5. Please consider revising this section. [Y. Jeffrey Yang, USA]	Accepted - text revised
1234	1	8	38	8	38	This is missing snowfall accumulation on land areas (seasonal snowpack) which also contributes FW to oceans in the spring melt period [Ross Brown, Canada]	rejected - this report does not discuss he snow in mid latitudes (only alpine and polar)
12082	1	8	39	8	39	Change to "(and hence also helps control density)" because T is a strong density regulator as well. [Sarah Cooley, USA]	taken into account - text revised
12356	1	8	39	8	39	"controls the sea level and salinity": isn't it too strong for salinity? (what about evaporation, evapotransipration?) Suggestion: constrain [Sylvain Ouillon, France]	taken into account - text reviosed
19286	1	8	39	8	40	Delete "of the ocean" [Michelle A. North, South Africa]	taken into account -text revised
6570	1	8	40	8	40	It would be good to mention the contribution of Antarctic and Greenland icesheets septrately as Antarctica (60 m) and Greenland (6 m). The sentence can be re-written as "The vast ice sheets in Antarctica (60 m) and Greenland (6 m) currently contain approximately 66 m of global sea level rise [APECS Group Review, Germany]	agreed - text revised
12358	1	8	40	8	41	66m of global SLR equivalent: at which temperature? With an increasing mean temperature, this value would rise? An additional information may be welcome. [Sylvain Ouillon, France]	agreed - text revised
910	1	8	41	8	41	comment: atmosphere is heated by the warming ocean, rises and melts the ice cap top while cooling down? See (Andre Berger, 2017) [Herve Nifenecker, France]	agreed - text revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
3964	1	8	41	8	42	majority is still considered as stable over the foreseeable future' sounds vague. Try to be more specific on exact sea level rise that is potentially unstable on what timescale. Or empahsise the uncertainty. [Helene Hewitt, UK]	agreed - text revised
20942	1	8	41	8	42	omit ", although the majority of this is still considered as stable over foreseeable time scales (Church et al., 2013)": this half-sentence contradicts the next sentence. [Claudio Richter, Germany]	agreed - text revised
1492	1	8	42	8	43	relationship between ocean level and ice melt needs further elaboration. [Danyal Aziz, Pakistan]	taken into account - text revised, and more specific information can be found in chapter 4
17208	1	8	42	8	42	An indication of "foreseeable time scales" would eb helpful. [Iulian Florin Vladu, Germany]	noed - this text has been reviesed
23382	1	8	42	8	42	what do you mean by “forseeable time scales” - please define/be more specific [Inga Koszalka, Germany]	Text revised
14138	1	8	43			ice-sheet [Christopher Fogwill, UK]	Accepted - text revised
19288	1	8	43	8	43	Delete parentheses and "their associated ice", so that it reads: "in places where the base of ice sheets and shelves are in direct contact with ocean water…" [Michelle A. North, South Africa]	Accepted - text revised
23384	1	8	43	8	45	please also mention glacier termina for completeness (termina & ice shelves, the majority of marine-terminating Greenland glaciers do not have ice shelves) [Inga Koszalka, Germany]	Accepted - text revised
18822	1	8	44	8	45	As correctly pointed out in Chapter 3, changes in ocean circulation are actually impacting ice shelves in Antarctica, more than the rise in ocean temperature. [Frank Pattyn, Belgium]	Rejected - ocean circulation alone would not melt ice
14140	1	8	45			destabilize [Christopher Fogwill, UK]	Rejected - we use UK spelling
21544	1	8	45	8	46	The review by Joughin et al. 2012, Nature, summarizes best the concept of oceanic forcing of ice sheets. [Fiamma Straneo, USA]	Talken into account
6354	1	8	48	8	50	Technically, it is only the formation of sea ice that induces the production of dense waters. The melting will contribute to create low-density waters, isn't it? [François Massonnet, Belgium]	Accepted - text revised
6356	1	8	50	8	51	I do not understand why the fact that ocean must be cold enough for sea ice to form, is any form of ocean-ice connection. Consider dropping or reformat [François Massonnet, Belgium]	Accepted - Text deleted
6572	1	8	50	8	51	Cut the end of the sentence that says “representing another ocean-ice connection”. [APECS Group Review, Germany]	Accepted - Text deleted
12298	1	8	50			"Ocean temperature also needs to be cold enough for sea ice to form, representing another ocean-ice connection" is an awkward formulation. Surely you mean "Sea ice forms when ocean temperatures is low enough" [Eric Wolff, UK]	Accepted - Text deleted
17674	1	8	51			some more information on the (relative) contribution of earth surface cover types to the radiation balance of the Earth /refelected contributions would be useful. I.e. how import are the reflection contributions of cryospheric components? [Andreas Kääb, Norway]	rejected - out of the scope for chapter
19290	1	8	53	8	53	Delete "including the energy taken up by the ocean" [Michelle A. North, South Africa]	accepted
19292	1	8	53	8	53	Insert as a new paragraph from "The cryosphere and ocean also interact biogeochemically…" [Michelle A. North, South Africa]	noted, but have space limitation
23386	1	8	53	8	57	This content pertains to the next section (1.2.3) [Inga Koszalka, Germany]	rejected - major text revisions, and removal of section 1.2.3

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
14142	1	8	54			sea ice (no hyphen needed) [Christopher Fogwill, UK]	Accepted
18452	1	8	54	8	57	I would suggest to divide this sentence into two e.g. by ending the first sentence after the reference and starting the second with "Nutrient-rich…". [Anette Jönsson, Sweden]	Accepted - text revised
6574	1	8	56	8	57	Also nutrient-rich water delivered to oceans by the many rivers that are maintained by glacier and ice/snow melt. [APECS Group Review, Germany]	Accepted - text revised
564	1	9	0			After "emissions scenarios" add "has or" [William Clarke, Australia]	Accepted - text revised
4034	1	9	2	9	15	There is scope here to provide a slightly more expansive discussion on the threats posed to human settlements from currents and projected sea level rise, storm surge and flooding advised broadly in Ericson et al. (2006), Hallegate et al. (2013), McGranaghan et al. (2007) and Neumann et al. (2015). References: Ericson, J.P., Vörösmarty, C.J., Dingman, S.L., Ward, L.G., and Meybeck, M., 2006. Effective sea-level rise and deltas: causes of change and human dimension implications. Global and Planetary Change, 50(1), pp.63-82. Hallegatte, S., Green, C., Nicholls, R.J. and Corfee-Morlot, J., 2013. Future flood losses in major coastal cities. Nature climate change, 3(9), pp.802-806. McGranahan, G., Balk, D., and Anderson, B., 2007. The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. Environment and Urbanization, International Institute for Environment and Development (IIED), 19(1), pp.17–37. Neumann, B., Vafeidis, A.T., Zimmermann, J., and Nicholls, R.J., 2015. Future coastal population growth and exposure to sea-level rise and coastal flooding-a global assessment. PloS one, 10(3), 0118571, https://doi.org/10.1371/journal.pone.0118571. [Phil Watson, Australia]	Taken into account: This can't be assessed in chapter 1, but we have passed the comment and references to chapter 4.
660	1	9	3	9	24	The aspect "Importance for Ecosystems and Human Systems" shurely is in the focus of policy makers. This subchapter could be elaborated further (more depth / content). [Thomas Ackermann, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
4698	1	9	4	9	5	"…transportation, LIVELIHOODS and migration… [Manuel Barange, Italy]	Taken into account: this section has been removed/merged with other sections and extensively revised
6140	1	9	4	9	4	does this sentence really need any references (any choice seems random.) Also many other general intro statements [Regine Hock, USA]	Taken into account: this section has been removed/merged with other sections and extensively revised
6142	1	9	4	9	24	these paragraphs are not balanced: biased towards oceans and sea ice, but fails to mention sea level (the most direct connection between the oceans and the cryosphere) and cryospheric hazards [Regine Hock, USA]	Taken into account: this section has been removed/merged with other sections and extensively revised
6268	1	9	4		24	How can report highlight human dependency on the ecosystems that are shaped by the oceans & the cryosphere? [Melinda Kimble, USA]	Taken into account: this section has been removed/merged with other sections and extensively revised

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12360	1	9	4	9	6	What about marine energy (such as tidal farming)? This sector mainly based on wave power or tidal power is under development. (and offshore wind turbines may be quoted as well). May I suggest to add "marine energy" to the list, and quote, for example: Khan N., Kalair A., Abas N., Haider A., 2017. Review of ocean tidal, wave and thermal energy technologies, Renewable and Sustainable Energy Reviews, 72, 590-604. DOI:10.1016/j.rser.2017.01.079 (or alternatively: Melikoglu, M., 2018. Current status and future of ocean energy sources: A global review, Ocean Engineering, 148, 563-573). doi:10.1016/j.oceaneng.2017.11.045) [Sylvain Ouillon, France]	Taken into account: this section has been removed/merged with other sections and extensively revised
13272	1	9	4	9	9	This point is entirely valid but the reference from 1999 is relatively dated. A newer reference should be added to make this statement more contemporary. [Katherine Bishop-Williams, Canada]	Taken into account: this section has been removed/merged with other sections and extensively revised
13348	1	9	4	9	6	Start the sentence with "For millennia,..." [Debra Roberts and Durban Team, South Africa]	Taken into account: this section has been removed/merged with other sections and extensively revised
16048	1	9	4	9	9	The ocean is also culturally significant to certain contemporary populations, e.g. peoples of Pacific island countries. See Julia B Edwards "The Logistics of Climate-Induced Relocation: Lessons from the Carteret Islands, Papua New Guinea" 32(3) Refugee Survey Quarterly 52 at 67 : "people have a special, emotional bond with the 'vanua' [and] [o]wning land gives people an identity, a sense of belonging, and a voice". [Nathan Ross, New Zealand]	Taken into account: this section has been removed/merged with other sections and extensively revised
17212	1	9	4	9	6	To reflect reality of communities with close ties with ocean, for the services that humans have depended upon the oceans, it is important to also highlight 'cultural identify', similar to the mentioning of how snow and ice support indigenous cultures in the Arctic in two paragraphs below. [Iulian Florin Vladu, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
21142	1	9	4			It is recommended that this paragraph mention explicitly that the oceans contribute to the management of human waste (sewage, management of industrial discharge, river discharge associated with human land practices) etc. While the role of biodiversity in maintaining water quality (next paragraph) is one component, the physical environment is another. [Andrew Constable, Australia]	Taken into account: this section has been removed/merged with other sections and extensively revised
21144	1	9	4			It is important to note that a valuable service of the oceans is the part that it plays in the human psyche, whether that be related to spiritual or aesthatic aspects, or psychological well-being. It is recommended that this be included in this chapter and as a component of consideration of the oceans. [Andrew Constable, Australia]	Taken into account: this section has been removed/merged with other sections and extensively revised
10786	1	9	5	9	5	the oceans in themselves don't provide coastal protection. Perhaps a workaround is to talk about 'oceans and their margins' [Thomas Spencer, UK]	Taken into account: this section has been removed/merged with other sections and extensively revised
12464	1	9	5	9	5	Eicken et al 2009 is a good ref here as they specifically focus on the ecosytem servics provided by sea ice - its in the journal Arctic [James Ford, Canada]	Taken into account: this section has been removed/merged with other sections and extensively revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
13116	1	9	5	9	5	coastal protection as the first point makes no sense. What is meant here? Protection by coral reefs, mangroves? These would be biological components that are not mentioned in the previous sentence. I can't think of any other "service" oceans and cryospere provide to protect coastlines. I would suggest to remove this here or provide more details, or better move it into the following paragraph. [Baerbel Hoenisch, USA]	Taken into account: this section has been removed/merged with other sections and extensively revised
6576	1	9	6	9	6	I don't think “migration” works in this sentence. Perhaps the term "transportation" captures what the authors meant? [APECS Group Review, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
17210	1	9	6	9	6	Is "migration" a service? Is this not referring to transportation, which is already listed? [Iulian Florin Vladu, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
4702	1	9	8	9	8	It is not demonstrated that post-industrial times are PROPORTIONALLY more impacting than pre-industrial times. In absolute terms yes, but proportionally? Think about ecological degradation of rivers and waterways during the middle ages, when population was below 1 billion people [Manuel Barange, Italy]	Taken into account: this section has been removed/merged with other sections and extensively revised
21146	1	9	11			This paragraph is not needed in its current form. It amounts to saying that biodiversity is only valuable for the productivity in fisheries. Biodiversity impacts on many elements of the ecosystem services including the carbon cycle (a food web is summarised as the 'closure term' in biogeochemical models). In other words, food web structure and function matters to biogeochemistry. This is recommended to be included here. Any number of references could be used (Worm et al is not a good or foundational example). A reference suitable for polar systems is Murphy, E. J., R. D. Cavanagh, E. E. Hofmann, S. L. Hill, A. J. Constable, D. P. Costa, M. H. Pinkerton, N. M. Johnston, P. N. Trathan, J. M. Klinck, D. A. Wolf-Gladrow, K. L. Daly, O. Maury and S. C. Doney (2012). "Developing integrated models of Southern Ocean food webs: Including ecological complexity, accounting for uncertainty and the importance of scale." Progress in Oceanography 102: 74-92. [Andrew Constable, Australia]	Taken into account: this section has been removed/merged with other sections and extensively revised
22986	1	9	11		12	it also generates oxygen which is released to the atmosphere. [Jamie Shutler, UK]	Taken into account: this section has been removed/merged with other sections and extensively revised
23388	1	9	11	9	12	Please expand on the importance for fisheries (with some regional examples to illustrate the problem) [Inga Koszalka, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
12084	1	9	12	9	12	Biodiversity supportS [Sarah Cooley, USA]	Taken into account: this section has been removed/merged with other sections and extensively revised
14144	1	9	12			supports [Christopher Fogwill, UK]	Taken into account: this section has been removed/merged with other sections and extensively revised
16032	1	9	12	9	14	Erase TO from the sentence: The biodiversity of the world’s oceans support ocean productivity, resource availability, water quality, and the ability "to" of ecosystems to recover from perturbations(Worm et al., 2006). [Mariela Lopez-Gasca, Venezuela]	Taken into account: this section has been removed/merged with other sections and extensively revised
16034	1	9	12	9	14	It is important to include and differentiate among primary and secondary ocean's productivity in this sentence as the primary productivity is the main process for the fixation of CO2 into the system [Mariela Lopez-Gasca, Venezuela]	Taken into account: this section has been removed/merged with other sections and extensively revised
826	1	9	13	9	13	Delete "to" after "ability" [Kathiresan Kandasamy, India]	Taken into account: this section has been removed/merged with other sections and extensively revised
1494	1	9	13	9	13	grammatical error: to/of ecosystem. [Danyal Aziz, Pakistan]	Taken into account: this section has been removed/merged with other sections and extensively revised

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5182	1	9	13	9	13	"the ability to of ecosystems" should read "the ability of ecosystems" [Pauline Midgley, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
12362	1	9	13	9	13	"the ability to of ecosystems…" to be corrected [Sylvain Ouillon, France]	Taken into account: this section has been removed/merged with other sections and extensively revised
13350	1	9	13	9	13	Remove 'to' before 'of ecosystem' [Debra Roberts and Durban Team, South Africa]	Taken into account: this section has been removed/merged with other sections and extensively revised
19294	1	9	13	9	13	remove the 'to' before "of ecosystems to recover…" [Michelle A. North, South Africa]	Taken into account: this section has been removed/merged with other sections and extensively revised
20944	1	9	13	9	14	replace "the ability to of ecosystems to recover from perturbations" with "resilience" [Claudio Richter, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
23390	1	9	13	9	14	Please provide a more recent reference [Inga Koszalka, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
34	1	9	16	9	18	The example of polar bears reads somewhat stereotypical. Consider placing that differently. [Daniel Farinotti, Switzerland]	Taken into account: this section has been removed/merged with other sections and extensively revised
1496	1	9	16	9	16	for polar bears. [Danyal Aziz, Pakistan]	Taken into account: this section has been removed/merged with other sections and extensively revised
6578	1	9	16	9	17	Perhaps broaden this example beyond just polar bears, as sea ice provides critical habitat and hunting grounds for marine mammals more generally - for example, seals and walruses. [APECS Group Review, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised
12466	1	9	16	9	19	references needed: could use Ford et al 2015 in Nature Climate Change and/or recent AMPA AACA assessments which need to be referenced as they produce a state of the art undertanding on climate change impacts, adaptation, and vulnerability in the Arctic. they need to be cited here and elsewhere [James Ford, Canada]	Taken into account: this section has been removed/merged with other sections and extensively revised
15356	1	9	16	9	24	This paragraph appears too scattered in content ; it seems to be a collection of examples, and it is not clear how the examples were chosen and whether they are the most appropriate ones. The examples on High Mountains only focuses on hydrological impacts, without a rational for making such a choice. [Samuel Morin, France]	Taken into account: this section has been removed/merged with other sections and extensively revised
18504	1	9	16	9	24	It might not be the most popular aspect, but retreat of sea ice in particular in the Arctic certainly has implications for exploitation, tourism & shipping in the Arctic, which at least should be mentioned! [Angelika Renner, Norway]	Taken into account: this section has been removed/merged with other sections and extensively revised
21260	1	9	16	9	24	In this parragraph the report talks about the way that sea ice supports lfe as hunting grounds for bears and humans. Which although this is a indigenous tradition I think we either ommit this par or explain why shouldn't we ban the hunting of this endengared species. Further down it laks about the blooms produced from the melting of the ice, but the comments made after that does not give us a clear idea if this is beneficial or not, I will like to see this clarified [Alejandro Souza, Mexico]	Taken into account: this section has been removed/merged with other sections and extensively revised
21486	1	9	16	9	24	It's better to remove or improve the material of the paragraph because of less importance of it. [Layeghi Behzad, Iran]	Taken into account: this section has been removed/merged with other sections and extensively revised
23546	1	9	16	9	17	"hunting grounds of polar bears" - you may wish to add "arctic foxes" as in winter, they also opportunistically use sea ice as grounds for hunting (ringed seal pups) and scavenging (carrion left behind by polar bears) [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: this section has been removed/merged with other sections and extensively revised

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6034	1	9	17	9	19	The meaning and value of sea ice to Arctic Indigenous Peoples is not properly captured here. More than simply hunting grounds and protection from erosion, sea ice is a core component of Inuit way of life, culture, communication, transportation, health, and identity. On line 5 of this page, some services provided via sea ice are listed but again this fails to capture the intrinsic value of sea ice. To properly communicate this important point, please include information from and cite two reports from the Inuit Circumpolar Council that discuss in detail the importance of sea ice for Inuit: 1. The sea ice is our highway 2. The sea ice never stops Both available at http://www.inuitcircumpolar.com/icc-reports.html [Joanna Petrasek Macdonald, Canada]	Taken into account: text has been extensively revised and merged with other sections. CCB-3 includes examples of the importance of sea ice to Inuit.
22548	1	9	17	9	19	The sea ice is much more than an Indigenous hunting ground. There are two reports from the Inuit Circumpolar Council (ICC) on the importance of sea ice for Inuit: "The sea ice is our highway", and "The sea ice never stops". Just one little quote from the latter to give an indication: "Far from being perceived as an obstacle, the sea ice enlarges Inuit territory, enables communication, and offers access to essential dietary resources." It would be good to include some of this information in this IPCC assessment. One of the reports is also referenced in the 3rd Chapter of this IPCC report. It would be good to mention it here, as well. [Eva Kruemmel, Canada]	Accepted: importance of sea ice for transport/travel added to section1.1
23548	1	9	17	9	17	"hibernation dens for pregnant female polar bears" - the polar bear example is already often perceived as a cliché, and many readers are becoming desensitised to this particular example. Consider adding examples in addition to polar bears, or at least say “for polar bears and other mammal species”. For instance, snow drifts over sea ice also provide substrate for ringed seals’ birth lairs, where they shelter their pups. [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: this section has been extensively revised and text has not been retained.
5200	1	9	18	9	18	copy-edit: no need to capitalise "indigenous" here; several other instances later in the Chapter and Cross-Chapter Box 3. For consistency, indigenous would only be capitalised when it comes before "Knowledge" [Pauline Midgley, Germany]	Rejected: after consultation and checking of peer-reviewed literature, we decided to capitalise Indiegenous out of respect (we capitalise "Indigenous" in the same way that we would "Australian")
12300	1	9	18			"Indigenous" should be lower case, words like Inuiit are upper case. [Eric Wolff, UK]	Rejected: after consultation and checking of peer-reviewed literature, we decided to capitalise Indiegenous out of respect (we capitalise "Indigenous" in the same way that we would "Australian")
14146	1	9	18			indigenous (no capitial needed) [Christopher Fogwill, UK]	Rejected: after consultation and checking of peer-reviewed literature, we decided to capitalise Indiegenous out of respect (we capitalise "Indigenous" in the same way that we would "Australian")
23550	1	9	18	9	18	should this be ‘indigenous and local’ rather than just "indigenous"? [Hans-Otto Poertner and WGII TSU, Germany]	Agreed
18176	1	9	19	9	21	Thinning and melting: please clrify if the seasonal thinning and melting is meant here, rather than progressive incerases in thinning and melting in response to anthropogenic climate change. [Laurens Bouwer, Netherlands]	Taken into account: section extensively revised and merged with section 1.1 to strengthen the rationale/importance of this special report
14424	1	9	21	9	24	This focuses on the water resource aspect of snow/glaciers. Another major issue is that a snowpack maintains a saturated soil, snowpack loss leads to soil drying, effecting local vegetation. Reduced snow season lengths and snow amounts increase wildfire risk.---This will link to Chapter 2, page 16, line 40 [Sarah Kapnick, USA]	Taken into account: section extensively revised and merged with section 1.1 to strengthen the rationale/importance of this special report. Specific details left for chapter 2

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14426	1	9	21	9	22	provies water for drinking, irrigating crops, and aquaculture in many parts of the world. [Sarah Kapnick, USA]	Taken into account: section extensively revised and merged with section 1.1 to strengthen the rationale/importance of this special report
21320	1	9	21	9	24	References for these two sentences need to be given, e.g. Immerzell and Lutz. [Philippus Wester, Nepal]	Taken into account: section extensively revised and merged with section 1.1 to strengthen the rationale/importance of this special report
23392	1	9	21	9	22	Please provide a (regional) example(s) to illustrate the impact of melting for drinking water and crops [Inga Koszalka, Germany]	Accepted: A regional example of Hindu Kush Himalaya added to section 1.1
17424	1	9	22	9	22	Change "further" to "also" [Sonya Legg, USA]	Taken into account: section extensively revised and merged with section 1.1 to strengthen the rationale/importance of this special report
23634	1	9	22	9	24	Mention water supply to cities and agriculture here [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: section extensively revised and merged with section 1.1 to strengthen the rationale/importance of this special report
4036	1	9	27	9	34	This appears to be a very trivial and superficial discussion on separating comparatively “short” (decades) from “longer” term natural processes (eg. solar irradiation and Milankovitch cycling). See also comment No. 1. [Phil Watson, Australia]	Taken into account: The text has been revised substantially.
20450	1	9	27	13	20	Other significant changes to the physical and chemical characteristics need to be highlighted. They are introduced as a result of manmade activities in the form of industrial and agricultural chemicals. These substances are designed and manufactured and can be persistent organic compounds (POPs). They remain in the environment for long periods of time and will effect the physical, chemical and biological characteristics of the Ocean and Cryosphere. [Fakhru'L-Razi Ahmadun, Malaysia]	Rejected: Although we agree with the reviewer that the ocean is threatened by more than just climate change, these issues are outside the scope of this report.
1236	1	9	29	9	34	There should be more emphasis (and citations) highlighting cryospheric changes since AR5 which is one of the main reasons for this SR update. [Ross Brown, Canada]	Rejected: Chapter 1 is about framing the issue, and not meant to provide an overview of the new material since AR5. This is covered in the subsequent chapters
2800	1	9	31			« Against a backdrop » ?? [Anne Guillaume, France]	Noted: no change to the text, since the expression was considered to be appropriate
17702	1	9	32	9	32	Reviewer agrees with the conclusion here attributed to Bindoff et al. The implications for policy-making/design are paramount. The report should address uncertainties and their implications for policy-making and design more clearly. Specific examples will be given in the comments on subsequent chapters [Hessel Voortman, Netherlands]	Noted:
16886	1	9	33	9	34	Isn't this true already for some aspects of the ocean and cryosphere, and certainly even more so already under moderate (or also high-mitigation) emission scenarios? [Markku Rummukainen, Sweden]	Noted
17326	1	9	33	9	34	This sentence implies that cryosphere changes still remain within the realm of natural variability and are not expected to go outside these for several more decades, which I do not believe is the meaning intended by the author? unless on paleo time frames in which case this should be clarified. [Pamela Pearson, USA]	Accepted: Section has been revised.
18178	1	9	33	9	34	"projected changes in oceans and cryosphere ..". [Laurens Bouwer, Netherlands]	Noted

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18180	1	9	34	9	34	Please also indicate which changes are already detenced now, in oceans and cryospehere, or refer to tables/attribution in other chapters. [Laurens Bouwer, Netherlands]	Accepted: we added a few examples (not complete, though)
18608	1	9	36	10	30	This subsection is of high importance but needs to be focussed on key characteristics of the ocean/cryopshere system. My understanding is that ocean/cryosphere might encounter linear, non-linear (tipping point) and abrupt changes due to anthropogenic or external forcings. It would cause a suite of effects that cascade through the climate-natural and human ecosystems. Abrupt and non-linear changes might also occurs from natural oscillations of the climate variability and also causing cascading effects (e.g., Chavez et al. 2009 for marine ecosystems). TThose points should to be clearly explained (emphasized) here. On the contrary, the definition of Detection and attribution + time or emergence doe sbelong to the glossary and is not useful here. One of the key characteristics that has been assessed in AR5 and further investigated since then is the fact that ocean, biogeochemical (and cryopsphere) natural oscillations are predictable several years in advance. This substentially contrasts with atmosphere predictability as used for numerical weather forcecast. [Roland Seferian, France]	Rejected: While we agree with the reviewer that the notion of non-linear system dynamics is worth highlighting, we also consider the other elements as critical and thus refrained from moving them to the glossary.
23394	1	9	36	11	7	This section should be rewritten, be less abtract, more specific and please provide more recent references. Figure 1.1c too abstract. The panels of the figure 1.1 are not referenced in order in the text. [Inga Koszalka, Germany]	Accepted: Figure has been revised and all panels are now discussed in the text.
2276	1	9	38	9	45	Include additional citations of Solomon et al 2009 and Zeebe et al 2016 for the inertia of the system. Furthermore, specify examples of the ice sheets and sea level rise. (Zeebe R. E., et al. (2016) Anthropogenic carbon release rate unprecedented during the past 66 million years, NATURE GEOSCIENCE 9:325–329; Drijfhout S., et al. (2015) Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models, PROC. NAT'L. ACAD. SCI. 112(43):E5777–E5786; O'Neill B. C., et al. (2017) IPCC reasons for concern regarding climate change risks, NATURE CLIMATE CHANGE 7:28–37; Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.) [Kristin Campbell, USA]	Noted: Thanks for the many references. Some of which we added to the text.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2402	1	9	38	9	45	Include additional citations of Solomon et al 2009 and Zeebe et al 2016 for the inertia of the system. Furthermore, specify examples of the ice sheets and sea level rise. (Zeebe R. E., et al. (2016) Anthropogenic carbon release rate unprecedented during the past 66 million years, NATURE GEOSCIENCE 9:325–329; Drijfhout S., et al. (2015) Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models, PROC. NAT'L. ACAD. SCI. 112(43):E5777–E5786; O'Neill B. C., et al. (2017) IPCC reasons for concern regarding climate change risks, NATURE CLIMATE CHANGE 7:28–37; Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.) [Durwood Zaelke, USA]	Noted: duplicate of comment 644
3272	1	9	38	9	38	Large inertia and long response times…I understand that this phrase introduces the problem globally. However, it can lead to some confusion since at a local / regional scale it is widely demonstrated both in paleo-records (eg Lehmaan & Keigwing, 1992. Nature, 356: 757-762) and historical evidence (e,g, contemporary retraction of glaciers) that the changes due to sudden warming events are much faster than those that are the result of cooling phases, in general much more progressive. [Castor Muñoz Sobrino, Spain]	Rejected: Our aim was to introduce the concepts in relative broad terms, and not to go into specific details.
6270	1	9	38	10	30	Inertia and long response times are important elements in highlighting the long term impacts of forcing (warming). Abrupt changes (tipping) may catch societies by surprise. The amplification of variability must be better understood by the public. [Melinda Kimble, USA]	Noted: No change in the text
10654	1	9	38	9	38	The statement 'Large inertia and long response times are key characteristics of the ocean and cryosphere' should be rephrased. It is correct for deep ocean circulation and glaciers' accumulation. But in case of glaciers' melting, the process can be very repid: Causacus Mountains glaciers lost 40% of their area from 1950th to 2014 (observed by satellite images) - The Second Roshydromet Assessment Report on Climate Change and its Consequences in the Russian Federation (2014) [Oxana Lipka, Russian Federation]	Accepted: Sentence has been rephrased.
11626	1	9	38	9	45	This paragraph should also address biogeochemical changes. For example, it takes millennia to remove the anthropogenic perturbation in DIC (Archer et al., GBC, 1999) and deoxygenation peaks about a thousand years after stabilization of radiative forcing and new steady-state conditions are established only many millennia after forcing stabilisatin (Battaglia and Joos, ESD, 2018) . [Fortunat Joos, Switzerland]	Rejected: A good point, but we would like to stay here at the very general level, i.e., the ocean system as a whole.

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12900	1	9	38	9	45	Include additional citations of Solomon et al 2009 and Zeebe et al 2016 for the inertia of the system. Furthermore, specify examples of the ice sheets and sea level rise. (Zeebe R. E., et al. (2016) Anthropogenic carbon release rate unprecedented during the past 66 million years, NATURE GEOSCIENCE 9:325–329; Drijfhout S., et al. (2015) Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models, PROC. NAT'L. ACAD. SCI. 112(43):E5777–E5786; O'Neill B. C., et al. (2017) IPCC reasons for concern regarding climate change risks, NATURE CLIMATE CHANGE 7:28–37; Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change.) [Gabrielle Dreyfus, USA]	Noted: duplicate of comment 644
15452	1	9	38	9	44	I suggest to revise the contents from line 38 to 44 considering that, with regard to the cryosphere, the idea of "long response times" or "change very slowly" is still a subject of discussion. For instance, tropical and small glaciers, ice shelves and its tributary glaciers have short-time responses. Possibly, it might be better to say that "cryosphere has diverse components that can react simultaneously at different time scales". [Hernan Sala, Argentina]	Accepted: Sentence has been rephrased.
17704	1	9	38	9	45	The time reference for engineered systems (adaptation) is of the order of 100 years. This passage indicates that, even if we are succesful in curbing greenhouse emissions, we still will be forced to adapt to climate change for centuries to come. Although undoubtedly the preferred option for several reasons, the message appears to be that the effects of mitigation are expected to be limited and we should look for ways to effectively adapt. This important message should be conveyed clearly to the readers of the report, especially to policy-makers [Hessel Voortman, Netherlands]	Noted:
21030	1	9	38		45	This intertia concept NEEDS to stated earlier and made a key point. ADAPTATION STRATEGIES ARE REQUIRED REGARDLESS OF ACTIONS ON CO2. [Thomas Wagner, USA]	Accepted: These concepts were moved up and given an own section, i.e., section 1.3.
6580	1	9	41	9	42	The phrasing in this sentence is unclear. Change "…tend to lag behind in their response to a rapidly changing forcing" to "…the responses of the ocean and cryosphere lag behind rapid changes in climate." Or, conversely, define forcing beforehand (this second option may be more useful given what's discussed in the following paragraph). [APECS Group Review, Germany]	Accepted: Sentence has been rephrased.
2802	1	9	42			« Consequently », I believe that « Also » will be more accurate. [Anne Guillaume, France]	Accepted: Sentence has been rephrased.
19296	1	9	42	9	42	This is the first time the authors have mentioned "forcing", it would be better if there was an explanation of 'climate forcing' before this use, or choose to use a different term in this sentence (e.g., "…in their response to a rapidly changing climate") [Michelle A. North, South Africa]	Accepted: The concept of forcing was rephrased
2804	1	9	43			« This also implies » is this proven? Then please give a reference or change phrasing [Anne Guillaume, France]	Accepted: rephrased

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6582	1	9	43	9	43	The end of this setence is misleading. Saying that "these systems will continue to evolve for hundreds of years" implies, to me, that the systems are changing in a natural way rather than in response to anthrogogenic pressures. I think that saying that the systems will continue to change (instead of evolve) would work better here. [APECS Group Review, Germany]	Accepted: Sentence has been rephrased.
19298	1	9	44	9	44	Delete the 'also' before "change very slowly", since you already have "This also implies" in the beginning of this sentence. [Michelle A. North, South Africa]	Accepted: rephrased
21148	1	9	44	9	44	the phrase "making many of the changes essentially irreversible on the timescale of humans" is incorrect unless we believe that changes are irreversible before humans die out, which I do not think is the intention. Presumably this means 'in the order of decades'. I think the statement is far more pessimistic than is required. If this were truly the case then there is no reason to take any steps to mitigate emissions to reduce climate impacts. Perhaps what is needed is to reflect that the timescales are sufficiently long that adaptation strategies are needed to "accommodate" changes already set in train. The time scales of response to mitigative actions are indicated by the response of the Earth system to the substantial reduction in ozone-reducing substances. Careful wording is needed here to indicate timescales of effectiveness of options rather than introducing a fateful perspective that eliminates options. [Andrew Constable, Australia]	Accepted: Sentence has been rephrased and made more specific
5184	1	9	45	9	45	"timescale of humans" seems an odd and imprecise formulation as it could be taken to mean the lifetime of a single human or to imply human existence on earth, tens or hundreds of thousands of years. Clarify? [Pauline Midgley, Germany]	Accepted: Sentence has been rephrased and made more specific
2278	1	9	47	9	51	Additional citations to elaborate on the point of the cascading hazards. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Cai Y., et al. (2016) Risk of multiple interacting tipping points should encourage rapid CO2 emission reduction, NATURE CLIMATE CHANGE 6:520–525; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Kristin Campbell, USA]	Noted:
2404	1	9	47	9	51	Additional citations to elaborate on the point of the cascading hazards. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Cai Y., et al. (2016) Risk of multiple interacting tipping points should encourage rapid CO2 emission reduction, NATURE CLIMATE CHANGE 6:520–525; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Durwood Zaelke, USA]	Noted: identical comment to 662

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12902	1	9	47	9	51	Additional citations to elaborate on the point of the cascading hazards. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Cai Y., et al. (2016) Risk of multiple interacting tipping points should encourage rapid CO2 emission reduction, NATURE CLIMATE CHANGE 6:520–525; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Gabrielle Dreyfus, USA]	Noted: identical comment to 662
17706	1	9	47	9	53	Please support this message with observed events, where available [Hessel Voortman, Netherlands]	Noted: partially done
21150	1	9	47			this paragraph needs to be made clearer. Care is needed in walking the reader through the figure. In the first line, what is the threshold that is being responded to and what is undertaking a response? The figure does not make this clear either. For example, it may be clearer to say "The response of oceans and cryosphere, or their constituent components, to changes in forcing variables, such as atmospheric temperature, may be rapid once critical thresholds of the forcing variables are reached. These thresholds are often referred to as tipping points, even though the characteristics of thresholds and the relationships of a response variable to those forcing variables may differ for different physical, chemical or biological parts of these systems. see figure..." In addition, there needs to be some good references added to this statement, that it is a hallmark of oceans and cryosphere. I do not see it as a hallmark as all other Earthly systems have the same theoretical attributes. This is a theoretical/abstract paragraph. (as a side note, a simple linear relationship does not have a tipping point. In theory, a tipping point is one when a new stable state arises and it is difficult to return to the previous stable state - hysteresis. The term 'tipping point' is often misused in place of the term 'threshold'. A threshold can be more easily related to a critical level, which is determined to be critical for a variety of reasons (including human rationale). Such a threshold may be defined according to an inflexion point of a logistic, but this is still a smooth continuous relationship between the response variable and the forcing variable and therefore is not strictly a tipping point). [Andrew Constable, Australia]	Accepted: the whole section was thoroughly revised and the connection to the figure improved.
2912	1	9	48	9	51	See also R. E. Kopp, R. Shwom, G. Wagner, and J. Yuan (2016). Tipping elements and climate-economic shocks: Pathways toward integrated assessment. Earth's Future 4, 346-372. doi:10.1002/2016EF000362. and R. E. Kopp, D. R. Easterling, T. Hall, K. Hayhoe, R. Horton, K. E. Kunkel, and A. N. LeGrande (2017). "Potential surprises – compound extremes and tipping elements". In: Climate Science Special Report: Fourth National Climate Assessment, Volume I. Ed. by D. J. Wuebbles, D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock. Washington, DC, USA: U.S. Global Change Research Program. Chap. 15, pp. 411–429. doi: 10.7930/J0GB227J. for more recent reviews on tipping elements. [Robert Kopp, USA]	Noted.

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6358	1	9	48	9	51	The sentence "Critical tipping elements can potentially create rapid and abrupt changes" is a bit vague. What are the "elements" referred to here? [François Massonnet, Belgium]	Noted: They refer to the preceeding sentence
6584	1	9	48	9	49	Change to "Critical tipping points…" both to be consistent with the terms used in Figure 1.1a, and because "tipping point" is a more commonly-used term than "tipping element". [APECS Group Review, Germany]	Rejected: The defining paper in this field, i.e., Lenton et al. 2008, specifically introduced the term "tipping element" to describe large-scale components of the Earth system that may pass a tipping point.
23552	1	9	48	9	51	consider briefly explaining “tipping element” [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: defined in the preceeding sentence
3698	1	9	49	1	49	A substantial number of publications have shown that sea ice is not a tipping element (e.g., Notz, PNAS, 2009; Tietsche et al., GRL, 2011, Wagner and Eisenman, J. Clim., 2015). Also see chapter 3, page 21, lines 25-26 [Dirk Notz, Germany]	Rejected: We recognize the opinion of this reviewer, but there are several other authors, who continue to consider Arctic Sea-ice as a tipping element (e.g. Drijfhout et al., (2015) 10.1073/pnas.1511451112. And since (summer) sea-ice has been included in the list from the very beginning, and since the list here is meant for illustrative purposes, we decided to keep this example in.
36	1	9	50	9	51	The possible collapse of the West Antarctic Ice Sheet would be a more pertinent example than thermally controlled glacier surges, I would say. Please replace. [Daniel Farinotti, Switzerland]	Rejected: The authors wanted to keep the list short and felt that the given example illustrates the concept well.
4038	1	9	50	9	50	Minor typo. Suggest deleting the word "a" from the text "….or the onset of a rapid ice-surges…" [Phil Watson, Australia]	Noted and implemented
12302	1	9	50			"a rapid ice-surges", remove either "a" or make surges singular. [Eric Wolff, UK]	Noted and implemented
14148	1	9	50			…onset of rapid ice surges… (no 'a' needed before rapid, no hyphen needed in ice surges) [Christopher Fogwill, UK]	Noted and implemented
21322	1	9	50	9	50	delete "a" in "or the onset of a rapid ice-surges" [Philippus Wester, Nepal]	Noted and implemented
1762	1	9	51	9	51	Suggest adding a refefernce MacAyeal, D. R. (1993), Binge/purge oscillations of the Laurentide Ice Sheet as a cause of the North Atlantic's Heinrich events, Paleoceanography, 8(6), 775–784, doi: 10.1029/93PA02200. [Olga Sergienko, USA]	Rejected. A good reference but not needed.
2806	1	9	51	9	53	Seems odd not to mention at least the atmosphere and may be others in the link between Ocean and Cryosphere [Anne Guillaume, France]	Rejected: unclear comment
12468	1	9	51	9	51	Lenton et al 2008 ref is dated. Lots of recent research on sea ice and CC needs to be cited - see recent 2018 papers in Nature Climate Change [James Ford, Canada]	Rejected: Granted, but the authors wanted to give credit here to the first paper that introduced this teminology
17676	1	9	51			this suggest that glaciers surge (only) if their bed thaws, which is not true and a bit simplistic even for cases where it applies [Andreas Kääb, Norway]	Accepted: sentence has been reformulated
23258	1	9	51	10	53	Editorial. What does the "system" refer to? It appears from the text it refers to Earth. [Y. Jeffrey Yang, USA]	Noted: Earth system
2914	1	9	55	10	9	This paragraph seems to confused variability and change. Variability usually does not encompass trends, but these are incorporated in the "forced variability" described here. [Robert Kopp, USA]	Accepted: paragraph has been reformulated
6362	1	9	55	10	9	This introduction chapter is very weak on the "physical feedback" aspect of oceans and cryosphere. These feedbacks are essential ingredients of very powerful positive and negative feedbacks, but this aspect is only touched superficially. They would deserve a full paragraph like the ones given to the tipping points or to forced/unforced variability. Indeed, understanding [François Massonnet, Belgium]	Rejected: The authors did not recognize the need to emphasize one type of feedback over another one.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6586	1	9	55	10	16	The definitions and explanations in these two paragraphs are necessary to understand the preceding two paragraphs (page 9, lines 38 to 53). I recommend moving these two paragraph to the start of section 1.3.1. [APECS Group Review, Germany]	Rejected: Was considered, but decided against.
19300	1	9	55	10	9	Consider moving this paragraph earlier in this section as an explanation of the 'forcing' term referred to in line 42. [Michelle A. North, South Africa]	Accepted: paragraph has been reformulated
566	1	10	0			After "require consideraion." add "Similar trade-offs are required for restoration and mitigation options and amongst them all." [William Clarke, Australia]	Rejected: the entire section has been reformulated.
2808	1	10	1			« Unforced », please replace by « natural » in all this paragraph, and this all chapter [Anne Guillaume, France]	Accepted: The terminology has been made more consistent.
6360	1	10	1	10	2	The use of terms "natural", "internal", and "unforced" is a bit confusing here. It would be good once for all to define how the terms relate to each other, or to point to a reference. In a Venn-diagram sense, I would see a big set named "Climate Variability". This set contains two subsets named "Natural Variability" and "Internal Variability", respectively. From what I understand here, unforced variability = intersection of natural and internal. [François Massonnet, Belgium]	Accepted: The terminology has been made more consistent.
21262	1	10	1	10	9	The term unforced variability, I would expecta that any natural change or variability is forced by the change in certain natural processes in a normal fashion; so this change will still be forced but not as a result of climate change so please refrase [Alejandro Souza, Mexico]	Accepted: The terminology has been made more consistent.
22920	1	10	1	10	1	consider changing "can also force" to "are maior climate forces on longer scales" [Vasily Smolyanitsky, Russian Federation]	Taken into account: A substantial figure caption was added.The text has been thoroughly revised.
2810	1	10	7	10	9	« Marine heat waves », give a word of explanation and/or a reference, avoid the « can » in « can change much faster » and again give a reference. [Anne Guillaume, France]	Accepted: reformulated
5186	1	10	7	10	7	shouldn't "lay" be "lie" [Pauline Midgley, Germany]	Noted: changed
12086	1	10	7	10	7	lay/lie mixed up. Replace with "lie" [Sarah Cooley, USA]	Noted: changed
19302	1	10	7	10	7	The past tense of the term 'lay' in "…lay well outside the normal variability…" isn't appropriate. Consider rather the present tense: "Extreme events… lie well outside the normal variability…" [Michelle A. North, South Africa]	Noted: changed
23554	1	10	7	10	7	"lie", not "lay" [Hans-Otto Poertner and WGII TSU, Germany]	Noted: changed
1238	1	10	11	10	11	Why are we suddenly discussing attribution? The paragraph relates to the panels in Fig. 1 but there needs to be some context provided in the text. [Ross Brown, Canada]	Taken into account: the text has been thoroughly revised and also made more consistent with the figure
1562	1	10	11	10	16	It is really surprising to see that this reference to the issues of detection and attribution restricts itself only to the attribution of climate change to anthropogenic greenhouse gas emissions. Clearly the authors need to learn the basics about impact attribution, e.g. by reading chapter 18 of IPCC AR5 WG2 and the related literature. This is necessary for a Special Report which largely focuses on impacts and vulnerabilities, rather than atmospheric change. [Wolfgang Cramer, France]	Accepted: The terminology has been widened.
2812	1	10	11	10	16	« Scenarios » has not yet been defined, and the statements here are based on models, « model » should appear somewhere and be defined there or before. [Anne Guillaume, France]	Rejected: Defined in the glossary
6098	1	10	11	10	16	in the discussion of attribution not mention of models is made. I think it is worthwhile to mention that models are essential to detection attribution science. The use of simulations is eluded to in the figure but not in the text. [Patrick Taylor, USA]	Accepted: the methodology has been more thoroughly described

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18182	1	10	11	10	11	"detected change in oceans and cryosphere". [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
4700	1	10	12	10	14	"...ecosystems to ABSORB or recover from perturbations... [Manuel Barange, Italy]	Rejected: due to the extensive revision, this is not longer applicable
11490	1	10	18	10	22	Another example of wider implication, namely fisheries - could be considered e.g. Sumaila, Cheung, Lam et al (2011) [Taehyun Park, Republic of Korea]	Noted: this section was deleted in the chapter revisions
12304	1	10	18			"to adapt to..." [Eric Wolff, UK]	Rejected: due to the extensive revision, this is not longer applicable
12470	1	10	18	10	30	Very few refs cited in this section belie a lot of work that has been conducted. See AMAP AACA assessments for relevant references and overarching findings relevant here. Watt-Cloutier et al is interesting but can't stand on its own as a sole reference here. [James Ford, Canada]	Rejected: due to the extensive revision, this is not longer applicable
21154	1	10	18			I recommend this paragraph also countenance the cost of not being able to adapt, as well as the potential to mitigate/minimise negative effects without any adaptation or benefit. How can the risks of failure to adapt also be included in these calculations. [Andrew Constable, Australia]	Rejected: due to the extensive revision, this is not longer applicable
1564	1	10	19	10	19	“these complex system characteristics” - the use of “this” or “these” almost always leads to confusion. Here it is completely unclear what “these” refers to. [Wolfgang Cramer, France]	Rejected: due to the extensive revision, this is not longer applicable
4040	1	10	19	10	19	Suggest adding to the end of the sentence “….complex system characteristics”….the text “and modern legal systems governing land tenures.” This is important because the certainty created over land tenures along the coast vested in perpetuity, hinders our capacity to avert risk associated with coastal processes and sea level rise through surrendering vulnerable land and relocating. [Phil Watson, Australia]	Rejected: due to the extensive revision, this is not longer applicable
6036	1	10	19	10	22	Need to clarify here WHO you're talking about re. access to seasonal hunting grounds. Is it access for marine mammals who hunt (i.e. polar bears hunting seals) or access for people who are hunting marine mammals. The issue of access applies in both cases and it would be good to indicate this. [Joanna Petrasek Macdonald, Canada]	Rejected: due to the extensive revision, this is not longer applicable
18184	1	10	21	10	21	Please add a reference here [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
22550	1	10	21	10	22	Unclear sentence - access to seasonal hunting grounds for whom? Marine mammals (polar bears) also hunt marine mammals (seals). Please clarify what is meant here. Since food security is mentioned afterward, I assume that the unsafe conditions for Arctic Indigenous Peoples are meant, but this should be made more clear. [Eva Kruemmel, Canada]	Rejected: due to the extensive revision, this is not longer applicable
2916	1	10	22	10	22	"Tipipng points" is a trendy term that is often used (as here) without a clear definition. For a discussion of various definitions and their associated problems, see R. E. Kopp, R. Shwom, G. Wagner, and J. Yuan (2016). Tipping elements and climate-economic shocks: Pathways toward integrated assessment. Earth’s Future 4, 346-372. doi:10.1002/2016EF000362 [Robert Kopp, USA]	Rejected: The authors agree that the expression "tipping point/element" is not very well defined, and that there are differing opinions. It is defined in the glossary, and thus do not require a further discussion here (especially given the tight space constraints)
5188	1	10	22	10	22	loss of ice thickness is a significant change but is it a tipping point? ref IPCC AR5 SYR Glossary, what happens when the drivers of change are abated? [Pauline Midgley, Germany]	Rejected: due to the extensive revision, this is not longer applicable

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18186	1	10	22	10	22	Watt-Cloutier is not a peer-reviewed/authorative reference; please provide other references or check with Chapter 3. [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
18578	1	10	22	10	22	refers to incremental loss of ice thickness as a tipping point. I think remove the workd tipping point. It is a response, sure, but it has not been shown that this is a threshold and irreversible. The term tipping point is being overused to refer to any relatively senitive response. Just because something changes does NOT mean it is a tipping point. [Alan Mix, USA]	Rejected: due to the extensive revision, this is not longer applicable
1566	1	10	24	10	30	The statements in these lines from “Failure to make” to the end seem to be poorly supported by scientific studies to me. I think this whole statement needs fundamental reconsideration. It could probably also be deleted. [Wolfgang Cramer, France]	Rejected: due to the extensive revision, this is not longer applicable
2814	1	10	24	10	30	Not mentioning any positive impact plays against the objectivity of the whole report. Some people in some countries may benefit. Example , England to grow Champagne, Greenland may be to become independent from Denmark, North Sea harbors getting closer to Chinese and Japanese Harbors through the North Pole……These people should be named as well as the looser. [Anne Guillaume, France]	Rejected: due to the extensive revision, this is not longer applicable
17216	1	10	24	6	26	…loss of…property' -- the word propery in this context is too limiting. The sentiment should be more widely along the line of traditional livelihoods. [Iulian Florin Vladu, Germany]	Rejected: due to the extensive revision, this is not longer applicable
20928	1	10	24			uncertainty is not only about when and how intensively, but also where - see spatial distribution addressed in sections 1.4.2.3 and 1.4.3.3 [Christophe Cudennec, France]	Rejected: due to the extensive revision, this is not longer applicable
18188	1	10	25	10	25	Please replace "to deal with" with "to adapt to". [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
12088	1	10	26	10	28	Confusingly worded… seems like a modifier is missing. Also, in line 28, "subsequent chapters" to what? [Sarah Cooley, USA]	Rejected: due to the extensive revision, this is not longer applicable
18190	1	10	26	10	26	Please add reference to Chpater 4 and Chapter 6, after "in loss of life and property". [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
18192	1	10	26	10	26	"background of uncertainty": please explain which uncertainty is meant here, unclear. [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
5210	1	10	28	10	28	here and on p. 22, line 11 & p. 24, line 26, following IPCC house style to use British English, this should be "programmes" not "programs" [Pauline Midgley, Germany]	Rejected: due to the extensive revision, this is not longer applicable
17214	1	10	28	10	28	Against this background of uncertainty, large capital investments in adaptation for tipping point changes that are less imminent than expected may erroneously appear fiscally wasteful and undermine popular and necessary support for the programs [Iulian Florin Vladu, Germany]	Rejected: due to the extensive revision, this is not longer applicable
18194	1	10	28	10	30	Unclear sentence, please rephrase. [Laurens Bouwer, Netherlands]	Rejected: due to the extensive revision, this is not longer applicable
244	1	11	0			Figure 1.1 (a) the blue line is also non-linear, a different nonlinearity shape compared to the green line. Why green is characterized non-linear ad not the blue? [Bilal Ayyub, USA]	Rejected: The blue is the solution of the response of a linear system with a response time scale that is significantly longer than the timescale given by the increase in the forcing, i.e., this is a typical delay curve of a linear system.
568	1	11	0			In graphic b, should not the time of emergence be when the red line passes beyond the variability envelope? [William Clarke, Australia]	Accepted:
570	1	11	0			In graphic c, the feedbacks can also jump over one or more other stages [William Clarke, Australia]	Rejected: Comment was considered, but rejected, as this would have made the graphic too complex.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
3966	1	11	0			Expand caption of figure 1.1 so it can be understood without the text [Helene Hewitt, UK]	Accepted: The caption has been substantially expanded.
6590	1	11	0	11		re: Figure 1.1: This figure is an excellent illustration of some key concepts that must be clearly defined and laid out to aid the reader's understanding of the report. Adding clear definitions in the text for "mitigation" and "tipping point" would be helpful as well. [APECS Group Review, Germany]	Accepted: The caption has been substantially expanded.
18610	1	11	0	11		Figure 1.1: it shouls be emphasized that climate variability might change in response to anthropogenic forcings. Several studies suggest that climate change might impact NAO/AO Besides, recent sutdies suggest that this could be the case for ENSO. This is also what SREX documents about extreme in response to climate change (shift in the mean and flattening of the distribution tails). As it is, panel b) is oversimplified. [Roland Seferian, France]	Rejected: Although this is a good point, it would stretch this figure too far out if this was also considered.
22944	1	11	0	12		section 1.3.2.1 this whole paragraphy seems very focussed on pH and ignores the carbon sink service that the oceans provide. It doesn't mention the ocean carbon sink which has been increasing over the last decade. this sink helps to reduce atmospheric concentrations (with implications on ocean carboante chemistry and pH), but this sink is also highly variable and not well characterised in some oceanic regions and periods. The oceans capability to act as a CO2 sink also decreases as pH lowers (so is a projected change). Suggest you extend the sentences on lines 4-5 to capture this. e.g. Watson et al.,Science, 2009 http://science.sciencemag.org/content/326/5958/1391 . [Jamie Shutler, UK]	Rejected: The role of the ocean as a carbon sink is given substantial space in various places throughout the chapter.
23146	1	11	0	11		Figure 1.1 is very edifying. [Aimé Fournier, USA]	Noted
23260	1	11	0			Figure 1.1 appears to be an illustrative diagram on the concepts. If so, the nature and scientific basis should be clearly stated in the text (Section 1.3.1) and in the figure caption. Also are the line plots in Figure 1.1a), d) based on real data or just for illustration? References should be cited if they are real data. [Y. Jeffrey Yang, USA]	Accepted: the text has been thoroughly revised and also made more consistent with the figure. The "data" are randomly generated.
166	1	11	1	11	11	Authors write "ocean acidity is increasing". This is misleading. Most parts of the ocean are still within the 8.0-8.1 pH range, therefore are slightly alkaline (not acid). The correct term to be used here is therefore "less alkaline", or "more neutral". [Sebastian Luening, Portugal]	Rejected. The text is correct. Ocean acidity refers to the proton concentration which is indeed increased as CO2 is absorbed. It does not mean that the ocean is acidic (pH<7).
1568	1	11	1	11	1	Fig. 1.1 c: these simplified diagrams often ask more questions than they resolve. Clearly, the big question is what the actual content of "forcings" is meant to be. Clearly the main REAL forcing are the "human systems changes", these are only to a lesser degree involved through mitigation. As an additional point, the figure remains completely silent on the question of what the actually impacted systems are – and if these are made explicit, then the unavoidable follow-up question will be how the concept distinguishes between climate-change driven impacts and other changes in impacted systems (the problem left out of the text on page 1O, lines 11-16). [Wolfgang Cramer, France]	Rejected. Although the reviewer makes a good point here, one of the many purpose of an illustration is to illustrate the essence, which requires a certain amount of simplification. The authors decided to keep this level of abstraction.
1570	1	11	1	11	1	Fig. 1.1 D this is a nice theoretical diagram, but it has little practical relevance since the actually impacted systems are not considered. [Wolfgang Cramer, France]	Rejected: not necessarily. The system state can include the state of an impacted system.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2816	1	11	1	11	4	This Figure is so important to the understanding of key IPCC concepts that it should be divide in four figures, each one with its own text. Example Fig 1.b) could be better used to explain how « time of emergence » depends on the alert level (likely, very likely, etc….) just by adding dates on the time line and explaining it in a text. [Anne Guillaume, France]	Rejected: Due to space constraints
11128	1	11	1	11	4	Figure 1.1 indicates the key concept of this report. But I think this figure is difficult to understand the general concept to policy maker. I hope that it is needed to revise the understandable figure. [Inseong Han, Republic of Korea]	Rejected: Conflcting statements.
13118	1	11	1	11	1	I would suggest to change "linear, in sync" in Fig. 1.1a to "linear, synchronized with forcing" [Baerbel Hoenisch, USA]	Accepted: change included
18506	1	11	1	11	1	Somewhere in this chapter, a clear definition/description of what the authors understand under "forcings" needs to be included. This might be clear to climate scientists, but does have different meanings in different contexts. If used without explanation as in Figure 1.1, it makes the figure ambiguous. [Angelika Renner, Norway]	Accepted: The text has been thoroughly revised.
18580	1	11	1	11	4	top left panel in Fig. 1.1 is not a perfect example of a tipping point, more like nonlinear response to forcing. It would be stronger if the forcing returned to the low state and the response stayed high, illustrating irreversibility, and that would be akin to the long-term (multimillennial) response to GHG -- which will eventually come back down but (for example) the ice sheets might not return. [Alan Mix, USA]	Accepted: Panel a has been expanded to include the aspect of irreversibility
19304	1	11	1	11	1	Figure 1.1a heading: Dynamic response of systems, not dynamical [Michelle A. North, South Africa]	Accepted
19312	1	11	1	11	1	Figure 1.1b Centre "Reference period" within the arrow indicating that period on the x-axis [Michelle A. North, South Africa]	Accepted
23556	1	11	1	11	4	Figure 1.1c could be turned by 90° for improved legibility [Hans-Otto Poertner and WGII TSU, Germany]	Rejected: This was considered by the authors, but rejected in the end. The horizontal arrangement avoid s the implication of hierarchy.
38	1	11	3	11	4	The figure is not self-explaining. A more elaborated caption would help. [Daniel Farinotti, Switzerland]	Accepted: A substantial figure caption was added.
1240	1	11	3	11	4	Fig 1b shows nothing about changes in extremes… it needs to show another PDF for the future period.Figs 1b and 1d are showing similar concepts. [Ross Brown, Canada]	Rejected: A good point, but beyond the scope of this figure.
2918	1	11	3	11	4	Figure 1.1 is inadequately explained. [Robert Kopp, USA]	Accepted: A substantial figure caption was added.
15358	1	11	3	11	3	This figure is very nice, thank you. I think "reversibility" is a concept that could also be introduced in a graphical way here. [Samuel Morin, France]	Accepted: Panel a was expanded to include this concept
16888	1	11	3	11	4	In the figure, panel C, an additional arrow might be needed, from the box "Physical and Biogeochemical changes" to the box "Human system changes". For example, sea level rise or changes to extremes can have direct impact to human systems. Also, what does the arrow from "Forcing" to "Human Systems changes" signify? Changing air quality? [Markku Rummukainen, Sweden]	Accepted. An additional arrow was added
18454	1	11	3	11	4	Figure 1.1 need to have a lot more explanations in the Figure text. [Anette Jönsson, Sweden]	Accepted: A substantial figure caption was added.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18508	1	11	3	11	4	Figure 1.1: this figure is really hard to understand: in a) how are the two panels connected? What are the different lines? In b) what is the Gauss distribution showing? a), b), d): why are there no arrows on the axes? In c): shouldn't there be an arrow directly from "physical/biogeochemical changes" directly to "human systems changes"? The figure caption is too meagre and not helpful when trying to understand the graphics. [Angelika Renner, Norway]	Accepted: A substantial figure caption was added.
6038	1	11	11	11	12	It is essential to include here that these changes are not only demonstrated through 'scientific progress' but also from knowledge and observations of Arctic Indigenous Peoples which so frequently lacks appropriate recognition. This can be supported by Shari Fox's article 'These are things that are really happening: Inuit perspectives on the evidence and impacts of cliamte change in Nunavut' in the book 'The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change' Edited by Igor Krupnik and Dyanna Jolly. [Joanna Petrasek Macdonald, Canada]	Rejected - This section is based on assessments done in AR5. Ways of knowing, including IK and LK, are addressed in section 1.8.2, 1.8.3 and CCB 3.
6588	1	11	11	11	12	This is a bold statement that anchors the whole section. Add more (and more recent) references. [APECS Group Review, Germany]	Taken into account - The section has been rewriten. New findings since AR5 are assessed in the following chapters.
15360	1	11	11	12	13	This content seems to be a mini assessment, thereby duplicating content to be found in the following chapters. Deleting such paragraphs is a good opportunity to saving space. [Samuel Morin, France]	Taken into account - The section has been rewriten to remove assessments of new findings since AR5, and instead refer to content of the following chapters.
22552	1	11	11	11	12	Arctic Indigenous Peoples have noted this for a long time, as well, unfortunately their knowledge and observations are often not recognized. [Eva Kruemmel, Canada]	Rejected - This section is based on assessments done in AR5. IK and LK are addressed in section 1.8.2, 1.8.3, and CCB 3.
23396	1	11	11	11	13	Could is be made more transparent when the AR5 is referenced to, in contrast to purely scientific (and more recent) references [Inga Koszalka, Germany]	Accepted - The section has been rewriten and the references were revised accordingly.
22938	1	11	12			the phrase 'ocean acidity' is misleading. The oceans are not acidic. This seems a poor phrase to use. the ocean acidifciation community have come under a lot of criticism for phrasing of this. Please check this phrasing with the ocean acidification experts on the lead authors. e.g. N. Gruber and P. Williamson [Jamie Shutler, UK]	Rejected. The text is correct. Ocean acidity refers to the proton concentration which is indeed increased as CO2 is absorbed. It does not mean that the ocean is acidic (pH<7).
2660	1	11	14	11	21	The "desert latitudes" concept is not well explained [Mohammad Javad Zareian, Iran]	Rejected - The section has been rewritten and the term 'desert latitudes' is no longer there.
18510	1	11	15	11	15	There should be a brief review of ocean warming patterns first. [Angelika Renner, Norway]	Taken into account - Text has been revised.
18582	1	11	16	11	16	change "salinity" to "regional distribution of sea-surface salinity". [Alan Mix, USA]	Accepted - text revised.
16172	1	11	17	11	17	cite also AR4 (Bindoff et al., 2007), Durack and Wijffels (2009), AR5 (Rhein et al., 2013). The IPCC chapters contain original comments and syntheses. If this is too many to include, then Rhein et al. (2013) is important to include. [Lynne Talley, USA]	Taken into account - text has been revised and we now refer to AR5 (full report and SPM).
17218	1	11	19	11	19	the reference or meaning from AR4 is missing [Iulian Florin Vladu, Germany]	Rejected - the comment is no longer relevant with the new text.
6364	1	11	20	11	21	I do not understand the part of the sentence: "with the magnitude of change corresponding largely with the magnitude of the cumulative greenhouse gas emissions". Please clarify [François Massonnet, Belgium]	Rejected - the comment is no longer relevant with the new text.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2920	1	11	23	11	26	The range of values for the last century supported by the literature is about 17-20 cm. Notably missing from the citations here are C. C. Hay, E. D. Morrow, R. E. Kopp, and J. X. Mitrovica (2015). Probabilistic reanalysis of 20th century sea-level rise. Nature 517, 481–484. doi:10.1038/nature14093. and Dangendorf, S., Marcos, M., Wöppelmann, G., Conrad, C. P., Frederikse, T., & Riva, R. (2017). Reassessment of 20th century global mean sea level rise. Proceedings of the National Academy of Sciences, 201616007. [Robert Kopp, USA]	Taken into account - We now refer to Chapter 4 for new findings assessed in SROCC. The suggested numbers and references are part of Chapter 4.
14150	1	11	23			comma after '20 cm' [Christopher Fogwill, UK]	Rejected - the comment is no longer relevant with the new text.
19306	1	11	23	11	23	Move "by about 20 cm" to before "in the last 100 years" [Michelle A. North, South Africa]	Rejected - the comment is no longer relevant with the new text.
22940	1	11	23			cm is non ISI unit. [Jamie Shutler, UK]	Agreed, but the text is not part of this section anymore.
19308	1	11	26	11	26	Alter sentence to read: "Continued sea level rise is expected..." [Michelle A. North, South Africa]	Taken into account - the text has been revised.
23398	1	11	26	11	26	Church 2013 is from AR5 and this report is supposed to provide an update since then (see p. 5., line 24). Are the conclusions of Church 2013 corroborated by more recent references? [Inga Koszalka, Germany]	Taken into account - Chapter 4 carries out the assessment of how the scientific literature on sea level rise has developed since AR5, however we can not provide an assessment of this in chapter 1.
168	1	11	27	11	27	The amount of sea-level rise also depends also strongly on the actual value of the CO2 climate sensitivity which is still only poorly known and lies somewhere between 1.5 and 4.5°C warming per CO2 doubling. This dependency has to be stated here, too. [Sebastian Luening, Portugal]	Rejected: The corresponding paragraph has been substantially rewritten, establishing in more detail the various processes governing sea level rise. Thus, it is no longer necessary to add the climate sensitivity.
19310	1	11	27	1	28	Alter sentence to read: "...magnitude of change varies substantially in models of different greenhouse gas emission scenarios and ice sheet dynamics..." [Michelle A. North, South Africa]	Rejected - Text no longer in the section.
2922	1	11	28	12	2	See also Levermann, A., Clark, P. U., Marzeion, B., Milne, G. A., Pollard, D., Radic, V., & Robinson, A. (2013). The multimillennial sea-level commitment of global warming. Proceedings of the National Academy of Sciences, 110(34), 13745-13750. [Robert Kopp, USA]	Taken into account - this is addressed in Chapter 4.
14152	1	11	28			ice-sheet dynamics [Christopher Fogwill, UK]	Rejected - The section has been rewritten and this text does not belong to the section anymore.
21264	1	11	28	12	2	The sentence is too vague [Alejandro Souza, Mexico]	Noted - The section has been rewritten and this text does not belong anymore to the section.
572	1	12	0			"decade 2017 - 2016" makes no sense. Probably should be 2007 - 2016 [William Clarke, Australia]	Accepted - The text has been revised and the time frame has been changed to 1750-2016.
574	1	12	0			After "substantially" add "adversely" [William Clarke, Australia]	Rejected - Thext no longer in the section.
576	1	12	0			Replace "this century" with "the next decade" see https://nsidc.org/arcticseaicenews/charctic-interactive-sea-ice-graph/ [William Clarke, Australia]	Rejected - Text no longer in the section.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
578	1	12	0			After "Marzeion et al., 2018)." add "However, polar and near polar sea ice should be able to be both massively thickened and extended by making use of wind-powered ice thickening and marine-based albedo enhancement technologies now being designed. Such thickening should extend to secure ice grounding in waters up to several hundred meters deep and the cooling and repulsion of warm, surface waters entering polar regions. Such increments may well be able to reverse melting and ice disintegration losses if commenced in time and at scale." [William Clarke, Australia]	rejected - we do not discuss geo-engineering methods in SROCC
12004	1	12	1	12	51	There is a huge gap on the analysis of seaports as 1) major sources of GHG emissions and wastes, 2) interface between land and maritime transport 3) important source of income in many developing countries that can contribute to climate change, and 4) an essential (public) infrastructure facilitating global trade highly vulnerable to climate change. This gap should be fixed. [Louis Mitondo Lubango, Ethiopia]	Rejected - This section refers to ocean and cryosphere changes, as assessed in AR5. This comment is more relevant to chapter 4.
16890	1	12	1	12	2	Would be useful to also note what the estimated rise might be under high-mitigation/moderate GHG emission futures. [Markku Rummukainen, Sweden]	Rejected: The text has been thoroughly revised and the quantitative statements removed. Thus, this comment no longer applies.
18512	1	12	1	12	1	here and at other places in this chapter: unprecise language: "many" meters - how many? "Huge" - what sort of measure is that? [Angelika Renner, Norway]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18584	1	12	1	12	2	for long-term commitments in various emissions scenarios.cite Clark et al. (2016) Consequences of 21st Century Policy for Multi-Millennial Climate and Sea-Level Change, Nature Climate Change, http://dx.doi.org/10.1038/nclimate2923 . Citation to Golledge et al. 2015 was specific to Antarctica, not global. [Alan Mix, USA]	Taken into account - Addressed in Chapter 4.
18824	1	12	1	12	1	many -> several [Frank Pattyn, Belgium]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
19314	1	12	1	12	1	"...estimated to be many meters..." - is there any indication of how many? A range that could be included here that is more specific than 'many'? [Michelle A. North, South Africa]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
666	1	12	3	12	4	Graphs could be explained in more detail, to assist and guide the reader. [Thomas Ackermann, Germany]	Accepted - Caption and text have been revised.
828	1	12	4	12	4	"decade 2017-2016" ????? [Kathiresan Kandasamy, India]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
1572	1	12	4	12	4	“During the decade 2017-2016” - clearly that must be 2007-2016 [Wolfgang Cramer, France]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
2280	1	12	4	12	4	“During the decade 2017-2016…” should be “During the decade 2007–2016…” [Kristin Campbell, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
2406	1	12	4	12	4	“During the decade 2017-2016…” should be “During the decade 2007–2016…” [Durwood Zaelke, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
3274	1	12	4	12	4	2007-2016, I guess [Castor Muñoz Sobrino, Spain]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
3724	1	12	4	12	4	Replace "decade 2017-2016" with "decade 2007-2016" [Serhat Sensoy, Turkey]	Accepted: this was an error, but text has not been retained with extensive revisions to this section

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4042	1	12	4	12	4	Minor typo. Suggest the text “decade 2017-2016,” should be "decade 2007-2016,". [Phil Watson, Australia]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
4704	1	12	4	12	4	decade 2017-2016? [Manuel Barange, Italy]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
5134	1	12	4	12	4	Incorrect dacadal period of "2017-2016" quoted. [Sai Ming Lee, China]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
5190	1	12	4	12	4	presumably the decade should be 2006-2017 [Pauline Midgley, Germany]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
6100	1	12	4	12	4	It appears the decade is denoted incorrectly at "2017-2016". I'm guessing that 2007-2016 is the decade you intended. [Patrick Taylor, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
6366	1	12	4	12	4	"The decade 2017-2016" should be "2007-2016" [François Massonnet, Belgium]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
6592	1	12	4	12	4	“During the decade 2017-2016…” I think the authors meant 2007-2016 here? [APECS Group Review, Germany]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
12364	1	12	4	12	4	"during the decade 2017-2016" [Sylvain Ouillon, France]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
12634	1	12	4	12	4	The sentence "During the decade 2017-2016, the ocean has …" should be "During the decade 2007-2016, the ocean has …" [Alejandro Cearreta, Spain]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
12904	1	12	4	12	4	“During the decade 2017-2016…” should be “During the decade 2007–2016…” [Gabrielle Dreyfus, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
13120	1	12	4	12	4	should this read "2007-2016"? [Baerbel Hoenisch, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
13352	1	12	4			Decade 2007-2016…? [Debra Roberts and Durban Team, South Africa]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
13354	1	12	4	12	4	Check the sentence. It seems something is missing. [Debra Roberts and Durban Team, South Africa]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
15454	1	12	4	12	4	Please revise: "During the decade 2017-2016…" [Hernan Sala, Argentina]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
16368	1	12	4	12	4	"During the decade 2017-2016" Typographical error. Presumably this should read: "During the decade 2007-2016" [Inga Smith, New Zealand]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
16892	1	12	4	12	4	Wrong period (decade of 2017-2016?) [Markku Rummukainen, Sweden]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
17224	1	12	4	12	4	typo in 2017. should be 2007. [Iulian Florin Vladu, Germany]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
18352	1	12	4	12	4	Kindly check the time span for decade: 2017-2016 [Suvadip Neogi, India]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
18456	1	12	4	12	4	I assume it should be 2007-2016 instead of 2017-2016. [Anette Jönsson, Sweden]	Accepted: this was an error, but text has not been retained with extensive revisions to this section

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18612	1	12	4	12	6	The magnitude of the ocean carbon uptake has to be harmonized with chapter 5 (22% here / 30% in chapter 5). The work of GCP tend to provide a quantitative assessment of the global carbon uptake. It is better to clearly indicate its magntitude over the last decades and put the percent with respect of anthropogenic CO2 emissions in bracket. Same suggesttion should be applied to heat uptake as well. [Roland Seferian, France]	Taken into account - the text has been revised with the numbers from AR5. Assessment of new bibliography is done in Chapter 5.
18614	1	12	4	12	13	I think the changes observed on ocean/cryosphere fields should be put upfront here. Many new findings are missing for example deoxygenation, change in costal nutrients supply, heat storage and so on… One manner for doing so could be to restructure this subsection in order to clearly mention (1) what has been observed over the last decades and then (2) indicate how thos changes could be amplified with climate change OR climate mitigation. It is also important to discuss results available from mitigation scenario such as RCP26. [Roland Seferian, France]	Taken into account - the text has been revised. Changes since AR5 are being assessed in the following chapters.
18726	1	12	4	12	4	Replace "During the decade 2017-2016" by "During the decade 2007-2016". [Antoine Pebayle, France]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
19316	1	12	4	12	4	The decade range mentioned here is incorrect, please check and correct (2007-2016, presumably). [Michelle A. North, South Africa]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
19318	1	12	4	12	5	Alter the sentence to read: "During 2007-2016, the ocean absorbed about 22% of global anthropogenic CO2 emissions ()" [Michelle A. North, South Africa]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
20946	1	12	4	12	4	"decade 2017-2016" : You mean: "decade 2007-2016"? [Claudio Richter, Germany]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
20986	1	12	4			I believe 2017 should be 2007 [Adrienne Sutton, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
21266	1	12	4			says 2017-2016 should say 2007 - 2016 [Alejandro Souza, Mexico]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
21324	1	12	4	12	4	Unclear "during the decade 2017-2016", assuming 2007-2016 is meant [Philippus Wester, Nepal]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
22370	1	12	4			2017-2016 is not a decade. Should it be 2007-2016? [Gary Lagerloef, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
22942	1	12	4			22% is different from the value previously stated of 25% [Jamie Shutler, UK]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
23400	1	12	4	12	4	2007 not 2017(!) [Inga Koszalka, Germany]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
23514	1	12	4			should read 2007-2016, not 2017-2016 [Galen Galen Mckinley, USA]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
23558	1	12	4	12	4	"2017-2016" - not a decade, this should read '2007-2016' [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: this was an error, but text has not been retained with extensive revisions to this section
6594	1	12	5	12	9	These lines of text describe the effects of ocean acidification, but don't adequately explain why more acidic oceans result in decreased shellfish and corals. I suggest adding a sentence right after the one ending "…and the saturation state with respect to carbonate minerals decreases (Orr et al. 2005)" that briefly explains that as the saturation state decreases there is less carbonate available to support the growth of shellfish and corals. [APECS Group Review, Germany]	Rejected - Changes after AR5 are being addressed in the following chapters. This is specifically addressed in Chapter 5.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6524	1	12	6	12	9	The "ocean acidification" is a kind of an indicator of a “mass extinction”. I’m not an expert in this field, but I think there is sufficient paleontological evidence to prove that the “ocean acidification” has been an indicator for all the 5 mass extinctions of the history of the earth. [Chamara Rajapakshe, Sri Lanka]	Rejected: The assessment of deep time and mass extinctions is outside the scope of this report
19320	1	12	6	12	6	Alter to read: "…the saturation state of carbonate minerals…" [Michelle A. North, South Africa]	Rejected - Revision is no longer relevant with the new text.
4706	1	12	7	12	7	"…is expected to POTENTIALLY affect marine ecosystems SUBSTANTIALLY, with POSSIBLE consequences on ecosystem…" The impacts of OA on society are not yet demonstrated, and those on ecosystems remain contentious (although clear at spp and trait level) [Manuel Barange, Italy]	Rejected - Revision is no longer relevant with the new text.
18514	1	12	7	12	8	what are ecosystem services and societies? Need to be introduced first. [Angelika Renner, Norway]	Rejected - Revision is no longer relevant with the new text.
19322	1	12	7	12	8	Alter to read: " …with consequences for ecosystem services and societies, since organisms (like corals) that build structures out of carbonates…" [Michelle A. North, South Africa]	Rejected - Revision is no longer relevant with the new text.
23560	1	12	7	12	7	‘is expected to affect’, or already ‘is affecting’? This statement could be rephrased for clarity, e.g. ‘Ocean acidification is already affecting ecosystems, and further change is expected to have consequences on …..’ [Hans-Otto Poertner and WGII TSU, Germany]	Rejected - Revision is no longer relevant with the new text.
6596	1	12	9	12	13	Has this changed? Can any of these changes be more definitively tied to anthropogenic effects now, as compared to when AR5 was written? [APECS Group Review, Germany]	Rejected - Revision is no longer relevant with the new text. the new literature since AR5 is addressed in chapter 5.
19324	1	12	9	12	12	Alter to read: "Many other oceanic changes that were difficult to attribute to anthropogenic activities during AR5 may still emerge, including changes in ocean circulation… decreases in the ocean's oxygen content (Keeling et al…), and…" [Michelle A. North, South Africa]	Rejected - Revision is no longer relevant with the new text.
5194	1	12	11	12	11	capitalise Atlantic Meridional Overturning Circulation for consistency? [Pauline Midgley, Germany]	Taken into account - Text does not belong to this section enymore, but the suggestion has been applied for the full chapter.
18586	1	12	12	12	13	In deoxygenation, cite Deutsch et al., 2014, Science 345, 665-668 that showed contraction of OMZ in the Pacific in response to winds, For Atlantic Meridional Overturning and potentialfor collapse, better summary reference is Bakker, P.et al. (2016)Fate of the Atlantic Meridional Overturning Circulation - Strong decline under continued warming and Greenland melting Geophysical Research Letters, 43(23), 12,252-12,260, doi:10.1002/2016GL070457 [Alan Mix, USA]	Taken into account - This will be addressed in Chapters 5 and 6.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6102	1	12	15	12	18	Another reference that I would like to brign to you attention is Taylor et al. (2017). The U.S. the USGCRP put together an assessment report generally focused on the U.S. but global changes. Chapter 11 in particular updates many of the cryosphere changes from Vaughan et al. 2013). In addition Chapter 12 discusses sea level rise. The entire report can be found at science2017.globalchange.gov ref for Chapter 11: Taylor, P.C., W. Maslowski, J. Perlwitz, and D.J. Wuebbles, 2017: Arctic changes and their effects on Alaska and the rest of the United States. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 303-332, doi: 10.7930/J00863GK. [Patrick Taylor, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12472	1	12	15	12	29	notable is that this section doesn't cite any studies drawing upon Indigenous knowledge - this woud give a more complete picture of changes taking place than just citing physical science refs alone. Some of the refs here are also quite dated and a lot of more recent work is overlooked [James Ford, Canada]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
1242	1	12	17	12	19	Arctic sea ice and snow cover are declining (SWIPA, 2017). [Ross Brown, Canada]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
15362	1	12	17	12	51	This content seems to be a mini assessment, thereby duplicating content to be found in the following chapters. Deleting such paragraphs is a good opportunity to saving space. [Samuel Morin, France]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
11788	1	12	18	12	18	*some* Antarctic Ice Shelves are thinning. Add "overall" to end of project [King Matt, Australia]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12306	1	12	18			"some Antarctic ice shelves are thinning" [Eric Wolff, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
1244	1	12	19	12	19	The 2017 SWIPA assessment of GIS mass balance trends would be a better reference (Box and Sharp, Chapter 6 in SWIPA 2017). [Ross Brown, Canada]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2282	1	12	21	12	29	Thinning sea ice has led to less multi-year ice that is more susceptible to break-up and melt. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Perovich D., et al. (2017) Sea Ice, in ARCTIC REPORT CARD 2017; Duarte C. M., et al. (2012) Abrupt climate change in the Arctic, NATURE CLIMATE CHANGE 2:60–62.) [Kristin Campbell, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2284	1	12	21	12	29	1-in-3 chance of ice free in September with 2ºC of warming; 1-in-40 chance of ice free in September with 1.5ºC of warming. (Sanderson B. M., et al. (2017) Community climate simulations to assess avoided impacts in 1.5 and 2 ºC futures, EARTH SYSTEM DYNAMICS 8:827–847; Screen J. A. & Williamson D. (2017) Ice-free Arctic at 1.5ºC?, NATURE CLIMATE CHANGE 7:230–231; Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413, 409.) [Kristin Campbell, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2286	1	12	21	12	29	Ice-free Arctic likely to be a one-off event for 1.5ºC of warming but a recurring event with 2ºC of warming. (Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413.) [Kristin Campbell, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2288	1	12	21	12	29	Even if not ice-free, the Arctic is likely to have sea-ice measurements below the record minimum that was set in September 2012. (Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413.) [Kristin Campbell, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2408	1	12	21	12	29	Thinning sea ice has led to less multi-year ice that is more susceptible to break-up and melt. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Perovich D., et al. (2017) Sea Ice, in ARCTIC REPORT CARD 2017; Duarte C. M., et al. (2012) Abrupt climate change in the Arctic, NATURE CLIMATE CHANGE 2:60–62.) [Durwood Zaelke, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2410	1	12	21	12	29	1-in-3 chance of ice free in September with 2ºC of warming; 1-in-40 chance of ice free in September with 1.5ºC of warming. (Sanderson B. M., et al. (2017) Community climate simulations to assess avoided impacts in 1.5 and 2 ºC futures, EARTH SYSTEM DYNAMICS 8:827–847; Screen J. A. & Williamson D. (2017) Ice-free Arctic at 1.5ºC?, NATURE CLIMATE CHANGE 7:230–231; Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413, 409.) [Durwood Zaelke, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2412	1	12	21	12	29	Ice-free Arctic likely to be a one-off event for 1.5ºC of warming but a recurring event with 2ºC of warming. (Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413.) [Durwood Zaelke, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2414	1	12	21	12	29	Even if not ice-free, the Arctic is likely to have sea-ice measurements below the record minimum that was set in September 2012. (Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413.) [Durwood Zaelke, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6368	1	12	21	12	21	"sea-ice" should be "sea ice" since it is a noun here. [François Massonnet, Belgium]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
10656	1	12	21	12	29	The statement about Declines in Antarctic sea ice are not yet detectable outside of the large range of Antarctic sea ice variability contradicts to the satement above One of the most visible changes in Earth's cryosphere is the decline in Arctic sea-ice and many publications about observed trends of the sea ice decline. Need to be rephrased [Oxana Lipka, Russian Federation]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12308	1	12	21			"sea ice" or "sea-ice", need to decide globally. I know there is an argument for hyphenating when another noun follows but that is not the case here and you do this inconsistently in the following para [Eric Wolff, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12906	1	12	21	12	29	Thinning sea ice has led to less multi-year ice that is more susceptible to break-up and melt. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Perovich D., et al. (2017) Sea Ice, in ARCTIC REPORT CARD 2017; Duarte C. M., et al. (2012) Abrupt climate change in the Arctic, NATURE CLIMATE CHANGE 2:60–62.) [Gabrielle Dreyfus, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12908	1	12	21	12	29	1-in-3 chance of ice free in September with 2ºC of warming; 1-in-40 chance of ice free in September with 1.5ºC of warming. (Sanderson B. M., et al. (2017) Community climate simulations to assess avoided impacts in 1.5 and 2 ºC futures, EARTH SYSTEM DYNAMICS 8:827–847; Screen J. A. & Williamson D. (2017) Ice-free Arctic at 1.5ºC?, NATURE CLIMATE CHANGE 7:230–231; Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413, 409.) [Gabrielle Dreyfus, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12910	1	12	21	12	29	Ice-free Arctic likely to be a one-off event for 1.5ºC of warming but a recurring event with 2ºC of warming. (Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413.) [Gabrielle Dreyfus, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12912	1	12	21	12	29	Even if not ice-free, the Arctic is likely to have sea-ice measurements below the record minimum that was set in September 2012. (Jahn A. (2018) Reduced probability of ice-free summers for 1.5 °C compared to 2 °C warming, NATURE CLIMATE CHANGE 8:409–413.) [Gabrielle Dreyfus, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
14154	1	12	21			no hyphen needed in sea ice [Christopher Fogwill, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
16318	1	12	21	12	21	Please replace the somewhat surprising reference to the paper by Harada (2016) for underpinning the claim of a large-scale decline in Arctic sea ice with a couple of more review-type papers or simply a link to the underlying data set e.g., the Arctic sea-ice index hosted by NSIDC [Dirk Notz, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
24714	1	12	21	12	23	This sentence should be accompanied by many more references to reflect the full effort that has gone into observing, quantifying and understanding Arctic Sea Ice loss. [Elizabeth Weatherhead, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
40	1	12	22	12	22	"in all scenarios" --> What scenarios? The sentence was about observations. [Daniel Farinotti, Switzerland]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2924	1	12	23	12	24	Icefree by the end of the century seems very conservative. By contrast, the US Global Change Research Program's Climate Science Special Report concluded: "Continued sea ice loss is expected across the Arctic, which is very likely to result in late summers becoming nearly ice-free (areal extent less than 106 km2 or approximately 3.9 × 105 mi2) by the 2040s." [Robert Kopp, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6370	1	12	23	12	23	"sea-ice" should be "sea ice" since it is a noun here. [François Massonnet, Belgium]	noted
21268	1	12	23	12	26	This sentence talks about the risks and opportunities of Arctic sea ice loss, I will like to see an explanation of what will be the impact of this on the MOC and in the deep water formation. [Alejandro Souza, Mexico]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
24716	1	12	23	12	24	“Future projections are for Arctic sea-ice to continue..” This sentence requires at least one reference. [Elizabeth Weatherhead, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6598	1	12	24	12	25	Not just in Arctic ecosystems. Positive feedback in climate warming via ocean absorption of incoming radiation due to loss of albedo has large effects in global climate models, with global implications. [APECS Group Review, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6600	1	12	24	12	24	The word I" ice free" shall be written as " ice-free" [APECS Group Review, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
23402	1	12	24	12	24	after “ice free in the summer”: Haine & Martin (2017; https://www.nature.com/articles/s41598-017-04573-0) could be cited here [Inga Koszalka, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
24718	1	12	24	12	26	“This will have dire…” is perhaps a value judgment that is not appropriate in the document. Better to quantify the impacts, such as “will stress Arctic ecosystems, from the primary production that occurs on the ice edge to the survival of larger mammals including seals and polar bears.” Better to stick to the science, than just to declare something as “dire.” [Elizabeth Weatherhead, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6602	1	12	26	12	29	For me, this statement is quiet conroversial as Antarctic se ice is not declining as per our record from satellite data. It would be useful to reconsider correcting this statement to avoid highlighting minor declining trends prodiuced by models. [APECS Group Review, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
17222	1	12	26		26	Why not specify "fossil-fuel reousrces" instead of just the more general "mineral resources"? [Iulian Florin Vladu, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18354	1	12	26	12	29	Kindly demistify: "Declines…..cryosphere system". [Suvadip Neogi, India]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
23404	1	12	26	12	26	Please provide reference for impacts. [Inga Koszalka, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
17708	1	12	27	12	29	From this section it is clear that uncertainties are large and attribution to GHG arguably even more so. The resulting uncertainty is extremely important in a decision-making context and should be communicated clearly and explicity. [Hessel Voortman, Netherlands]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18196	1	12	27	12	27	Please add "sea-ice natural variability". [Laurens Bouwer, Netherlands]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18516	1	12	27	12	27	"not detectable" - mention the recent drastic decrease since 2016, as it is included in Chapter 3? [Angelika Renner, Norway]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18588	1	12	27	12	28	In discussion of natural variability of Antarctic Sea Ice and its importance to natural variability of large-scale climate changes, a useful reference including paleo variability in the spirit of ice-ocean interaction may be: Bakker, P.r (2016) Centennial-scale Holocene climate variations amplified by Antarctic Ice Sheet discharge, Nature, 541, 72–76, doi:10.1038/nature20582. As currently phrased, sections 1.3.2.1 addresses changes in the ocean, and 1.3.2.2. addresses changes in the cryosphere, but there is little discussion of how these things are in some areas linked. This is a difficult point… many "hosing" experiments have been done, but they are often unrealistic and problematic. Is there something useful to be said about freshwater influences on the ocean? [Alan Mix, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
16894	1	12	28	12	29	Wrong reference. [Markku Rummukainen, Sweden]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
16896	1	12	28	12	29	The concept of "deep uncertainty" should be explained here, if it needs to be used at all (might be more useful to explain why it is so uncertain and what it implies. "Deep uncertainty" is probably not a term many are familiar with). The concept could be left for the more nuanced discussion in the cross-chapter box. [Markku Rummukainen, Sweden]	Accepted - details in 1.9.3 and CCB-4
20948	1	12	28	12	28	"may point towards an area of deep uncertainty": place the reference "Cross Chapter Box 4" behind "deep uncertainty", else it may not be clear that "deep uncertainty" is a technical term and cause a conflict in the sentence, between restraint ("may") and emphasis ("deep"), which do not fit together. [Claudio Richter, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2290	1	12	31	12	41	Paleoclimate records have shown that collapse of these ice sheets could lead to 6–9m of SLR with warming of 2ºC (or even less). (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Kristin Campbell, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
2416	1	12	31	12	41	Paleoclimate records have shown that collapse of these ice sheets could lead to 6–9m of SLR with warming of 2ºC (or even less). (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Durwood Zaelke, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12042	1	12	31	12	32	Should state "are all losing mass at observed accelerating rates". This is a dynamic non linear event due to increasing ocean heat content. [Michael Casey, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12914	1	12	31	12	41	Paleoclimate records have shown that collapse of these ice sheets could lead to 6–9m of SLR with warming of 2ºC (or even less). (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Gabrielle Dreyfus, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
14156	1	12	31			Antarctic Peninsula ice Sheet [Christopher Fogwill, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18590	1	12	31	12	41	Note The Imbie Team, Mass balance of the Antarctic Ice Sheet from 1992 to 2017, Nature 558, pages219–222 (2018), for accelerating ice loss from East Antarctica as well as West. [Alan Mix, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
17678	1	12	32			new paper by Shepard et al. out [Andreas Kääb, Norway]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6144	1	12	33	12	33	faster than what? [Regine Hock, USA]	Accepted. text has been revised
14158	1	12	33			...showing an even faster response. [Christopher Fogwill, UK]	Accepted. - text has been revised
14160	1	12	33			Antarcitc ice sheets [Christopher Fogwill, UK]	Accepted.- text has been revised
16898	1	12	33	12	33	The "with new models resulting in even faster response" is cryptic as no baselines (faster than what?) are provided. Delete or develop? [Markku Rummukainen, Sweden]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18198	1	12	33	12	33	Please replace "resulting in" with "indicating an". [Laurens Bouwer, Netherlands]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
20950	1	12	33	12	33	"faster" than what? [Claudio Richter, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
172	1	12	34	12	34	Authors write: "model-based studies suggest the potential for possibly irreversible change". This statement is not backed up by the majority of published studies. In reality, confidence into model results is low because the models still largely fail to replicate the observed climate change in Antarctica of the past decades. See Jones et al. 2016 (DOI: 10.1038/NCLIMATE3103). Most study groups find that current Antarctic climate is still very much within the range of natural variability. This IPCC Special Report needs to respect this and report accordingly. [Sebastian Luening, Portugal]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6604	1	12	35	12	35	I think the entry "AR6" is incorrect here. Should this be changed to "AR5"? [APECS Group Review, Germany]	Accepted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
11074	1	12	35	12	35	It must say “AR5” instead of “AR6” [Lucas Ruiz, Argentina]	Accepted
12366	1	12	35	12	35	"AR6": maybe AR5? [Sylvain Ouillon, France]	Accepted
13356	1	12	35			Since AR5' ? [Debra Roberts and Durban Team, South Africa]	Accepted
13358	1	12	35	12	35	Change 'AR6' to 'AR5' [Debra Roberts and Durban Team, South Africa]	Accepted
14162	1	12	35			Ice Sheet [Christopher Fogwill, UK]	Accepted
14164	1	12	35			AR5 [Christopher Fogwill, UK]	Accepted
17220	1	12	35	12	35	the reference or meaning from AR4 is missing [Iulian Florin Vladu, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18458	1	12	35	12	35	I assume AR6 should be AR5. [Anette Jönsson, Sweden]	Accepted
18518	1	12	35	12	35	There is more recent literature about the irreversible retreat of the WAIS, is also included in Chapter 3. [Angelika Renner, Norway]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
19326	1	12	35	12	35	I think this should be AR5, not AR6 [Michelle A. North, South Africa]	Accepted
21136	1	12	35			"and studies from AR6" you most mean AR5? [Malin Kanth, Sweden]	Accepted
23406	1	12	35	12	35	you mean AR5 not AR6? [Inga Koszalka, Germany]	Accepted
170	1	12	36	12	36	The description of Antarctic ice trends is misleading and misrepresents the findings of most publications. According to the majority of studies, the East Antarctic ice shield is currently growing and is expected to continue growing in the coming decades, partly because of an increase in snowfall, partly because of current cooling. Need to cite Martin-Espanol et al. 2017 (doi 10.1002/2017GL072937), Goel et al. 2017 (doi 10.5194/tc-11-2883-2017), Philippe et al. 2016 (doi 10.5194/tc-10-2501-2016), Zwally et al. 2015 (doi 10.3189/2015JoG15J071). [Sebastian Luening, Portugal]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12310	1	12	37			Until now you have used upper case fir Ice and Sheet in West Antarctic Ice Sheet. But not here. [Eric Wolff, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
14166	1	12	37			Ice Sheet [Christopher Fogwill, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
14168	1	12	39			modeling' not 'modelling' in US English [Christopher Fogwill, UK]	Rejected: IPCC uses UK English

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15456	1	12	39	12	39	Please, consider to reformulate to the following sentence: "Ice shelf retreat along the Antarctic Peninsula is attributed to atmospheric-driven surface melting" In this way: "Ice shelf retreat along the Antarctic Peninsula is attributed to atmospheric-driven surface melting and also to ocean-driven basal melt". Here are some references about ocean-driven basal melt in the Antarctic Peninsula: Depoorter, M. A., Bamber, J. L., Griggs, J. A., Lenaerts, J. T. M., Ligtenberg, S. R., Van den Broeke, M. R., & Moholdt, G. (2013). Calving fluxes and basal melt rates of Antarctic ice shelves. Nature, 502(7469), 89. Luckman, A., Jansen, D., Kulessa, B., King, E., Sammonds, P., & Benn, D. I. (2012). Basal crevasses in Larsen C Ice Shelf and implications for their global abundance. The Cryosphere, 6(1), 113-123. Pritchard, H., Ligtenberg, S. R. M., Fricker, H. A., Vaughan, D. G., Van den Broeke, M. R., & Padman, L. (2012). Antarctic ice-sheet loss driven by basal melting of ice shelves. Nature, 484(7395), 502. McGrath, D., Steffen, K., Scambos, T., Rajaram, H., Casassa, G., & Lagos, J. L. R. (2012). Basal crevasses and associated surface crevassing on the Larsen C ice shelf, Antarctica, and their role in ice-shelf instability. Annals of Glaciology, 53(60), 10-18. [Hernan Sala, Argentina]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
174	1	12	41	12	41	A prognosis until 2100 based on climate models for the Antarctic Peninsula (AP) is made. Authors fail to acknowledge, however, that temperatures on the AP have been decreasing since 1998, a fact that none of the climate models can reproduce. The same (failed) models are being used to predict temperatures and ice melting until the end of the century. A prognosis with extremely low cofidence, which needs to be acknowledged in the text. [Sebastian Luening, Portugal]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
23562	1	12	41	12	41	Possible to quantify "much of Antarctica"? [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
1246	1	12	43	12	44	The statement "Snow cover in the parts [sic] of the Northern Hemisphere has also decreased since the mid-20th century (Robinson, 2016; Hori et al., 2017)" is a bit off target as the Robinson reference relates to the US and the Hori reference to NH snow cover. There are recent publications related to snow cover changes in Polar and Mountain regions e.g. Brown et al. 2017a, Chapter 3 and Marty et al. 2017a, Chapter 2. Hopefully the next iteration will make more use of material in the other chapters to ensure greater consistency in content and messages. [Ross Brown, Canada]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
3276	1	12	43	12	51	These phenomena also can have risks (and may imply serious impacts) in coastal areas with submarine biogas. A well-know example of this may be the case of the Storegga Slide affecting the coasts of Norway at the end ot the last glaciation (Bryn, P. et al. (2005). Marine and Petroleum Geology 22 (2005) 11–19). [Castor Muñoz Sobrino, Spain]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
20952	1	12	43	12	43	The statement "Glaciers are retreating essentially everywhere" is ambiguous and should be re-phrased: A search of the World Glacier Inventory (http://nsidc.org/data/glacier_inventory/query.html) yields 72 glaciers showing a tongue activity "marked advance". [Claudio Richter, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12312	1	12	44			"in parts of" [Eric Wolff, UK]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
15364	1	12	44	12	45	References to NH snow cover decreases are irrelevant, given that it is indicated earlier, that seasonal snow outside polar and high mountain regions are not covered in this report. [Samuel Morin, France]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
20954	1	12	45	12	45	replace "and causes" with "with" [Claudio Richter, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6372	1	12	46	12	47	It should be specified that methane contributes to warming through greennhouse gas effect. [François Massonnet, Belgium]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12552	1	12	48	12	49	Model-based projections suggest that the ice loss from mountain glaciers will continue in future,... [Thomas Vikhamar Schuler, Norway]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
21326	1	12	48	12	51	Red Flag: these two sentences are vaguely worded and need to be much more specific. In which regions are glaciers disappearing completely? Use of "completely" is very strong, consdider qualifying this. Also indicate why melting continues this century even if GHG emmissions completely stop [Philippus Wester, Nepal]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
6146	1	12	49	12	50	complete' mass coss in many regions withn decades is not correct. Many is exaggerated. There are a few regions with little ice cover like Caucasus and central Europe where most, but not all glacier models and/or GCMs project complete disappearance but by far most large-scale regions still have substantial ice cover (see papers by Huss, Marzeion, Bliss, etc) [Regine Hock, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
23564	1	12	49	12	49	Which mountain glaciers may disappear specifically? If all, please say so; if only some, give examples [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
18200	1	12	50	12	50	Further melting; where? Everywhere? Please check reference. [Laurens Bouwer, Netherlands]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
17330	1	12	51	12	51	Suggest helpful to add here (based also on Marzeion 2018 as well as 2012), "Mpdeling indicates however that some glacier systems might be partially preserved under the lowest emissions scenarios especially." [Pamela Pearson, USA]	Taken into account. Text revised extensively. Rather than making an assessment, the SOD frames the issue by summarising information from AR5 SPM.
12044	1	12	54	13		The enormous speed and magnitude of global warming in all RCPs relative to historic precedents in Paloe climate and biological evolution condemn the planet to a prolonged period ofecological instability because climatic zones transition in decades as opposed to thousands of years. The resilience of human society is in peril as the ecology is already fragmented. It is safe to say that ecological niches that open up are transitory in the 21st century almost all of the RCP's. [Michael Casey, Germany]	Accepted. Opportunities now bounded by adding after "opportunities the phrase "in at least the near and medium term"

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6272	1	12	55	13	45	Stressing the impacts on human security and development is imperative. Where positive impacts are relevant, it is important to highlight it, but some evaluation of whether impacts are on balance more negative than positive is important. Increasing risks, especially for more vulnerable communities, demands planning, adaptation and development of resilience strategies. [Melinda Kimble, USA]	Noted
1666	1	12	57	13	1	"Some impacts are direct, such as sea level rise or enhanced erosion displacing coastal residents and potentially entire communities in some low-lying areas… [Lawrence Hamilton, USA]	Noted.
12474	1	13	1	13	3	very little rigorous evdience to support this assertion, especially based on the refs cited. [James Ford, Canada]	Rejected: We disagree that there is little rigorous evidence that the impacts fall disproportionately on the disadvantaged.. The MeLemen and the Otto references are only a small sample of the evidence.
12476	1	13	1	13	9	reliance on the Watt-Cloutier book to make this statement is problematic. See AMAP AACA assessments for more comprehensive articles dealing with this [James Ford, Canada]	Rejected: Our chapter makes a strong case for using Indigenous and local knowledge, and this sentence is about the impacts on Inuit and Northern cultures. Watt-Cloutier, an Inuit and author made an Officer of the Order of Canada in 2006 and as of 2015 had beeed awarded no fewer than 17 Honourary Doctorates. We didnt get on what makes her a "problematic" source?
1668	1	13	3	13	3	add to refs: Marino, E (2015) Fierce Climate, Sacred Ground: An Ethnography of Climate Change in Shishmaref, Alaska. Fairbanks: University of Alaska Press. [Lawrence Hamilton, USA]	Accepted: reference added
6040	1	13	3	13	4	Thawing permafrost and loss of sea ice is impeding much more than hunting grounds. There are many examples of the impacts of thawing permafrost on infrastructure like roads and buildings. Restricted access to stable, safe coastal sea ice also affects livelihoods, food security, and health/well-being. The significance of sea ice and the widespread impacts of thawing permafrost and the loss of sea ice should not be understated. To properly communicate this, please include and cite information from two reports of the Inuit Circumpolar Council that discuss in detail the importance of sea ice for Inuit: 1. The sea ice is our highway 2. The sea ice never stops Both available at http://www.inuitcircumpolar.com/icc-reports.html [Joanna Petrasek Macdonald, Canada]	Accepted. Text revised accordingly.
6606	1	13	3	13	4	It's mentioned here that permafrost loss is impeding access to hunting grounds in the Arctic . This is true, but there are other impacts on local residents as well – for example, damage done to infrastructure (houses, buildings, roads, railways, airports) that is very expensive and also directly impacts the people living there. I think that, since the target audience for this special report is policy-makers, the human costs (both decreased quality of life and increased expenses) should be mentioned. [APECS Group Review, Germany]	addressed in response to comment #6040
10658	1	13	3	13	4	Reindeer herders are missed. Pernafrost melting, landscape transformation and extremal weather events (ice crast on soil) make their traditional lifestile very risky with large losses in reindeer husbandry. Please add information from Terry V. Callaghan and other authors [Oxana Lipka, Russian Federation]	addressed in response to comment #6040

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
11024	1	13	3	13	4	In addition to affecting hunting and livelihoods, these changes are making some settlements uninhabitable, due to coastal erosion following from sea ice loss and sea level rise. Please comment on this "habitability" issue. Here are two references to cite The Tight Dialectic: The Anthropocene and the Capitalist Production of Nature By: Millar, Susan W. S.; Mitchell, Don ANTIPODE Volume: 49 Supplement: S1 Pages: 75-93 Published: JAN 2017…. And Climate displacement in the United States The case of Newtok village, Alaska By: Bronen, Robin LAND SOLUTIONS FOR CLIMATE DISPLACEMENT Book Series: Routledge Studies in Development Displacement and Resettlement Pages: 326-340 Published: 2014 [Ben Orlove, USA]	addressed in response to comment #6040
22554	1	13	3	13	4	As indicated earlier, this is not only a problem with hunting grounds. Apart of the importance of sea ice for Inuit, their building infrastructures are also affected by melting permafrost and sea-level rise, with whole communitites in Alaska having to move. [Eva Kruemmel, Canada]	addressed in response to comment #6040
18520	1	13	4	13	4	not only access to hunting grounds but also simple travel between communities [Angelika Renner, Norway]	addressed in response to comment #6040
16050	1	13	5	13	7	Changes in water temperature, etc. can also affect the path and distance of tropical cylones [Nathan Ross, New Zealand]	Taken into account: we don't elaborate on this, and leave this for the assessment in chapter 6
18202	1	13	5	13	5	Please check the word "likely" here: is it a confidence level? [Laurens Bouwer, Netherlands]	Accepted and rephrased." Change :climate change will cause a likely increase in both maximum" replaced by "Past IPCC assessments have linked climate change to increases in ncrease in both maximum … "
19328	1	13	5	13	5	Alter to read: "…climate change will likely cause an increase in…" [Michelle A. North, South Africa]	Accepted: text revised
19330	1	13	5	13	5	It is not clear what is meant by 'global mean tropical cyclones'. Please reword or explain. [Michelle A. North, South Africa]	Accepted: text revised
16900	1	13	6	13	6	Could refer to the actual Chapter of AR5, rather than the AR5 Technical Summary. [Markku Rummukainen, Sweden]	Accepted: text revised
4570	1	13	7	13	8	Stating that 2017 experienced five category 4 or 5 hurricanes is not an evidence for an increase in the rate or the strenght of extreme events; I know no clear statistically significant indication in teh lierature for a measured effect of the warming on the hurricanes. The economic damages of hurricanes too cannot be simply related to the strength of the hurricanes but is also due to the urbanizationand the modifications of the land. [Jean Poitou, France]	Rejected: Page 13, line 7: For the sentence that starts, "for Example …" , we can expand to "THESE HAZARDS CAN HAVE SERIOUS CONSEQUENCES'; for example …." This makes explicit that the case provided is to illustrate the seriousness of the hazardand necessary illustrate that the specific hurricanes were as strong as they were because of climate change. O(f course it is well kown that one cannot link the occurrence of a single event to the increased likelihood of a category of events, and the initial language did not do so. But the phrasing could possibly read as at least implying as much. and consequently this rephrasing avoids that misreading.
18204	1	13	7	13	9	This hurricane season example is just a random set of extremes; please indicate which impacts can be attributed to anthropgenic climate change: for instance hurricane Harvey rainfall. [Laurens Bouwer, Netherlands]	Noted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6104	1	13	8	12	9	As a note being a U.S. person, the death tolls associated with those 2017 hurricanes is likely dramatically understated. This is a huge issue in the U.S. right now. Specifically, the death toll in Puerto Rico associated with hurricane Maria. The deaths that occurred after the storm due to the lackluster response is thought to have caused many more deaths than 170, potentially in the thousands. The story of hurrican Maria in Puerto Rico aligns nicely, yet sadly, with the point that we much understanding the true hazards in order to mitigate and respond properly. https://www.washingtonpost.com/national/harvard-study-estimates-thousands-died-in-puerto-rico-due-to-hurricane-maria/2018/05/29/1a82503a-6070-11e8-a4a4-c070ef53f315_story.html?utm_term=.46c7a59f09f2 [Patrick Taylor, USA]	Noted .
14170	1	13	8			US$ 150 billion [Christopher Fogwill, UK]	noted
20956	1	13	8	13	8	replace "over 170 lives to be lost" with "the loss of 170 lives" [Claudio Richter, Germany]	noted
15458	1	13	9	13	9	Please, take into account: [REFERENCE TO BE ADDED]. [Hernan Sala, Argentina]	noted
15366	1	13	11	13	14	This material has to be cross-checked with Chapter 2 author team. Iis it the most appropriate/relevant example ? [Samuel Morin, France]	Noted
18592	1	13	11	13	20	do you want to say something about opening of the Arctic to shipping? Northwest Passage? Development of economic opportunities in the Arctic? It is already happening. Eguíluz, V. M., Fernández-Gracia, J., Irigoien, X., & Duarte, C. M. (2016). A quantitative assessment of Arctic shipping in 2010–2014. Scientific reports, 6, 30682. [Alan Mix, USA]	Rejected: Space is limited to incorporate comets
20930	1	13	11	13	13	Yes these are emerging opportunities but will not be sustainable as the melting storage will disappear. See Box 2.5 which present a counter-example - and there are others especially in the Andes. [Christophe Cudennec, France]	Noted
6148	1	13	12	13	12	glaciers not 'ice fields' [Regine Hock, USA]	noted
11076	1	13	12	13	12	The term ice fields is vague it will be worth to use a more specific and meaningful term. Are you reference to snow fields or glaciers or both? [Lucas Ruiz, Argentina]	noted
18912	1	13	13	13	16	I can't agree that redistribution of marine fish is an "opportunities." As the authors themselves mention in this sentence, this process brings not only opportunity of new fisheries but also "hazards" of closing old fiseries. At present it is very difficult to certificate that opportunity is larger than hazrads. I recommend that this process (redistributin of marine fish) should not be treated as a simple example of changes that brings opportunity, but an example that one process brings both opportunity and hazards simultaneously. [Tsuneo Ono, Japan]	Taken into account: we have rephrased to mention that hazards are also associated with changes in fish distribution.
20452	1	13	13	17	51	Refering to the comment above, The POPs introduced by manmade activities will eventually get into the food chain and will impact the biology of the ocean including the animals and humans. As these compounds can be carcinogenic thus leading to risks and impacts perhaps changing the ecological balance of the ocean. Already the impacts of plastics in the ocean are being felt across the world. This will have grave consequences to future marine life sustainability and human reliance on ocean food resources. [Fakhru'L-Razi Ahmadun, Malaysia]	Noted but "the phrase above" could not be located.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
18522	1	13	14	13	15	why not use ocean region instead of continents when talking about fishing?, eg. North Atlantic, North Pacific etc? [Angelika Renner, Norway]	Rejected: The sentence is about the opportunities presented to the fisherpersons, and they are based on the coasts of the contenients, not in the ocean basins,
21270	1	13	14	13	16	In this section the changes the report discuss the cheanges of fisheries and it attibute it to climate change, I will like to know how certain are we that this is due to climate change and not to overfishing. [Alejandro Souza, Mexico]	Noted
19332	1	13	16	13	16	Delete the 'to' before "...avoid or mitigate..." [Michelle A. North, South Africa]	accepted
1574	1	13	23			I would like to make the general comment that I find the entire section 1.4 very well-structured and informative. [Wolfgang Cramer, France]	Noted. Thank you.
2818	1	13	23	14	31	Several notions need to be clearly introduced, tipping point, feedback that amplifies the change (positive feedback) and feedback that curbs it (negative feedback) [Anne Guillaume, France]	Taken into account - covered in Glossary
2850	1	13	23	17	51	This all section 1.4 is a good example of something that need major restructuring and rewriting to put forward what is important and limit the content to what must be in an introductory chapter. A reader is lost between definitions and results that cannot be convincingly explained in few words. I would recommend to cut any result that cannot be easily explained and stick to defining concepts, with adding one example max. This also applies to all the other sections. [Anne Guillaume, France]	Accepted. This section of Chapter 1, as well as other sections in this Cross Chapter Box on Risk have been restructured and revised to minimize definitions and examples.
6374	1	13	23	13	23	In this section on Risks and Impacts, nothing is said on the potential influence of Arctic climate changes on lower-latitude atmospheric circulation changes, though this has been a hotspot of scientific research in the past years (and this is addressed in a later Chapter) [François Massonnet, Belgium]	This text has been removed; however, this comment was taken into account in Chapter 3.
12046	1	13	23	14		The high speed and high magnitude of future climate change relative to previous climate changes the planet under comparable period of time underwent drives the risk. 2c global change is over 20 times faster. 4C global change is well over 50 times faster. How can adaptationwith "dignity" be an option? [Michael Casey, Germany]	Taken into consideration by author team.
13240	1	13	23	17	51	In Figure 1.2, Risk comprises of Vulnerability, Hazard and Exposure. The subsection headings under 1.4.2 Natural Systems and 1.4.3 Human Systems do not reflect these components. Sections 1.4.2.2 and 1.4.3.2 discusses vulnerabilities that icrease risk, however, there is no similar discussion on hazards and exposure that increase risk. [Zelina Zaiton Ibrahim, Malaysia]	Taken into consideration in Chapter 1 -- the text provides clearer reference to these concepts now.
22224	1	13	23	14	27	Should the 3 SR's use the same definitions of risks and impacts as those defined in LAM4 of SR1.5, for consistency? [Debora Ley, Guatemala]	Taken into account in the Glossary.
6042	1	13	27	13	32	Add a reference on adaptation and resilience, such as the Arctic Monitoring and Assessment Programme's (AMAP) Adaptation Actions in a Changing Arctic (AACA) reports, and/or the Arctic Council Arctic Resilience Report. [Joanna Petrasek Macdonald, Canada]	Accepted: This text has been removed, but this comment has been taken into account in CCB1 and Chapter 3.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6280	1	13	27	14	27	I advise being careful with how the word "risk" is used here. The most widespread and accepted definition of the term involves taking the probability that something bad will happen and multiplying it by the costs that will be incurred if it does happen (or some variation on that general theme). This definition is used in everything from engineering to finance, and from geoscience to security studies. This report - particularly the introductory chapter - needs to be mindful of that standard definition. It seems like the alternative definition of risk introduced in section 1.4.1 can be interpreted in such a way that it's consistent with the standard definition of risk, and a sentence or two should be added here to explain how, bearing in mind that a broad range of people will be reading this material. [Sean Fleming, USA]	This text has been removed; however, this comment has been taken into consideration in CCB1.
16052	1	13	27	13	28	Climate change is not only compounding (aka "multiplying") risks. It is also creating new risks, e.g. climate migration in the Pacific and risks to social cohesion, culture, national identity, language, etc. [Nathan Ross, New Zealand]	This text has been removed.But the argument has been taken up in various parts of the report.
18208	1	13	27	13	45	Please add in this section the notion of extreme and abrupt changes, as well as multi-risk and cascading risks; as they are treated in Chapter 6 (add Ch 6 reference). [Laurens Bouwer, Netherlands]	This text has been removed; however, reference to the concepts and the glossary has been added to the CCB on Risk.
22556	1	13	27	13	32	Add a reference on adaptation and resilience, such as the Arctic Monitoring and Assessment Programme's (AMAP) Adaptation Actions in a Changing Arctic (AACA) reports, and/or the Arctic Council Arctic Resilience Report these are also referenced in Chapter 3. [Eva Kruemmel, Canada]	This section has been removed, but this comment has been taken into account in CCB1 and Chapter 3.
6608	1	13	29	13	29	Climate and non-climate hazards includes everything, it would be clearer to stick to climate and climate exascerbated hazards. [APECS Group Review, Germany]	This text has been removed; however, this comment has been taken into account in CCB1.
18206	1	13	30	13	31	Policy presceriptive text: Urgently needed, for what? [Laurens Bouwer, Netherlands]	This text has been removed; however, this comment has been taken into account in CCB1.
12478	1	13	31	13	32	this is one way to [James Ford, Canada]	This text has been removed.
246	1	13	34	34	35	Define resilience and sustainability -- See for example Ayyub (2014) doi: 10.1111/risa.1203, and Webb and Ayyub (2017) https://ascelibrary.org/doi/abs/10.1061/AJRUA6.0000893 . What is are relationships to risks? (I noticed that this item was partially addressed in Box 1 (page 33 of Chapter 1). See also the concepts provided by Ayyub and Wright (2016) on resilience, sustainability and adaptive design and risk management doi:10.4172/2167-0587.1000e118 [Bilal Ayyub, USA]	Taken into consideration by author team.
4708	1	13	36	13	37	The sentence "This process requires…/…are institutionally government" is speculative and rather naïve. It sounds like coming from someone that does not know much about governance. [Manuel Barange, Italy]	This text has been removed.
15368	1	13	36	13	36	The term "requires" appears to be policy prescriptive. [Samuel Morin, France]	This text has been removed.
19334	1	13	36	13	36	Delete "and its effects on the ocean and cryosphere" [Michelle A. North, South Africa]	This text has been removed.
19336	1	13	38	13	38	Key concepts for what? Please explain [Michelle A. North, South Africa]	Noted by the author team. This text has been removed.

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13236	1	13	39	13	41	I disagree that definitions of 'risk' are 'contradictory'. I can agree that the concepts for 'adaptation' and 'resilience' are still under discussion or varied, and doubt if the different views/concepts of these two terms can be regarded as 'contradictory'. I refer to the latest paper referenced in line 40-41: The Weichselgartner & Kelman (2015) paper states in I Introduction, paragraph 3, 'we suggest an agenda of reconnecting resilience within wider, well-established contexts of risk and sustainability' and refers only in 'II Resilience in theory…' in paragraph 5, of 'resilience' as 'not a universally accepted term'. However, they note that for the different concepts of 'resilience', the 'one common thread among many disciplines is the ability of materials, individuals, organizations and entire social-ecological systems, from critical infrastructure to rural communities, to withstand severe conditions and to absorb shocks'. The International Organization for Standards (ISO) publishes a family of standards on risk management (ISO 31000) since 2009. The Sendai Framework on Disater Risk Reduction (2015-2020) also discusses the different dimensions of risk. [Zelina Zaiton Ibrahim, Malaysia]	This text has been removed; however, this comment has been taken into account in CCB1
42	1	13	41	13	41	"Cross-Chapter" can be removed; very likely, the meaning won't be clear to the reader. [Daniel Farinotti, Switzerland]	Editorial – copyedit to be completed prior to publication
6610	1	13	41	13	41	Definitions sentence can be joined to the previous sentence with a comma. [APECS Group Review, Germany]	This text has been removed.
13122	1	13	41	13	42	"Cross-Chapter Box 1" is not very clear. Both Cross-Chapter Box 1 and Box 1 also include a Figure 1, which then causes confusion with the actual Fig. 1 of this chapter. I would suggest to number figures is Boxes either not at all (i.e. just refer to Box number), or in a different way, e.g. alphabetical. [Baerbel Hoenisch, USA]	Accepted. This figure has been removed.
1498	1	14	0	14		figure 1.2: environmental degradation and….. Complete the statement. [Danyal Aziz, Pakistan]	Editorial – copyedit to be completed prior to publication.
6616	1	14	0	14		Figure 1.2: This figure does not seem to be used in a good way to warrant its large size. Only the right and left panels are discussed and the middle diagram portion is unmentioned and a bit confusing. Better to redesign as a circular flow with the arrows and the driver boxes included. [APECS Group Review, Germany]	Accepted. This figure has been removed.
12480	1	14	0	14		Figure 1.2 was in SREX and AR5 but I think complicates matters [James Ford, Canada]	Accepted. This figure has been removed.
19100	1	14	0	14	0	figure is incomplete -- drivers of risk box text does not make sense [Anna Zivian, USA]	Figure has been removed. Copyedit to be completed prior to publication.
24540	1	14	0			Fig. 1.2: consider including the concept of adaptation capacity in the vulnerability propeller. Figure does not consider how vulnerability changes depending on adaptation capacity. Balancing needed with cross-chapter box (which addresses this through changing propeller surface area). [Hans-Otto Poertner and WGII TSU, Germany]	Accepted. This figure has been removed. The effect of adaptation has been considerd in a new figure provided in the cross-chapter box. The CCB and Chapter 1 risk text are now balanced.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
44	1	14	1	14	1	Fig. 1.2: (1) The fact that "anthropogenic climate change" is mentioned as the only driver of risk is potentially dangerous, in the sense that the report could easily be criticized as intentionally omitting other drivers. Mentioning some other drivers as well (e.g. natural variability) seems necessary to me. An alternative fix would be to use the caption to make clear(er) that the Figure is thought as an example. (2) Shouldn't the bottom arrow (the one for "changes in the ocean and cryo.") be bi-directional? Certainly, changes in the ocean and the cryosphere can have an impact on the "socio-economic development" as well (as the chapters says itself later). [Daniel Farinotti, Switzerland]	This text has been removed.
2820	1	14	1	14	4	Could not figure out how to read this figure1.2 and what to make out of it just from looking at it and reading its label « Conceptual framework of risk, its components and drivers ». In such a report it is very important to have self-contained figures, as they may be re-used out of context. [Anne Guillaume, France]	Accepted: Figure has been removed.
3278	1	14	1	14	1	Fig. 1.2. Drivers of Risks end with an 'and'. Perhaps uncomplete. If not, this last 'and' should be deleted. [Castor Muñoz Sobrino, Spain]	Editorial – copyedit to be completed prior to publication
5192	1	14	1	14	1	Figure 1.2: has the right hand panel lost some text at the bottom as there seems to be a dangling "and" or is the text on the bottom arrow meant to be read here? If so, not a very clear presentation [Pauline Midgley, Germany]	Editorial – copyedit to be completed prior to publication
11130	1	14	1	14	3	Figure 1.2 represents the conceptual framework of risk with components and drivers in this report. But, I think it might be not complete yet, I suggest that this figure also should be revised to understand the concept of risk in this report. [Inseong Han, Republic of Korea]	Figure has been removed.
12314	1	14	1			Fig 1.2 doesn't currently make sense. The right hand box is unfinished, and it seems to imply that impacts cause risks which is very odd phrasing. I also don't know what the sentence at the top is supposed to be doing. I think it just isn't finished but anyway as currently shown it is very poor. [Eric Wolff, UK]	Accepted. Figure has been removed.
13124	1	14	1	14	1	insert commata before and after "e.g."; on the right had side of the figure, include "drought" as a more intuitive driver for poverty and conflict; the bottom part of the right hand box is also incomplete and I am not sure what was intended here. In all honesty, the figure is hard to read… [Baerbel Hoenisch, USA]	Figure has been removed. Copyedit to be completed prior to publication.
13274	1	14	1	14	2	Text in the right-hand side of the figure is cut strangely and does not appear correctly. [Katherine Bishop-Williams, Canada]	Figure has been removed.
15946	1	14	1	14	1	Figure 1.2: The right hand box "Drivers of Risk" - the text is split and needs to be continuous, and the sentence seems to be missing a final exacerbator "…causing emissio, climate change and environmadation and ??". Suggest remove final "and", or modify further to achieve statements purpose. The figure appears to be low resolution as well. [Tim Riding, New Zealand]	Figure has been removed. Copyedit to be completed prior to publication.
17288	1	14	1	14	1	Fig 1.2 - this is adapted from AR5 - but then a similar figure is used for fig 6.1 - can these be edited for cross-chapter consistency in the figures? [Iulian Florin Vladu, Germany]	Figure has been removed; Comment taken into consideration in Chapter 6.
17426	1	14	1	14	1	Figure 1.2: The right hand bar ends with "causing emissions, climate change and environmental degradation and": I think something has been omitted from the end of the sentence. [Sonya Legg, USA]	Editorial – copyedit to be completed prior to publication

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17710	1	14	1	14	1	The implicit assumption of the figure appears to be that natural forcing is neglible with respect to anthropogenic forcing. This important assumption should be clearly explained since the balance between natural and anthropogenic forcing has major impact on policy-making [Hessel Voortman, Netherlands]	Figure has been removed.
19338	1	14	1	14	1	The right-most box in Figure 1.2 has problems with it's text (is incomplete or running over out of the box) [Michelle A. North, South Africa]	Accepted. Figure has been removed.
4710	1	14	2	14	2	I do not understand how can HAZARD not be part of EXPOSURE in the figure. This is a contentious figure, as demonstrated in AR5 reviews already [Manuel Barange, Italy]	Considered by author team. Exposure has been explained as a hybrid between hazard and vulnerability.
1576	1	14	3	14	3	It should be said that this figure comes from AR5 WG2. [Wolfgang Cramer, France]	This figure has been removed; however, this comment has been taken into consideration in CCB1
13238	1	14	3			Figure 1.2 illustrates the conceptual framework for risk in section 1.4, however, there is some disconnect between the terms used in the figure and in the text as well as in the Chapter/section headings. There is no term 'natural systems'; 'human systems' as discussed in the sub-sections. [Zelina Zaiton Ibrahim, Malaysia]	This figure has been removed.
15370	1	14	3	14	3	I'm not sure the description of the left-hand side of the figure is consistent with the IPCC risk framework. Here, "hazards" seems to be referring to individual hazards, although I had understood that "hazard" in the IPCC terminology would be referring to any change, either positive or negative, of the functioning of the global environment, which could be due to climate change. [Samuel Morin, France]	This figure has been removed.
18210	1	14	3	14	3	Figure 1.2: At the bottom, the "changes in the ocean and cryophere" are not placed in the right location. These changes should be placed in the left-hand box (drivers of risk). At the bottom, "changes in radiative forcing" should be added, which are caused by the GHG emissions from the box on the righ-hand side. [Laurens Bouwer, Netherlands]	This figure has been removed.
6612	1	14	6	14	6	vulnerable element is well defined here, I would suggest a similar definition for 'hazard' [APECS Group Review, Germany]	This text has been removed.
18212	1	14	6	14	17	Reference to the SREX report is missing, where these concepts were introduced/adopted. [Laurens Bouwer, Netherlands]	This text has been removed; however this comment has been taken into consideration in CCB1.
20932	1	14	6			Be careful "Product" has different meanings. Here it is meant as "result" but could be understood as "mathematical product" which would be wrong. [Christophe Cudennec, France]	This text has been removed; however this comment has been taken into consideration in CCB1.
23262	1	14	6	14	7	The definition of risk can be better worded. [Y. Jeffrey Yang, USA]	This text has been removed; however this comment has been taken into consideration in CCB1.
14172	1	14	9			ocean-related [Christopher Fogwill, UK]	This text has been removed.
15372	1	14	9	14	9	"section 2.5" to be cross-checked with the content of Chapter 2. I think what is referred to here is Section 2.3. [Samuel Morin, France]	This text has been removed.
6044	1	14	10	14	17	Other impacts include ehanced release/cycling of contaminants, changes in food-web structures that impacts contaminant exposure, as well as pathogens, which already impact food security and health of Arctic Indigenous Peoples and wildlife. Also see AMAP 2015 Human Health Assessment, and papers such as McKinney et al Global Change Biology (2013) 19, 2360–2372, doi: 10.1111/gcb.12241. [Joanna Petrasek Macdonald, Canada]	This text has been removed; however this comment has been taken into consideration in Chapter 3.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
22558	1	14	10	14	17	Other impacts include ehanced release/cycling of contaminants, changes in food-web structures that impacts contaminant exposure, as well as pathogens, which already impact food security and health of Arctic Indigenous Peoples and wildlife. Also see AMAP 2015 Human Health Assessment, and papers such as McKinney et al Global Change Biology (2013) 19, 2360–2372, doi: 10.1111/gcb.12241. There is also a section on this in Chapter 5 which could be cross-referenced here. [Eva Kruemmel, Canada]	This text has been removed; however this comment has been taken into consideration in Chapter 3.
6614	1	14	12	14	12	I assume salinization here is of aquifers and soil, it should be fully defined as intended. [APECS Group Review, Germany]	This text has been removed.
18214	1	14	14	14	14	Please replace "Vulnerability" with "Changes in vulnerability". [Laurens Bouwer, Netherlands]	This text has been removed.
13360	1	14	16	14	16	…food systems in parts of the Arctic - delete "in parts of the arctic" because food security will be a global problem. [Debra Roberts and Durban Team, South Africa]	This text has been removed.
12482	1	14	17	14	17	The Beaumier ref (on which I am an author) is not the most appropriate here. Ford et al 2010 in Global Env Change is much more relevant or Ford and Smit (2004) in Arctic [James Ford, Canada]	This sentence has been removed.
17226	1	14	26	14	27	Interplay between changing resilient development pathways overtime and attainment of the SDGs should be reverse considering the former is a process that would take beyond 2030. The message should be that achieving SDGs is a step towards resilienty development pathway (which is not a one-off achievement but continous and iterative process). [Iulian Florin Vladu, Germany]	This text has been removed; however, this comment is taken into consideration in CCB1
23410	1	14	26	14	26	Please remove “Among other things” [Inga Koszalka, Germany]	This text has been removed.
46	1	14	27	14	27	The acronym "SDGs" is introduced but never used again --> remove [Daniel Farinotti, Switzerland]	This text has been removed; however, copyedit to be completed prior to publication
18216	1	14	27	14	27	Reference to UN seems too generic; please add other (scholarly) references. [Laurens Bouwer, Netherlands]	This text has been removed; however, this comment was taken into consideration in CCB1
23412	1	14	27	14	27	Please add a couple sentences about the SDGs if you mention them here. [Inga Koszalka, Germany]	This text has been removed; however this comment was taken into consideration in CCB1
62	1	15	1	17	51	I found this part very repetitive, especially in light of what the preceding part of the chapter already said. Basically, most sub-sections keep iterating the same message (changes in the ocean and cryosphere will have large impacts) with the same list of examples. I guess streamlining won't happen at this stage, but it should really be considered. [Daniel Farinotti, Switzerland]	Taken into account; we have revised to make the section less generic

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
176	1	15	2	15	7	The chapter is called "Natural Systems". Authors fail to fully describe the natural system by restricting their reference to the last 200 years. Climate (and human) history is much older and should not stop randomly at a natural cold phase such as the Little Ice Age, to which the starting date 1800 AD belongs. One of the key challenges for modern climatology is to integrate the modern warming into the context of the natural warm phases of the past 2000 or even 10,000 years. Current versions of climate models do not have any strong natural forcings that could help to replicate these pre-industrial warm phases. It is symptomatic for this chapter that the authors do not even describe the most basic and widely accepted project results related to the pre-industrial climate. Is this happening by mistake or is this happening consciously? The most up-to-date temperature reconstruction for the past 2000 years stems from the PAGES2k Consortium (2013). Their global temperature curve is not discussed even rudimentarily, nor can the paper be found in the references of this chapter. The updated database (PAGES2k 2017) is cited in the text (without any comment on the temperature reconstruction of 2013), but also misses in the references. The discussion of pre-industrial pre-Little-Ice-Age natural climate change must be a key component in the description of the "Natural System". If the "Natural System" is restricted to the Little Ice Age, the description is inevitably incomplete and of little value. This 2k or even 10k context is very much needed to inform attribution and model skill quality assessments. [Sebastian Luening, Portugal]	Taken into consideration. We felt that this specific section was not the correct place to add content related to this topic, but has been expanded on in Section 1.3
2822	1	15	4	15	7	I don't quite agree with this definition of Natural System. With such a restrictive view, very little on Earth would today qualify as « Natural ». Do you mean any system driven by natural forces, without man involvement? But if so, this is very restrictive for ecosystems as native and indigenous people are obviously humans too. Wouldn't it better to replace human by industrial? System driven by natural forces, without industrial involvement? I also don't understand the meaning of « organisms » there. [Anne Guillaume, France]	Taken into account. A definition of "natural system" has been added to the Glossary, and we are now careful to note that natural does not imply pristine,.
5070	1	15	4	15	4	Could add ,for the definision, after (that exists in nature), "as circulation of water in the ocean, weather and climate or water drainage". [Essam Hassan Mohamed Ahmed, USA]	Accepted. We added upwelling as an example.
23414	1	15	9	15	27	Shouldn't be plastic pollution included in the risks to natural systems?! [Inga Koszalka, Germany]	Accepted. Plastics were added as an anthropogenic but non-climate change factor
2824	1	15	11			« Ecosytem services », repeating what I wrote earlier: « ecosystem services » is an IPCC shortcut based on a language that carries an ideological background (economic thinking, capitalistic view,…) that clashes with the aim, and novelty of this report, to bring in indigenous and local knowledge. Authors should be more aware of this in their writing. Extremely important in this first chapter. [Anne Guillaume, France]	Rejected. See response to comment 2786 where we justify the use of the term.
6274	1	15	11	17	51	Discussion of vulnerabilities of natural and human systems offers important illustrations of how human activities impact on coral reefs and fish populattions as well as other biodiverstity. Choices of CO_2 emission pathways are vital to mitigate some of these impacts. [Melinda Kimble, USA]	Noted.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
15460	1	15	11	15	15	For the sake of simplicity, I suggest to reword this (long) sentence: "This report emphasizes the interactive effects of risks and impacts within the ocean and cryosphere and updates the attribution and confidence in relevant trends for emerging risks in extreme events (Chapter 6), as well as changes to major ocean and cryosphere components including the Atlantic Meridional Overturning Circulation (Chapter 6), marine heat waves (Chapter 5), and ice sheet collapse (Chapters 3 and 4)." An alternative wording could be to insert a comma and to split it in two sentences: "This report emphasizes the interactive effects of risks and impacts within the ocean and cryosphere, and updates the attribution and confidence in relevant trends for emerging risks in extreme events (Chapter 6). It also highlights changes to major ocean and cryosphere components including the Atlantic Meridional Overturning Circulation (Chapter 6), marine heat waves (Chapter 5), and ice sheet collapse (Chapters 3 and 4)." [Hernan Sala, Argentina]	Accepted.
4720	1	15	13	15	14	Molinos et al 2016 actually concludes that there would be "net increases in species richness"and "redistribution rather than loss of diversity" as a result of CC, which does NOT support the statement in the report that "...with increasing extinction risk and loss of both ecosystem and human health". Also, what is "loss of human health" in this context? Population health? Individual health? is there evidence for either? [Manuel Barange, Italy]	Accepted--the text was revised to address this issue.
6618	1	15	14	15	14	Although the AMOC is a key part of ocean circulation, it is not the only part whih is vulnerable to chance, this phrase should represent global circulation as it does with heat and ice sheet collapse. [APECS Group Review, Germany]	Accepted and revised.
48	1	15	17	15	25	This paragraph seems unbalanced, as only ocean-related "risks" are mentioned. Some examples from the cryosphere should be added as well. [Daniel Farinotti, Switzerland]	Rejected. This para. already mentioned cryosphere, and has been revised. Due to space constraints we cannot provide alll possible examples.
6106	1	15	17	15	17	Here is an important reference that concludes that it is extremely unlikely that the record Arctic sea ice minimum of 2012 would not have occurred with out human influence. Kirchmeier-Young, M.C., F.W. Zwiers, and N.P. Gillett, 2017: Attribution of extreme events in Arctic sea ice extent. Journal of Climate, 30, 553-571. http://dx. doi.org/10.1175/jcli-d-16-0412.1 [Patrick Taylor, USA]	Accepted.
13126	1	15	17	15	22	the confidence statements need to be repeated from AR5 - not everyone reading this report wil know of the previous definitions [Baerbel Hoenisch, USA]	Accepted, a reference to Section 1.8.3 has been added.
5196	1	15	18	15	19	this is I believe the first use of the IPCC calibrated uncertainty language in this report. I suggest a footnote referring the reader to Table 1.2 [Pauline Midgley, Germany]	See comment 13126
17228	1	15	18	15	18	the reference or meaning from AR4 is missing [Iulian Florin Vladu, Germany]	See comment 13126
6620	1	15	21	15	25	This point is important to make clear here - the progress since AR5 should be the main point behind this paragraph. The last sentence can be interpreted with ambiguity, it seems that only polar ecosystems have the chance for expansion (and without contraction), whereas all ecosystems under change will have opportunities for both expansion and contraction. [APECS Group Review, Germany]	Noted, the sentence has been rewritten to use polar systems as an example, rather than the only case.
4712	1	15	23	15	23	"sandy beach"? Seems rather specific and not very well substantiated. [Manuel Barange, Italy]	Noted, but that is taken directly from Chapter 5

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2826	1	15	24			« seamount ecosystems »?? [Anne Guillaume, France]	Noted, but that is taken directly from Chapter 5
2848	1	15	29	15	35	Transport and shipping are not mentioned [Anne Guillaume, France]	Taken in account: mentioned in 1.1
4714	1	15	31	15	31	Where is the evidence that demonstrates that overexploitation of mineral resources magnifies the vulnerability of oceans to climate-related changes? [Manuel Barange, Italy]	Accepted, this was removed.
16036	1	15	31	15	32	I would suggest the use a different term for "ECOSYSTEM SERVICES" as it implies the definition of nature as a service provider to humans when we are only a very small part of it. Our contributions are rather minuscule compare to the harm we generate [Mariela Lopez-Gasca, Venezuela]	Rejected. See response to commen 2786 where we justify the use of the term.
4716	1	15	32	15	33	The text from "Risks faced by…/…would have moderate risks…/…under high emission scenarios" should be extracted as one of the main messages of this chapter. It is CRUCIAL to highlight that the risks are moderate under moderate RCPs. [Manuel Barange, Italy]	Noted.
16038	1	15	32	15	35	The idea expressed in the sentence may turn confussing as there is no specificity on why warm-water corals and bivalves are an exception in the risk level.Many (except warm-water corals and bivalves) would have moderate risks of impacts under a low emission future (RCP2.6;section 1.8.2), but almost all would have high to very high risks of impacts under higher emission scenarios (Mora et al., 2013; Gattuso et al., 2015). [Mariela Lopez-Gasca, Venezuela]	Noted, and rewritten to be less confusing.
23566	1	15	32	15	35	Could you add a very brief explanation as to why warm-water corals and bivalves form an exception, are these at higher or lower risk? [Hans-Otto Poertner and WGII TSU, Germany]	Noted, this was rewritten.
2926	1	15	37	15	37	The "spatial distribution" in the title seems a bit out of sync with the substance of the section -- "cryosphere" is not a spatial location. [Robert Kopp, USA]	Accepted. We have removed "spatial" from the subheading.
16902	1	15	37	16	9	The use of "risk" should be reviewed here. For example, page 16, line 2 speaks of "risks to natural systems include ocean acidification...", where ocean acidification is perhaps a hazard (from marine organisms' point of view...). [Markku Rummukainen, Sweden]	Accepted. This was rewritten to algin with the language used in AR5 by referencing drivers, risks, and impacts.
2292	1	15	39	15	50	Feedbacks can also beget other feedbacks/tipping points. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Cai Y., et al. (2016) Risk of multiple interacting tipping points should encourage rapid CO2 emission reduction, NATURE CLIMATE CHANGE 6:520–525; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Kristin Campbell, USA]	Noted, but not included due to space constraints.
2418	1	15	39	15	50	Feedbacks can also beget other feedbacks/tipping points. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Cai Y., et al. (2016) Risk of multiple interacting tipping points should encourage rapid CO2 emission reduction, NATURE CLIMATE CHANGE 6:520–525; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Durwood Zaelke, USA]	Noted, but not included due to space constraints.
2928	1	15	39	15	39	"Risks to" not "Risks on" [Robert Kopp, USA]	Accepted.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12916	1	15	39	15	50	Feedbacks can also beget other feedbacks/tipping points. (Arctic Monitoring and Assessment Programme (AMAP) (2017) SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC: SUMMARY FOR POLICYMAKERS; Cai Y., et al. (2016) Risk of multiple interacting tipping points should encourage rapid CO2 emission reduction, NATURE CLIMATE CHANGE 6:520–525; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Gabrielle Dreyfus, USA]	Noted, but not included due to space constraints.
6622	1	15	42	15	42	Reducing sea ice cover poses at least as big a risk to the West Antarctic ice sheet as to Greenland, it seems bizarre only to focus on the Northern Hemisphere here. [APECS Group Review, Germany]	Rejected. We considered adding the WAIS but this sentence is specific to Arctic amplification. Ice sheets generally have been added in the rewritten text.
14174	1	15	42			Greenland Ice Sheet [Christopher Fogwill, UK]	Accepted
18356	1	15	43	15	43	Kindly demistify : "....and through the direct albedo feedback that amplifies Arctic climate warming". [Suvadip Neogi, India]	Noted. The sentence was modified to make the statement more relevant.
12554	1	15	44			Land ice loss is another example... (there is actually a considerable contribution from ice masses other than the ice sheets) [Thomas Vikhamar Schuler, Norway]	Noted, and rewritten to include all ice loss.
50	1	15	47	15	50	Here and elsewhere: In light of the statement at page 6 line 40 (which says that the report does not address permafrost) it is unclear why permafrost is mentioned so prominently as an example. [Daniel Farinotti, Switzerland]	Rejected. The sentence states that permafrost is not assessed outside polar and high mountain areas, but it is still assessed.
15374	1	15	47	15	50	These statement needs to be discussed with Chapter 2 and Chapter 3 author teams. [Samuel Morin, France]	Accepted: we have referenced chapters 2 and 3 here
4718	1	15	52	15	53	Glibert et al 2014 shows some increases in HABs by 2100 in some regions but not in others, based on "assumed physiological rules for genera-specific bloom development". This seems way to vague and untested to support the sentence in the report that "ecosystems are expected to experience increases in HAB..." [Manuel Barange, Italy]	The wording was changed, and other relevant references have been added.
10660	1	15	52	15	57	Please add also costal erosion - up to 100-200 m per year in Russian Arctic: http://www.zikj.ru/images/25/7.pdf [Oxana Lipka, Russian Federation]	Rejected. We agree that this is an important point, but it is covered in Chapter 4 and we are under tight space constraints.
10788	1	15	52	15	52	Coastal ocean' should be defined. I am assuming this is that part of the ocean within and above the continental shelf margin. It's abit of an odd phrase. More usual to refer to 'oceans and coasts' [Thomas Spencer, UK]	Accepted. It has been added to the Glossary.
14076	1	15	52	15	57	I suggest to mention alsi the risk of coastal inundation due to climate change. As a study by Feng et al. 2017 (https://doi:10.5194/nhess-2017-31) where they found that sea-level rise shortened the recurrence period of extreme water levels significantly and extreme events would become common. As we know that coastal inundation has significant impact to the society living in the coastal region especially in the low lying region like Jakarta and north coast of Java and other countries. The risk coastal disaster to human impact has been address in page 17 line 29-42. [Siswanto Siswanto, Indonesia]	Accepted and added.
17376	1	15	52	15	52	Like this example where the term "coastal ocean" is used. This is great - coastal scientists and managers can immediately find the information of most use. Using this term plus "open ocean" could be used a lot more in this report for ease of reading. [Helen Kettles, New Zealand]	Noted.

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18918	1	15	54	15	54	Mention invasive species. e.g. Townhill, B., Pinnegar, J., Tinker, J., Jones, M., Simpson, S., Stebbing, P., and Dye, S.: Non-native marine species in north-west Europe: Developing an approach to assess future spread using regional downscaled climate projections, Aquatic Conservation Marine and Freshwater Ecosystems, 2017. [Jonathan Tinker, UK]	Agreed and added.
6046	1	15	55	16	9	This section would benefit from citing the AMAP Arctic Ocean Acidification Assessment (a new report on societal and economic impact examples will be published very soon). [Joanna Petrasek Macdonald, Canada]	Noted and taken into account: this comment has been passed to chapter 5 for their assessment on this topic
22560	1	15	55	16	9	This section would benefit from citing the AMAP Arctic Ocean Acidification Assessment (a new report on societal and economic impact examples will be published this fall). [Eva Kruemmel, Canada]	Noted, but if not published it cannot be referenced.
6624	1	15	56	15	56	multidriver impacts = impacts from multiple causes? [APECS Group Review, Germany]	Accepted.
18920	1	15	56	15	56	shallow shelf seas areas are particularly vulnerable to cc, and are often global warming hot spots [Jonathan Tinker, UK]	Noted.
580	1	16	0			After "political systems," add "health systems," [William Clarke, Australia]	Accepted.
582	1	16	0			After "infectious disease," add "heat stress," [William Clarke, Australia]	Accepted.
584	1	16	0			After "disruption;" and "conflict;" [William Clarke, Australia]	Accepted
11628	1	16	2	16	9	May be one could also mention here multiple/compound hazards, e.g, warming and O2 decrease related to metabolic indices (e.g. Deutsch et al., Science, 2015 [Fortunat Joos, Switzerland]	Accepted, this reference has been added to the end of the previous paragraph.
14078	1	16	2	16	9	mentioning the risk of more intense tropical cyclone as well as changes in atmospheric quick processes and ocean–atmosphere coupling such as water vapor, surface latent heat flux, clouds, and atmospheric dynamics is valuable in this paraghraph. (Li et al. 2017, https://doi.org/10.1007/s00382-017-4043-9) [Siswanto Siswanto, Indonesia]	Accepted and added. a reference to Chapter 6
22988	1	16	2			sugested update to this sentence as it ignores the ocean carbon sink: ..include ocean acidification (refs) leading to a reduced ocean carbon sink (potentially further reduced as the ocean continues to warm), changes in… [Jamie Shutler, UK]	Accepted and added, but edited for length.
13128	1	16	3	16	3	replace "morbidity" by "vulnerability"? [Baerbel Hoenisch, USA]	Rejected. Morbidity reflects health impacts beyond loss of life.
1780	1	16	4	16	5	Since the atmosphere interacts with top layer of the ocean, it may be worth mentioning the heat increase above 700m. [Meer Ali, India]	Accepted, sentence was modified.
12644	1	16	4	16	5	In the sentence "Heat content is rapidly changing at depth, with over one third of the industrial-era heat increases occurring …" the same comment as above should be applied regarding definition of the Industrial era concept. [Alejandro Cearreta, Spain]	Noted.
6626	1	16	5	16	5	There is an annual review by L.D. Talley et al. 2016 "Changes in Ocean Heat, Carbon content, and BVEntilation: A review of the first decade of GO-SHIP Global Repeat Hydrography" which has additional information on the deep ocean heat content increases. [APECS Group Review, Germany]	Taken into account: this reference has been passed to chapter 5 for their assessment of OHC
12316	1	16	5			"over one third of the industrial-era heat increases occurring below 700 m" is awkward, do you mean "with over one third of the industrial-era heat content increase (singular) occurring…"? [Eric Wolff, UK]	Editorial: Fixed.
15462	1	16	7	16	8	In order to be more precise, in the sentence: “for example, about half of species assessed on the northeast United States continental shelf exhibited high to very high climate vulnerability”, I suggest to add “fish and invertebrate” before the word “species”. [Hernan Sala, Argentina]	Accepted.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
52	1	16	11	16	21	The content of this subsection does not really match its heading (line 11). Moreover, the last two sentences are confusing: They seem to establish a link between "permafrost, ice, and snow" and "phytoplankton". Revision is necessary. [Daniel Farinotti, Switzerland]	Accepted. This paragraph was removed.
12320	1	16	11	16	21	I don't understand what this para is trying to say or how it differs from previous sections. Needs redrafting to show what it is adding. [Eric Wolff, UK]	Accepted. This paragraph was removed.
15376	1	16	13	16	21	This paragraph is hard to understand, it appears to be considered as an assessment, although the references provided e.g. on line 17 refer to studies varying widely in terms of scope, content, topic etc. These references also mix up content relevant to past changes and future projections. This probably needs a rephrasing, potentially benefitting from discussion with authors from Chapter 2 and Chapter 3. [Samuel Morin, France]	Accepted. This paragraph was removed.
6108	1	16	14	16	14	Please change the phrasing here of "related hazards related". You can probably delete the first "related" [Patrick Taylor, USA]	Accepted. Editorial – copyedit to be completed prior to publication.
12318	1	16	14			"related" apears twice in three words [Eric Wolff, UK]	Accepted. Editorial – copyedit to be completed prior to publication.
12368	1	16	14	16	14	"the risk of related hazards related to..." [Sylvain Ouillon, France]	Accepted. Editorial – copyedit to be completed prior to publication.
13276	1	16	14	16	14	The world "related" is used twice in a short space and reads very awkwardly. [Katherine Bishop-Williams, Canada]	Accepted. Editorial – copyedit to be completed prior to publication.
15464	1	16	14	16	14	Consider to delete the word "related" (the first time this word appears) in the sentence: "...substantially increasing the risk of related hazards related to the cryospheric processes at all spatial and temporal scales worldwide." [Hernan Sala, Argentina]	Accepted. Editorial – copyedit to be completed prior to publication.
15948	1	16	14	16	14	Double up of "related': remove first instance from "...the cryosphere, substantially increasing the risk of related hazards related to the cryospheric processes at all..." [Tim Riding, New Zealand]	Accepted. Editorial – copyedit to be completed prior to publication.
19340	1	16	14	16	14	Delete 'related' in front of 'hazards' [Michelle A. North, South Africa]	Accepted. Editorial – copyedit to be completed prior to publication.
5208	1	16	15	16	16	"at how" should presumably be "as to how" [Pauline Midgley, Germany]	Accepted. Editorial – copyedit to be completed prior to publication.
19342	1	16	15	16	15	Alter to read "There is considerable uncertainty about how these risks..." [Michelle A. North, South Africa]	Accepted. This paragraph was removed.
6628	1	16	18	16	18	current period of rapid global warming' - This statement seems to disregard the current period of relative inertia in global temperatures. Future studies may consider this to be the period of relatively slower warming. [APECS Group Review, Germany]	Accepted. This paragraph was removed.
15950	1	16	19	16	21	This sentence could be a little ambiguous, "...redistribution of phytoplankton and higher trophic levels is occurring...". Consider re-wording to something like "..redistribution of primary productivity and dependant trophic levels is occuring.." [Tim Riding, New Zealand]	Accepted. This paragraph was removed.
4722	1	16	20	16	21	The subsection on Risks to Human Health appears to be very hypothetical, listing challenges (some of which are already present regardless of climate change) and without specific reason for inclusion in the context of the report. [Manuel Barange, Italy]	Taken into consideration by author team; section was revised.
11492	1	16	20	16	21	the sentence needs re-writing to make it clear. Currently it implies there's extinction risk for human health [Taehyun Park, Republic of Korea]	Accepted. This paragraph was removed.
12484	1	16	25	16	26	In this definiton of human system, I think - given we're also dealing with Indig peoples here - that you need to include culture and belief systems. [James Ford, Canada]	Accepted. Text revised.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16054	1	16	26	16	28	Important to add to the list of human systems one or more that relate to norms, e.g. social systems, cultural systems, legal systems. [Nathan Ross, New Zealand]	Accepted. Text revised.
6048	1	16	32	16	38	This section would benefit from citing the AMAP 2015 Human Health Assessment [Joanna Petrasek Macdonald, Canada]	Accepted. Text revised.
16056	1	16	32	16	38	Important to add to the list of human systems one or more that relate to norms, e.g. social systems, cultural systems, legal systems. See, for example, Nathan Jon Ross "Risks to Representative Government in Kiribati" available https://nathanrossconz.files.wordpress.com/2016/11/nathan-jon-ross-climate-change-risks-to-representative-government-in-kiribati-21-cljp-jdcp-91.pdf See also Michael M Cernea "Impoverishment Risks, Risk Management, and Reconstruction: A Model of Population Displacement and Resettlement" (Keynote Paper presented to the UN Symposium on Hydropower and Sustainable Development, Beijing, October 2000) [Nathan Ross, New Zealand]	Accepted. Text revised to include socal norms.
17232	1	16	32	16	36	Other than human health/loss of life, non-economic impacts/losses is refelcted. To be compatible with the emerging thriving consideration on non-economic losses in the international climate change policy process, they should be included. [Iulian Florin Vladu, Germany]	Accepted. Text revised.
22562	1	16	32	16	38	This section would benefit from citing the AMAP 2015 Human Health Assessment [Eva Kruemmel, Canada]	Accepted. Text revised.
11026	1	16	33	16	36	You could add "loss of habitability" to the impacts you list ("infrastructure damage and failure; increased morbidity and mortality due to unintentional injury, infectious disease, and mental health; compromised food security; economic impacts due to reduced production and social system disruption; and widespread human migration" There are examples of regions in high mountain areas which are now unihabitable due toi dessication following glacier retreat, or destruction from cryosphere hazards like outburst floods (chapter 2); coastal erosion in the Arctic (chapter 3)' SLR and deltas/islands in Asia and Pacific (chapter 4), and hazard impacts of extreme El Nino events (chapter 6). [Ben Orlove, USA]	Accepted. Text revised.
54	1	16	34	16	34	This reads somewhat far-stretched to me: Are there really studies that credibly establish a link between "climate-induced cryospheric change" and "mental health"? This is what the combination of sentences seem to imply. [Daniel Farinotti, Switzerland]	Taken into account: references added to support the cryosphere-related climate change impacts on mental health.
6630	1	16	34	16	34	pollution related impacts should be added to this list - both air and physical varieties. [APECS Group Review, Germany]	Accepted. Text revised.
12322	1	16	34			"food and water security" [Eric Wolff, UK]	Accepted. Text revised.
19344	1	16	34	16	34	Delete 'unintentional' - isn't almost all injury invariably unintentional? [Michelle A. North, South Africa]	Accepted. Text revised.
21272	1	16	34			shoul include water security [Alejandro Souza, Mexico]	Accepted. Text revised.

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2888	1	16	36	16	36	A possible reference to incorporate in this line (in addition to Oppenheimer et al., 2014) is " ". This paper provides an overview of uses of social–environmental scenarios in impact, adaptation and vulnerability studies and identifies the main shortcomings of earlier such scenarios. van Ruijven, B. et al., 2014: Enhancing the relevance of Shared Socioeconomic Pathways for climate change impacts, adaptation and vulnerability research. Climatic Change, 122, 481-494. [M. Dolores Garza-Gil, Spain]	Accepted. Text revised.
17230	1	16	36	16	37	The example could also include increased use of reclaimed land which, when used for industrial purposes, is not subsumed by the term urbanization. [Iulian Florin Vladu, Germany]	Taken into consideration by author team.
19346	1	16	40	16	41	Alter to read: "...many of these risks are already impacting people residing in coastal and cryosphere regions." [Michelle A. North, South Africa]	Text revised. Copyedit will occure prior to publication.
11494	1	16	41	16	43	the sentence that starts with "Furthermore,.." does not make sense. [Taehyun Park, Republic of Korea]	Accepted. Text revised.
15546	1	16	45	17	9	As risk is resulting from the interaction between a hazard, exposure and vulnerability, if the structure of the report was not imposed, I would recommend to include the section “1.4.2.2 Vulnerabilities that Increase Risks to Natural Systems” into “1.4.2.1 Risks to Natural Systems”, same for 1.4.3.2 and 1.4.3.1. [Edmond Totin, Benin]	Accepted. Sub-headings relabeled and text reorganized.
18398	1	16	45	17	42	Climate change not only increases risks to current communities, but also poses a substantial threat to human cultural heritage. Often overlooked in the face of threats to living community members, increased vulnerability to submerged and terrestrial archaeological resources, as well as other facets of cultural heritage, should be mentioned here. Corresponding effects of the loss of such heritage to modern-day communities (specific examples include loss of cultural identity, damage to heritage tourism, increased risks from potentially-polluting shipwrecks) should also be considered. [Jeneva Wright, USA]	Taken into consideration by author team; addressed in Chapter 2 and IK & LK CCB.
24544	1	16	45			title seems inappropriate in light of risk definition which includes vulnerability [Hans-Otto Poertner and WGII TSU, Germany]	Accepted. Sub-headings relabeled and text reorganized.
4724	1	16	47	16	48	Barange et al. 2014. Nature Climate Change is a better reference for demonstrating that ocean- dependent societies are more vulnerable to climate change. Romeo-Lankao et al. is an IPCC AR5 regional report on North America, which is not a region particularly dependent on ocean resources. . [Manuel Barange, Italy]	Accepted. Reference added to support this statement.
12486	1	16	47	16	48	need a cryosphere reference to compliment Romero-Lankao [James Ford, Canada]	Accepted. Reference added to support this statement.
24720	1	16	47	16	54	This section would be strengthened with some references. [Elizabeth Weatherhead, USA]	Accepted. References added to this section.
19348	1	16	49	16	49	Add 'particular' in front of vulnerability [Michelle A. North, South Africa]	Accepted. Text revised.
16058	1	16	50	16	53	Sexual orientation is another basis for social exclusion that may affect climate vulnerability [Nathan Ross, New Zealand]	Text revised to include other factors.
17234	1	16	50	16	51	Access to technological resources should be included. [Iulian Florin Vladu, Germany]	Accepted. Text revised.
586	1	17	0			After "however, are" add "generally but" [William Clarke, Australia]	Accepted. Text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4726	1	17	1	17	2	Yes, those with greater wealth and privilege ARE less vulnerable to climate change risks. Not to ALL the risks, but to many. This is consistent with the first sentence in this paragraph, otherwise it contradicts it. [Manuel Barange, Italy]	Accepted. Text revised.
16060	1	17	1	17	2	Suggest adding a sentence explaining how beneficiaries of greater wealth and privilege can still be vulnerable to climate risks. [Nathan Ross, New Zealand]	Rejected. Two references are provided for readers interested in learning more about this topic.
19102	1	17	1	17	2	this does not seem to follow. Perhaps one more clarifying sentence or phrase would help [Anna Zivian, USA]	Text revised.
16040	1	17	4	17	9	This is a very important paragraph in which the intention to describe the vulnerabilities to human systems is well presented. However, once I finished reading I believed it needs depth and specificity on how (giving a more elaborated example) on how the marginalization of knowledge, culture, values, and livelihoods has happened in the past. [Mariela Lopez-Gasca, Venezuela]	Rejected. "...that further marginalise..." is intended to communicate this historical component.
21274	1	17	4	17	9	Example provided come from Puerto Rico, I am sure ther are better examplles showing thiis from the likes of Cuba, Central America and Southeast Asia [Alejandro Souza, Mexico]	Taken into account in Chapter 6.
56	1	17	6	17	6	The name of the hurricane ("Maria") should be provided. [Daniel Farinotti, Switzerland]	Accepted. Text revised.
2758	1	17	6	17	6	Where it says '...the 2017 hurricane in Puerto Rico...', I would suggest to write '...the Maria hurricane in 2017 in Puerto Rico...'. (Maria killed more than 4,000 people in Puerto Rico. It is considered the worst natural disaster on record to Puerto Rico). [Javier Martin-Vide, Spain]	Accepted. Text revised.
6632	1	17	6	17	7	This is quite an aggressive statement, I have no doubt in its veracity, but I think some more explanation of what a 'weak institution' or governance is or how it impacted this specific event - even if it is covered in more detail in Chapter 6. [APECS Group Review, Germany]	Accepted. Text revised to clarify.
17238	1	17	6	17	7	For example, the 2017 hurricane in Puerto Rico illustrates how weak institutions 7 and governance challenge responses to extreme events [Iulian Florin Vladu, Germany]	Editorial - copyedit to occur prior to publication.
1248	1	17	11	17	11	What a weird concept... the spatial distribution of risks is the spatial distribution of the population in sparse areas such as polar and mountain regions. I don't think this section works. [Ross Brown, Canada]	Accepted. Text revised.
12488	1	17	13	17	27	see / cite AMAP AACA assessment for more uptodate refs [James Ford, Canada]	Accepted. Reference added to support this section.
15378	1	17	13	17	20	This material duplicates in several ways material to be found in Chapter 2. Furthermore, I don't see here elements which pertain to "spatial distribution of risks to human systems", but rather a collection of examples, with a large number of cited references out of whom no specific information is extracted. [Samuel Morin, France]	Taken into account: cross-reference to Chapter 2 added; sub-heading title revised.
17680	1	17	13	17	16	This sentence should be updated according to the Ch02 assessment or simply refer to Ch02 instead of own statements. Applies also to the following sentences. [Andreas Kääb, Norway]	Taken into account by author team.
23568	1	17	13	17	42	consider linking these statements to other Chapters of SROCC [Hans-Otto Poertner and WGII TSU, Germany]	Accepted. Text revised.
6050	1	17	22	17	27	This section would benefit from citing the AMAP AACA reports. [Joanna Petrasek Macdonald, Canada]	Accepted. Text revised.
22564	1	17	22	17	27	This section would benefit from citing the AMAP AACA reports. [Eva Kruemmel, Canada]	Accepted. Text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
11028	1	17	24	17	25	You could add "loss of habitability" to the impacts you include here "r livelihoods, food security, transportation, culture, and health and wellbeing " [Ben Orlove, USA]	Accepted. Text revised.
58	1	17	25	17	27	Again, permafrost is addressed although page 6 line 40 said that it would not. [Daniel Farinotti, Switzerland]	Accepted. Text removed.
10662	1	17	29	17	42	Please add also costal erosion - up to 100-200 m per year in Russian Arctic: http://www.zikj.ru/images/25/7.pdf [Oxana Lipka, Russian Federation]	Accepted. Text added.
18218	1	17	29	17	42	Extremes to be added: Changes in cyclones (Chapter 4), sea-level rise (Chapter 4 and 6), marine heatwaves (Chapter 6). [Laurens Bouwer, Netherlands]	Accepted. Text added.
21276	1	17	29	17	42	Examples from US and Australia, should also use examples from Europe, Southeast Asia, developing countries [Alejandro Souza, Mexico]	Taken into consideration; examples have been removed.
23570	1	17	29	17	29	How many "billions of people"? Please be more specific; this will enhance the impact of this statement. [Hans-Otto Poertner and WGII TSU, Germany]	Taken into consideration; text removed.
60	1	17	30	17	30	The acronym "SSPs" was never defined. Add definition. [Daniel Farinotti, Switzerland]	Accepted. Copyedit to be completed prior to publication.
5198	1	17	30	17	30	this is I believe the first use of the acronym SSP so please define or spell out "Shared Socio-economic Pathways (SSPs)" [Pauline Midgley, Germany]	Accepted. Copyedit to be completed prior to publication.
6110	1	17	30	17	30	What is SSP stand for? [Patrick Taylor, USA]	Accepted. Copyedit to be completed prior to publication.
6150	1	17	30	17	30	What is SSP? Acronyms should be avoided as much as possible to increase readability for non-expert readers [Regine Hock, USA]	Accepted. Copyedit to be completed prior to publication.
12370	1	17	30	17	30	SSPs (Shared Socio-economic Pathways) are introduced later (page 30). Suggestion: to introduce SSP page 17 rather than page 30. [Sylvain Ouillon, France]	Accepted. Copyedit to be completed prior to publication.
13130	1	17	30	17	30	what are SSPs? [Baerbel Hoenisch, USA]	Accepted. Copyedit to be completed prior to publication.
17236	1	17	30	17	30	definition of SSPs could add value [Iulian Florin Vladu, Germany]	Accepted. Copyedit to be completed prior to publication.
19350	1	17	30	17	30	The acronym 'SSPs' has not yet been explained, add: "...Shared Socio-economic Pathways (SSPs) (Section 1.8.2.3) by 2050..." [Michelle A. North, South Africa]	Accepted. Copyedit to be completed prior to publication.
23572	1	17	30	17	30	refer to section 1.8.2 where SSPs are specified [Hans-Otto Poertner and WGII TSU, Germany]	Accepted. Cross-reference added.
13362	1	17	32	17	39	Increasing ocean temperature, marine heat waves and ocean acidification are not directly the factors that lead to the "emerging risks to disruption of basic services including..." but from "Coastal flooding and extreme weather events", mentioned in the following sentence. Perhaps re-order the wording. [Debra Roberts and Durban Team, South Africa]	Accepted. Text revised.
19352	1	17	34	17	35	Split this sentence so that the first ends after "food security", and the next reads "These include loss of life and damaged assests, and emerging risks to disruption..." [Michelle A. North, South Africa]	Accepted. Text revised.
18220	1	17	37	17	37	Not jus the coast of Noth America, but in fact all coasts. [Laurens Bouwer, Netherlands]	Accepted. Text revised.
19354	1	17	37	17	39	This example in North America doesn't make sense, these risks are not limited to North America alone although it is written as though they are. If it is meant to be an example, then it should rather say something like: "For instance, in North America, coastal flooding and extreme weather events have resulted in damage to property and aging infrastructure..." AND this needs to be cited [Michelle A. North, South Africa]	Accepted. Text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16062	1	17	41	17	42	The major risks from sea level rise are also acute in low-lying States, i.e. Tuvalu, Kiribati, the Marshall Islands and the Maldives, as well as for the New Zealand territory of Tokelau. [Nathan Ross, New Zealand]	Taken into consideration by author team; text removed.
6634	1	17	42	17	42	The reference to the Torres Strait islanders is a bit specific in this placing. There are other communities at risk from small sea level perturbations. [APECS Group Review, Germany]	Taken into consideration by author team; text removed.
13242	1	17	43			The topic on Open Ocean is missing. Refer to Page 16, line 2. The issue for small island states should be discussed here. [Zelina Zaiton Ibrahim, Malaysia]	Taken into consideration in the Integrative Cross-Chapter Box on Low Lying Islands and Coasts.
12324	1	17	44	17	51	Again I don't know what this para is trying to say. [Eric Wolff, UK]	Taken into consideration by author team; text removed.
13244	1	17	44			The topic of Section 1.4.3.4 is on Future dynamics of risk and exposure. It is unclear why the other 2 components risk, that is, vulnerability and hazard, are not also considered. [Zelina Zaiton Ibrahim, Malaysia]	Taken into consideration by author team; text removed.
20934	1	17	44			Risk and exposure AND VULNERABILITY - to be coherent with the Figure 1.2 [Christophe Cudennec, France]	Taken into consideration by author team; text removed.
12490	1	17	46	17	51	Flynn et al 2018 in Env Science and Policy also note a lack of futures focused work in the Arctic [James Ford, Canada]	Taken into consideration by author team; text removed.
18222	1	17	46	17	51	This section s not really covering the important drivers of changes in risk and exposure (and vulnerability). SREX (2012) has clearly indicated that with the impacts from weather extremes, changes in expsoure are the most important current (and future) drivers. This could be examplified with more recent studies, of which there are many (also many are included in AR5, WG2 chapters 10 and 18). [Laurens Bouwer, Netherlands]	Taken into consideration by author team; text removed.
18226	1	17	48	17	48	Can help to increase", instead of "are increasing". [Laurens Bouwer, Netherlands]	Taken into consideration by author team; text removed.
18224	1	17	49	17	49	Replace "mitigate" with "adapt". [Laurens Bouwer, Netherlands]	Taken into consideration by author team; text removed.
18228	1	17	50	17	50	Please mention that lack of data and resources is mostly an issue in developing countries, but not in most OECD countries. [Laurens Bouwer, Netherlands]	Taken into consideration by author team; text removed.
23104	1	17	50			" ...such efforts forward and especially short term policies" : may be it's not the correct place for this add [Jacques Beall, France]	Taken into consideration by author team; text removed.
1584	1	17	54			I do not see need to criticize much in section 1.5, but I question the need for this level of detail on mitigation issues in a Special Report such as this one. [Wolfgang Cramer, France]	This section aims at framing the issues of mitigation and adaptation. It is 2 pages long plus a figure, which does not seem unreasonable.
1578	1	17	56			“need” as used here is policy-prescriptive. The “if they want” comes a little awkwardly later in the sentence. At that point, one is not sure where the sentence is heading. Probably the intention of the authors can be made clearer if this is rewritten. [Wolfgang Cramer, France]	Taken into account: sentence rewritten
15604	1	17	56	18	18	It's important to note that mitigation may lead to potentially surprise responses and unintended consequences - there may be winners and losers. See e.g. John et al., A more productive, but different, ocean after mitigation, GRL, https://doi.org/10.1002/2015GL066160, 2015 [Jasmin John, USA]	Rejected. Although this is correct, the framing chapter is not the place for this discussion. Space is lacking to evaluate the approaches shown in the figure, not only unintended consequences but also efficiency, co-benefits, costs etc..This is why a recent paper covering all this aspects is cited.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
588	1	18	0			After "(UNFCCC, 2015). Add "However, the need for deep societal change may substantially be reduced should selected climate restoration methods be validated, approved and deployed early." [William Clarke, Australia]	Rejected for two reasons. First, the framing chapter does not have the sapce to provide and in-depth discussion of approaches. Second, the suggested chnages could be perceived as promoting some "climate restoration methods", a term that is not often used in the literature and would include geoengineering. IPCC reports cannot be prescriptive.
590	1	18	0			After "change (" add "restoration and " [William Clarke, Australia]	Rejected: it is not clear which sentence this comments refer to
592	1	18	0			After "addressed" add "in detail" [William Clarke, Australia]	Accepted: text revised.
594	1	18	0			After "global problem." add "Unfortunately, no amount of mitigation can now save the planet's biosphere, though extensive mitigation can help enormously. The only methods that might are counter-actions that are generally described as geoengineering, even though some seek to avoid the somewhat pejorative categorization. Most such methods do have uncertainties, all of which can typically be resolved by R&D. Those that enhance or mimic natural processes tend to be of a low-risk nature, though space-based and stratospheric ones are typically exceptions." [William Clarke, Australia]	Rejected because solar radiation management is not covered in this report and other geoengineering options barely covered. They are covered in the 1.5°C report and will be covered in the AR6 WGIII report.
596	1	18	0			Despite the claim being made that this report does not contemplate geoengineering, in fact many of the methods shown in the diagram should be classified as geoengineering ones. According to the IPCC's own definition of geoenngineering, see https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_Glossary.pdf geoengineering these would appear to include CCS, DAC&S, BECCS, Afforestation, Enhanced weathering and alkalinisation, Cloud Brightening, Surface albedo enhancement, Aerosol-based methods, Space-based methods, and possibly even some aspects of Restoration and Enhancement of habitats, all of which are identified by stars in the document as being either Mitigation, Sunlight reflection or Adaptation. Furthermore, six of these are identified by stars as being measures covered in this report. Hence, this report does cover some geonngineering methods, simply not all of them and none in detail. [William Clarke, Australia]	Accepted: text revised. But SRM will be removed from fig. 1.3.
12494	1	18	0	18		Figure 1.3: unclear how these adaptation options were selected. Only 9 are given yet there are way more options available. Is explanation given elsewhere in the text? The caption could clarify? [James Ford, Canada]	This comment is not clear. 5 adaptation options are given. I am not sure which one(s) is(are) left out. Perhaps the reviewer is talking about the 9 approaches to address the causes. But I do not know which is missing either. The legend has been revised to stress that only the main responses are shown.
23150	1	18	0	18		Figure 1.3 (and presumably its referring text) under "managing solar radiation" (and with some "increasing sinks" items) we really need to append "assessing and managing possible unintended side effects" or something, or else we seem naïve. [Aimé Fournier, USA]	Rejected. The framing chapter is not the place for this discussion. Space is lacking to evaluate the approaches shown in the figure, not only unintended consequences but also efficiency, co-benefits, costs etc..This is why a recent paper covering all this aspects is cited.
1582	1	18	1			The figure 1.3 is rather nice, but is it justified in this particular report? It is a general issue which would fit better in AR6 perhaps. [Wolfgang Cramer, France]	Noted. This opinion is not shared and was not raised by other referees. The benefit of this figure is to provide an overview of the ocean-based measures and indicate which of the approaches available are considered in this report.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17378	1	18	1	18	2	Great to see mitigation clearly stated to include "enhancing the sinks" e.g. blue carbon as an example. In my experience there is confusion about this and many people call that adaptation. Would be good to see where thhis could be reinforced elsewhere in the document. [Helen Kettles, New Zealand]	Noted.
19356	1	18	1	18	1	Alter to read: "...damage to a minimum" (deleting 'from climate change') [Michelle A. North, South Africa]	Accepted: text revised.
6636	1	18	3	18	3	The "partly" here is redundant. [APECS Group Review, Germany]	Rejected. Partly is required because some impacts of climate change are avoidable.
12492	1	18	4	18	5	Adaptation will not necessairly require deep societal transformation; it may for some risks and in some locations depending on impacts, but in many cases will not. Where are the references for this huge statement? The ref given is to the UNFCCC which is not a scientific document but a policy one [James Ford, Canada]	Accepted: text revised.
21400	1	18	4	18	5	The legal requirement for Parties to the Paris Agreement concerns reporting of greenhouse gases emission inventories. For accuracy suggest replacing “at the level required for achievement of the Paris Agreement” with “for achievement of aims of Parties as described by Article 2 of the Paris Agreement.” [Alice Alpert, USA]	Agreed but the text has been revised and this sentence is gone.
64	1	18	7	18	9	Again, I think that putting "managing solar radiation" so high on the list is very inopportune. Certainly "societal adaptation" and "behavioural changes" (not mentioned at all so far!) should be mentioned earlier. [Daniel Farinotti, Switzerland]	Taken into account. SRM is not giving prominence in this list but it has been moved to the end of the sentence with an explicit mention that it is not covered in this report, and removed from Fig. 1.3. Also, "potential" replaced by "could". Behavioural changes are included under adaptation and reducing the causes.
12326	1	18	7			Putting solar radiation management second in line is a little bizarre. Even if geoengineering is seen as a solution, greenhouse gas removal (as envisaged under negative emissions at Paris) is surely wiorth a mention ahead of more exotic technologies, and is not generally considered part of mitigation. If you do include CDR/GGR as mitigation you need to explicitly say so. [Eric Wolff, UK]	Taken into account. It should be obvious from the figure that CDR and GGR are included in the group "Addressing the causes of climate change". We use the IPCC definition of mitigation: "A human intervention to reduce the sources or enhance the sinks of greenhouse gases." SRM is not giving prominence in this list but it has been moved to the end of the sentence with an explicit mention that it is not covered in this report, and removed from Fig. 1.3.
16904	1	18	7	19	3	It would seem that a broader discussion on geo-engineering is well beyond the scope of the report, cf. lines 78-12. Along the same line of thought, Figure 1.3 would seem to be too general for the purposes of the report. (The report does not provide a broad description of mitigation in general either). Mentioning of geo-engineering options and implications for the ocean and cryosphere does make a point (lines 12-18). Elements of Fig 1.3 could be highlighted or focused on here. [Markku Rummukainen, Sweden]	Taken into account. The benefit of the figure is to indicate which of the possible approaches are considered in this report. It is agreed that a comprehensive assessment of geo-engineering is not within the scope of this report. This is mentioned in the text.
17380	1	18	7	18	8	"addressing the causes of climate change (mitigation)". This statement excludes mitigation from "enhancing the sinks"...could it be rephrased "addressing the sources and sinks of greenhouse gases (mitigation)" which is used later in this paragraph? [Helen Kettles, New Zealand]	Accepted: text revised.
22226	1	18	7	18	18	SR1.5 also addresses options for adaptation, not just mitigation, so ref should be for both [Debora Ley, Guatemala]	Accepted: text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6418	1	18	8	18	8	Manage the angle and intensity of the sun's radiation [Leila Rashidian, Iran]	Rejected. The space allocated to chapter 1 does not allow to go deep deep in the technicalities of solar radiation management. SRM is not giving prominence in this list but it has been moved to the end of the sentence with an explicit mention that it is not covered in this report, and removed from Fig. 1.3.
6420	1	18	8	18	8	local geo-engineering [Leila Rashidian, Iran]	It is not clear where the reviewer is suggesting to add this text.
10664	1	18	8	18	8	Managing solar radiation' - an geoengineering approach has a strong negative impact on natural and human systems. To propose it as a best solution for nature and people is not evironmentally friendly. This solution in decision-making is very risky. Please eliminate from the text [Oxana Lipka, Russian Federation]	Rejected. This sentence absolutely does not say that SRM is "the best solution for nature and people"! As per IPCC rules and regulations this text is not policy-precriptive. The goal here was to provide an overview of options available, without advocating for the best ones. Furthermore, it is mentioned later that "most global measures currently exhibit too many uncertainties for large-scale deployment". Anyway, SRM is not giving prominence in this list but it has been moved to the end of the sentence with an explicit mention that it is not covered in this report, and removed from Fig. 1.3.
12328	1	18	11			Misleading: most types of negative emissions are definitely "other forms of geoengineering", are considered in scenarios that reach 1.5 degrees, and are presumably considred in the 1.5 degree report. [Eric Wolff, UK]	Accepted: text revised.
21250	1	18	11	18	11	"IPCC scenarios" should be changed to "scenarios assessed by IPCC". [Jan Fuglestvedt, Norway]	Agreed but the sentence is gone in the SOD.
6154	1	18	12	18	12	That this report focuses on should not come after 18 pages of text but is something that should be given on page 1 [Regine Hock, USA]	One cannot bring every aspect addressed in the report on page 1. Will be mentioned in the executive summary.
12330	1	18	12	18	17	This is oddly written, probably the Gattuso sentence needs to come before the "this report" sentence. Also I don't know what "these" refers to in "Syntheses of these". The statement that follows might be justified if this is about ideas like ocean fertilisation but is probably not supported if it refers to all forms of GGR. [Eric Wolff, UK]	Accepted: text revised.
13132	1	18	14	18	16	I wish this report could break free from bad-mouthing efforts to mitigate climate change. They are indded expensive, some of them may not be employable on a large scale yet, but a lot of progress has been made over the past few years, and we need to encourage that progress instead of discouraging it over and over again. Call mitigation processes in their infancy, and for the time being the only reliable strategy is to reduce emissions, but to keep temperature rise below 1.5°C, or even below 2°C, more is needed than just emissions reductions. So please let's keep a positive spin on emission reduction procedures, they need more progress and support to become employable on a large scale [Baerbel Hoenisch, USA]	Noted. It is not clear where bad-mouthing occurs in the text.
18230	1	18	14	18	17	Seems policy-prescriptive, please rephrase to accuretaly reflect AR5 WG2 conclusions. [Laurens Bouwer, Netherlands]	Accepted: wording has been revised
19358	1	18	14	18	15	Is it really acceptable to cite a submitted paper? What if it isn't accepted? [Michelle A. North, South Africa]	Yes, it is acceptable as per IPCC rules and regulations. Submission must be before 15 October 2018 and accepted by 15 May 2019. If rejected, the text will be reised accordingly.
2852	1	18	17			Low-regret option, definition missing [Anne Guillaume, France]	Noted but this is plain English and does not need a definition. The dash has been deleted though.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17382	1	18	17	18	18	What is a "local ocean-based measure"? Do you mean coastal-based measures such as blue carbon. I like the use of the phrase "no regrets". [Helen Kettles, New Zealand]	Yes, < ~100 km 2 .
23574	1	18	17	18	18	This statement is vague, please provide examples for ocean-based measures. Please also provide references for this statement, or refer to a section/chapter where this topic is discussed in detail. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: text revised.
17332	1	18	18	18	18	In addition to local ocean-based measures, local air pollution measures -- especially those impacting black carbon -- can have a signficant impact on radiative forcing in local cryosphere, as noted elsewhere in this report and which is encompassed also in the 1.5 degree report. Modeling by Shindell (World Bank, 2013) suggests the decrease in RF in the Himalayas especially could be on the order of >8W/m2 given current high particle pollution levels. Suggest adding language along the lines of, "Similarly, local efforts to decrease air pollution near mountain glaciers and other cryosphere can bring no-regrets health benefits while potentially slowing retreat, although primarily on regional scales." [Pamela Pearson, USA]	Accepted: text revised and reference to Shindel et al. (2012) added.
1580	1	18	20	18	21	The sentence is unclear. What is meant by “linkages and feedbacks”? [Wolfgang Cramer, France]	Accepted: text revised.
21156	1	18	20			There is no evidence to date that humans have been able to successfully engineer particular states of marine ecosystems and to manage them in such a way that those conditions are maintained (e.g. fisheries, geomorphology, chemistry etc.). I recommend this paragraph be written with the level of confidence that this is possible. While options are worth exploring, the idea of being able to successfully manipulate and maintain ecosystems in a specified state has extreme low confidence at present. [Andrew Constable, Australia]	Taken into consideration. Examples were provided. The text has been revised anyway for clarity
24546	1	18	20		21	sentences such as: "Linkages and feedbacks in ecosystem processes provide natural systems with some adaptive capacity to climate change. In addition, human interventions in natural systems can enhance natural adaptive capacities" illustrate the difficulties in keeping definitions clearly distinguishable. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: text revised.
66	1	18	22	18	23	Also in this case, the statement "manipulating ecosystem structural or functional properties can minimize climate change pressures" should come with a big word of caution. [Daniel Farinotti, Switzerland]	Accepted: text revised.
18232	1	18	25	18	25	Which policies and pratice? [Laurens Bouwer, Netherlands]	Taken into consideration but the space allocated to this chapter is limited and one cannot provide much details. The expression is generic enough to cover all policies and practices at the local, regional and national levels.o
4008	1	18	26	18	26	Figure 1.3, under "Pollution reduction" has "Reduce pollution from all sources, including land, rivers and black carbon". I can't really parse this sentence so it makes sense. How are land and rivers sources? Also, black carbon isn't a source, it's an emissions component. [Sarah Doherty, USA]	Accepted: text revised.
4658	1	18	26	18	27	This figure has too much text that is far too tiny for visually impaired folks like me. [Baylor Fox-Kemper, USA]	Noted. The figure will be revised by a professional to improve style and legibility.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4728	1	18	26	18	27	1. I do not think this figure is appropriate in a context chapter, as it provides the solutions/ actions that should instead emerge from the report, rather than stated in the context chapter. 2. The entry of "Biodiversity Preservation" is vague in concept and unclear. We normally use the term Conservation, but Preservation is conceptually very loaded. Preserve as in a Museum? Given that ecosystem are dynamic what does Preservation mean?. Also, habitat protection "per se" does very little to support adaptation to climate change. Appropriate, adaptive management (which may include protection of specific areas and ecosystems) would be more effective to support adaptation (e.g. removal of invasive species is an adaptive management action, which simple protection would not achieve). [Manuel Barange, Italy]	Accepted: text revised (conservation).
11496	1	18	26	16	28	Managing solar radiation' is not the same level of grouping as "enhancing societal adaptation", "Addressing the causes of climate change" or "supporting biological and ecological adaptation" (the other 3 headings). If solar radiation management techniques are mentioned "for the sake of completeness but direct geo-engineering techniques are outside the socpe of this report", it should be replaced with "Measures to reduce climate change impact" or "Interventions to reduce impact of climate change". [Taehyun Park, Republic of Korea]	Rejected. SRM is appropriate as a title of this grouping because the 4 measures under it are exactly that: man aging solar radiation. Note that there is no hierachy among the 4 groups and that SRM will be removed from Fig. 1.3
12332	1	18	26	18	32	From Fig 1.3 I gather that you consider GGR to be mitigation and not geoengineering, in which case this needs to be a very clear part of the definitions. I think this is a bit mad since emissions reductions are clearly a different class to highly engineered carbon removal processes. [Eric Wolff, UK]	Interventions can be grouped using to various criteria. Greenhouse gas removal certainly belong to the group "Addressing the causes. This report uses the definition of mitigation used in IPCC AR5 (reducing the sources and enhencing the sinks). GGR is then considered as a mitigation action.
12334	1	18	26	18	32	The stars on Fig 1.3 are not well described. Presumably you consider the impact of all emissions reductions and negative emissions in an indirect sense, and your point is that some of these technologies are actually deployed in the oceans. But because of the SRM discussion, it comes over as you not considering them because ethey are undesirable tecnologies which is a completely different point, and probably not what you mean with eg BECCS. [Eric Wolff, UK]	To make things simpler, the stars will be replaced by chapter numbers of the SOD which cover the measures SRM techniques have been removed.
17712	1	18	26	18	29	The figure appears to combine a set of well-established methods with highly speculative ones without making this distinction. However, the certainty of the effect, the cost and the time to realise a measure greatly depends on it. Please include the level of maturity of the measures in the figure [Hessel Voortman, Netherlands]	Rejected. It is outside the scope of the framing chapter to evaluate each measure. Furthermore, additional text would need to be added in the main body of the text. Chapter 1 does not have enough space for that. That is why a paper providing a comprehensive evaluation of the ocean-based approaches is cited.
18728	1	18	26	18	27	Figure 1.3: "Carbon capture and storage" should be pictured as "Increasing sinks of GHG" rather than "Reducing sources of GHG". [Antoine Pebayle, France]	Rejected. CCS could perhaps be viewed both ways but it is primarily carbon captured at the source of emission and stored. It is then best described as reducing sources of GHG (to the atmosphere).
22228	1	18	26	18	26	Fig. 1.3 - in SR1.5 (Ch. 4 and 5), renewable energy is also considered as an adaptation option [Debora Ley, Guatemala]	Noted. Yes, so is increasing energy efficiency and several other measures. However, in our grouping it is mostly about reducing the causes of climate change.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
68	1	18	27	18	32	Fig. 1.3: "Managing solar radiation" should be removed from the figure. The caption says that it is "mentioned for the sake of completeness", but according to this logics, other forms of geo-engineering should be included as well. [Daniel Farinotti, Switzerland]	Accepted. SRM techniques will be removed from the figure.
13134	1	18	27	18	27	Figure 1.3: what is "blue carbon" under aforestation, left hand side of figure. Two in CO2 should be sucscript, and there is a superfluous space after "Carbon" under biochar [Baerbel Hoenisch, USA]	Accepted: figure revised accordingly. Blue carbon is the carbon stored primarily in the sediment of seagrass beds, mangroves and saltmarshes. The definition of blue carbon will be in the glossary.
19360	1	18	27	18	27	Figure 1.3. Under "Polluion reduction", the sub-text lists sources of pollution that should be reduced; however, black carbon is not a source of pollution, it is a type of pollution. Similarly, rivers and land aren't sources of pollution, they are the polluted. Maybe rather say: "Reduce pollution of all types, including land, rivers and air" [Michelle A. North, South Africa]	Accepted: text revised.
19362	1	18	27	18	27	Figure 1.3. Insert a space before 'Direct air capture and storage' (on the left side of the figure) [Michelle A. North, South Africa]	Accepted: figure revised.
19364	1	18	27	18	27	Figure 1.3. The text on the right contains a lot of ellipses that suggest that the figure is not complete? [Michelle A. North, South Africa]	Noted. No, it indicates that these are not complete lists.
5202	1	18	29	18	29	Excellent Figure 1.3; one small point: if CCS is mitigation due to reducing sources of GHG, then bioenergy with CCS is mitigation with both reducing sources and increasing sinks of GHG, so the circle should be half purple and half orange [Pauline Midgley, Germany]	Accepted: figure revised.
598	1	19	0			Apparently, the location in the report of some of the detail of these geoengineering methods is described in Cross-Chapter Box 2. Appendix 1.A, Table 1. The details include information about their efficiency, readiness, benefits and/or disbenefits. [William Clarke, Australia]	Not in cross-chapter box 2. It was in a table of the appendix. However, the table will be removed in the SOD and the chapters in which the measures are covered indicated in the figure.
600	1	19	0			"reducing emissions through mitigation" does not include "increasing the sinks". That is geoengineering. However, geoengineering "could indeed reduce the need for adaptation strategies". [William Clarke, Australia]	This comment is unclear. Of course "reducing emissions through mitigation" does not include "increasing the sinks". If the question is about which definition of "mitigation" is used: it is the IPCC AR5 definition (reducing the sources and enhancing the sinks).
602	1	19	0			After "drive evolution" add ", or cause organisms to activate biochemical pathways latent in their biological makeup," [William Clarke, Australia]	Rejected. Activating a biochemical pathway would fall under "genetic modifications".
1782	1	19	8	19	8	Is it worth refuting here that GHGs theory is not practicle? [Meer Ali, India]	This comment is unclear.
13136	1	19	8	19	8	"GHGs" has been used o previous pages and the abbreviation needs to be explained where it is used for the first time [Baerbel Hoenisch, USA]	Accepted: text revised.
18616	1	19	8	19	16	This section on mitigation shoudl be more developped since SR15 briefly discuss ocean-based mitigation approaches. Besides, for some options mitigation is adaptation. For instance, coastal ecosystem preservation is adaptation. It results in a larger sequestration of carbon in sediments or other blue carbon reservoirs. [Roland Seferian, France]	Rejected. It is not the task of the framing chapter to comprehensively cover mitigation. The agrred outline is quite specific about which mitigation options should be covered: "Blue carbon, mangrove restoration, and other nature-based solutions".
19366	1	19	8	19	8	"greenhouse gas (GHG) emissions", not "greenhouse gases (GHG) emissions" [Michelle A. North, South Africa]	Accepted: text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12336	1	19	9			Related to my earlier point, removing GHG from the atmosphere by something like direct air capture is not "enhancing the sinks" and should therefore not be considred part of mitigation. To me this seems like confused thinking that will only serve to allow people to ignore emissions reductions as the first line of defence. [Eric Wolff, UK]	As mentioned above, this report uses the definition of mitigation used in IPCC AR5 (A human intervention to reduce the sources or enhance the sinks of greenhouse gases). Hence, DAC is considered to enhance the sinks. This is in agreement with UNFCCC (eg, Art 1.8) for which sinks comprise "any process, activity or mechanism which removes a greenhouse gas, aerosol, or a precursor of a greenhouse gas from the atmosphere".
18234	1	19	11	19	11	Please indicate where mitigation is addressed in the report (which Chapter(s)). [Laurens Bouwer, Netherlands]	Noted. It was mentioned in a table of the appendix. In the SOD, the chapters covering the measures will be indicated right in the figure and the table removed.
6422	1	19	12	19	12	pullution reduction, Especially Oil and Hospital Pollution [Leila Rashidian, Iran]	Rejected. It is not possible to list here all sources of pollution.
23576	1	19	20	19	53	This section is imbalanced; it starts of well by naming a variety of responses, but then the emphasis is placed on adaptation responses of marine (micro-) organisms and is lacking discussion of higher organisms, large animal species, high mountain species. [Hans-Otto Poertner and WGII TSU, Germany]	Rejected - additional explanation in comment section
24548	1	19	20			title seems unspecific in light of definition of natural systems, better use ecosystems [Hans-Otto Poertner and WGII TSU, Germany]	Rejected: It was decided to use "natural system" and "human system" to differentiate talking about living organisms and their physio-chemical environment (natural system) and the human interactions with those natural systems as the "human system".
2688	1	19	25	19	25	Himalayan' should be 'alpine', because Himalayan is a proper noun but there is a variety of apline areas in the world. [Kentaro Hayashi, Japan]	Accepted - Delete "Himalayan"
6638	1	19	25	19	25	If Himalayan ecosystems are substantially different from other high altitude systems then an explanation should be provided, otherwise it is wrong to single out one mountain chain (albeit the biggest one). [APECS Group Review, Germany]	Accepted- text revised
12338	1	19	25			How is Himalayan separate from high altitude (and if mentioned explicitly why not also eg Andean)? [Eric Wolff, UK]	Accepted- text revised
14176	1	19	25			high-altitude [Christopher Fogwill, UK]	Accepted- text revised
19368	1	19	27	19	28	The following doesn't make sense and should be reworded: "...ocean and cryosphere change as a more general driver." [Michelle A. North, South Africa]	Accepted- text revised
14178	1	19	30			climate change (no hyphen needed) [Christopher Fogwill, UK]	Accepted- text revised
16174	1	19	30	19	30	remove extra comma after parenthesis [Lynne Talley, USA]	Accepted- text revised
18236	1	19	38	19	38	Please adda a reference to Chapter 6 here. [Laurens Bouwer, Netherlands]	Accepted- text revised
4730	1	19	43	19	53	There is an growing and elaborate body of literature that shows that marine organisms can adapt through acclimation, transgenerational and evolutionary adaptation (Gaylord et al., 2015; Munday et al., 2013; Munday, 2014). This section is very negative and dismisses the role of adaptation of marine populations and ecosystems, which is not supported by evidence. Why is this? [Manuel Barange, Italy]	Accepted: a paragraph on different types of biological adaptation has been added to 1.6.1

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23578	1	19	43	19	50	The literature in the first part of this paragraph is exclusively about phytoplankton / microorganisms but the text reads as though the statements apply to all organisms. Please make this limitation clear; evidence on microorganisms cannot simply be transferred to higher organisms. [Hans-Otto Poertner and WGII TSU, Germany]	add a new sentence in line 44, following ",,, is emerging." The sentence would read "Because of their much shorter generation times, evidence for evolutionary responses is more readily documented for micro-organisms and phytoplankon (e.g. Schaum et al. 2016) than for longer-lined organisms, where evidence for evoluionary changes in response to climate change pressures is inferential from models and limted field observations (e.g. Gaylord et al., 2015; Munday et al., 2013; Munday, 2014).
13138	1	19	48	19	48	please replace "there is little data" by "there are few data" [Baerbel Hoenisch, USA]	Accepted - Text revised
16906	1	19	50	19	51	The sentence "Projection methods…" is cryptic in the context. What is the assessment result here? [Markku Rummukainen, Sweden]	Accepted: Added "STATISTICAL" before "Projection methods"
14004	1	19	55	20	33	This section should refer to the adaptation happening in cities given the focus in Chapter 4 and that local governments around the globe are actively addressing SLR. [Debra Roberts and Durban Team, South Africa]	Jake and Raphael
604	1	20	0			After "risk attitudes of" add "and returns for" [William Clarke, Australia]	Accepted. Text revised.
12496	1	20	1	20	33	This section, especially the first 2 paragraphs, gives the impression there haven't been many developments in the adaptiion field, with some pretty old refs cited. The field has advancedv rapidly, and while there is still a lot to be done, the text gives the impression there has been very little advancement. Adger (2005) is very dated for example, I suggest the authos read AMAPs AACA assessment which has specific chapters focused on adaptation in polar regions and can help make this section more uptodate. Ford et al (2014) surveys the state of adaptation in the Arctic. [James Ford, Canada]	Accepted. We have updated the text and referencs. Regarding types of adaptation measures, we now refer to a more recent frame developed within this report, which are carried out in each of the chapters.
15380	1	20	2	20	3	This sentence should be discussed with Chapter 2 authors. [Samuel Morin, France]	Taken into consideration by author teams.
16546	1	20	2	20	3	Adaptation in mountain communities, especially among the ski community, has moved beyond just coping strategies. The current reference from Behringer et al. (2000) needs to be updated. See e.g. Dawson & Scott (2013), "Managing for climate change in the alpine sector" article [Osman Cenk Demiroglu, Sweden]	Taken into consideration by author team; text removed.
21328	1	20	2	20	3	For mountain areas, much more has been published on adaptation. The Behringer et al. 2000 citation is very old, and is a rather strong statement. See the HIMAP chapter on Adaptation (forthcoming with SpringerNature) for a thorough analysis of adaptation in the HKH region. All HIMAP chapters have now been submitted to Springer, and will be shared with TSU in their pre-publication form. [Philippus Wester, Nepal]	Taken into consideration by author team; text removed.
2930	1	20	3	20	3	By "coping" do the authors mean "accomodation"? "Coping" is not one of the three categories identified. [Robert Kopp, USA]	Taken into consideration by author team; text removed.
4732	1	20	6	20	14	In marine fisheries, the growing implementation of Ecosystem Approaches to Fisheries (EAF) is a societal response to mainstream biodiversity considerations, and are societal adaptations to change. It is worth mentioning as a specific example (e.g. Serpetti et al. 2017, Scientific Reports; Link and Browmann 2017 ICES JMS…) [Manuel Barange, Italy]	Accepted. Text revised and reference added.
19370	1	20	6	20	7	Reword this sentence [Michelle A. North, South Africa]	Accepted. Text revised. Copyedit to occur prior to publication.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17240	1	20	7	20	8	it would be good to include some examples of what nature-based approaches and managed retreat mean as these are esential concepts for climate action [Iulian Florin Vladu, Germany]	Taken into consideration by author team; cross-references to other chapters added, which provide examples.
5204	1	20	8	20	10	for "emerging evidence" I would expect a more up to date citation, i.e. not just one that was now 13 years old (Adger et al 2005) [Pauline Midgley, Germany]	Accepted. References updated.
16064	1	20	8	20	8	Change "managed retreat" to "managed retreat and other forms of internal migration, as well as cross-border migration". See, for example: Climate Change and Migration in the Pacific: Links, attitudes and future scenarios in Nauru, Tuvalu, and Kiribati (United Nations University Institute for Environment and Human Security). [Nathan Ross, New Zealand]	Taken into consideration by author team; text revised.
19372	1	20	11	20	12	Replace 'under-researched' with 'inadequate' (because scientific evaluation can't be under-researched), and change 'will be' to "is urgently needed". [Michelle A. North, South Africa]	Accepted. Text revised. Copyedit to occur prior to publication.
16908	1	20	12	20	12	It is not clear what the sentence "and evidence will be urgently needed to document progress towards the global adaptation goal" conveys. It sounds like a policy-recommendation? [Markku Rummukainen, Sweden]	Taken into consideration; text revised.
15544	1	20	13	20	13	I would suggest to rephrase this sentence " [...] The priorities for adaptation will depend on the risk attitudes of investment institutions" [Edmond Totin, Benin]	Accepted. Text revised. Copyedit to occur prior to publication.
16066	1	20	13	20	13	The priorities for adaptation will depend on many factors, not just the attitudes of investment institutions. For example, for coastal communities in the Pacific, it will depend on financial and other capacities of affected households and communities, local government, and national government. [Nathan Ross, New Zealand]	Accepted. Text revised. Copyedit to occur prior to publication.
18358	1	20	22	20	25	Kindly demistify and please make it lucid for easy apprehension: "In exploring.....coasts and deltas". Kindly brief on scenario planning and adaptation pathway. [Suvadip Neogi, India]	Accepted. Text revised for clarity.
19374	1	20	23	20	23	Alter to read: "...scenario planning and 'adaptation pathway' design have gained..." [Michelle A. North, South Africa]	Accepted. Text revised. Copyedit to occur prior to publication.
19376	1	20	25	20	25	Alter to read: "...concepts are helpful when choosing..." [Michelle A. North, South Africa]	Accepted. Text revised. Copyedit to occur prior to publication.
18238	1	20	27	20	27	Please add "and uncertainties". [Laurens Bouwer, Netherlands]	Accepted. Text revised.
6640	1	20	29	20	29	Please define residual risk. [APECS Group Review, Germany]	Taken into consideration in CCB1; text removed here.
12498	1	20	29	20	29	unclear what residual risk is, how it is assessed / identified, and therefore why it is a major focus. [James Ford, Canada]	Taken into consideration in CCB1; text removed here.
15466	1	20	29	20	29	"residual risk" has been previously mentioned in this Special Report (just one time), but it has not been defined up to this line. In order to dispel doubts, consider to include a short definition concerning it. [Hernan Sala, Argentina]	Taken into consideration in CCB1; text removed here.
18240	1	20	32	20	32	Please adda reference to losses and damages, and a reference to Loss & Damage, as discussed in Cross Chapter Box 1. [Laurens Bouwer, Netherlands]	Accepted. Text revised.
1586	1	20	36			Secton 1.6 is highly relevant – more detail could be well justified, given the specific concerns of alpine and arctic situations for people. [Wolfgang Cramer, France]	Taken into acount: We have included this.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4734	1	20	36	21	12	Section 1.6 is rather weak. It focuses a bit on climate governance (if this is possible), but not on governance systems of goods and services, where major changes could be promoted. It also points towards fears rather than opportunities to fix systems that are currently -in some cases- not operating properly. As it stands it is a lost opportunity, that shows the drafters are not governance experts and do not know what to say about it. [Manuel Barange, Italy]	Accepted - text revised
12500	1	20	36	20	57	A narrow view of governance and instituions is taken here referring primary to state led formal mechanisms. In local and Indigenous communities - very important in this assessment - informal governance, customs, social relations etc also are very important and need to be acknowledged and assessed. [James Ford, Canada]	Accepted - text revised
5072	1	20	38	20	38	To add after (negotiate), "Capabilities". [Essam Hassan Mohamed Ahmed, USA]	Accepted - text revised
15540	1	20	38	20	54	It is interesting that authors make this assumption that local/indigenous institutions can enable or constraint adaptation. I would suggest, if possible, to elaborate a bit with one or two specific case studies that show how this can happen in the context of the ocean and cryosphere. The report can get more visibility by illustrating the causes of the major governance challenges to ocean and cryosphere change. For instance, why access and engagement of private sector, public sector and business sector capabilities are still a challenge? (it can be the poor policies available, communication challenges – how to articulate strong research evidence to convince policy/private sectors?) [Edmond Totin, Benin]	Accepted - text revised
24722	1	20	38	21	12	This section discusses governance and institutions in a general sense (and discusses the specific organizations in a later chapter). The discussion looks like it could have been written twenty years ago, and just had the references and examples updated. I'd like to suggest that now, more than ever, the private sector is getting involved in addressing ocean health and sea level rise. This can be seen with the private sector developing new methods to monitor the ocean and trade groups caring about over-fishing. This can also be seen with the insurance and re-insurance industries getting directly involved in assessing future change and risk. Adding a few sentences in this direction could help flesh out this area into a more inclusive and accurate description of relevant institutions. [Elizabeth Weatherhead, USA]	Accepted - text revised. Point on pvt sector is well taken

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16068	1	20	47	20	49	There is no clear risk to statehood, except when scholars talk about there being a risk to statehood. Statehood, once attained, cannot be taken away both third parties. On the peoples of that state are competent to make changes to their legal status in international law. See Alberto Costi and Nathan Jon Ross "The Ongoing Legal Status of Low-Lying States in the Climate-Changed Future", Chapter 6 in Petra Butler and Caroline Morris (eds) "Small States in a Legal World" (Springer, 2017). There are, however, risks to the right to self-determination (see: OHCHR Report of the Office of the United Nations High Commissioner for Human Rights on the relationship between climate change and human rights A/HRC/10/61 (2009)), and to culture (see Margaretha Wewerinke "A Right to Enjoy Culture in the Face of Climate Change: Implications for 'Climate Migrants'" (2013) CGHR Working Paper #6 / 4CMR Working Paper #7, Cambridge Centre for Climate Change Migration Research, University of Cambridge). There are also risks to political institutions that reflect culture and self-determination (see: Susannah Willcox "Climate Change Inundation, Self-Determination, and Atoll Island States" (2016) 38 Human Rights Quarterly 1022 at 1024). [Nathan Ross, New Zealand]	Noted
23580	1	20	47	20	49	Could you briefly mention why these states are losing their state, culture and voice? Also this sentence is out of place here - it sits between two statements about river basins. Please swap it with the previous sentence to improve logical flow. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted - text revised- and reference added
15542	1	20	48	20	48	Based on the definition that was given for “institution” in L41, “ […] losing their state, culture and voice in institutions including the United Nations” should rather be “losing their state, culture and voice in organizations including the United Nations” [Edmond Totin, Benin]	Accepted - text revised- and reference added
21330	1	20	50	20	50	In addition to the Molle 2009 reference, consider citing Warner, Wester, Bolding 2008, who make a similar argument on river basins being a political construct. [Philippus Wester, Nepal]	Accepted - text revised- and reference added
12502	1	21	0	21		Table 1.1. and associated text focused on the differences between ILK and science, yet what about the similairites and overlaps? Moreover, many Indigenous / local knolwedge systems integrate scientific understanding and approaches alongside the Indigenous / local (and also vice versa). it is often not a case of Indigenous vs. scientfic but of hybrid systems. i think this needs to be at least mentioned. Riedlinger and Berkes (2001) is an old ref but one i have found quite useful. Huntington 2011 in Science is also important here. [James Ford, Canada]	Accepted- We have now removed table 1.1 from the section and revised the text to talk about complementarity and overlaps of knowledge systems, both suggested citations added.
12504	1	21	0			In this section and chapter, Indigenous and local knowledge are referred to together, often as the compound ILK. I would argue thay Indigenous and local knowledge are very different and should not be combined as one term. In the SR1.5 for example, we make the difference between Indigenous and local knowledge; both are rooted, in many instances, in different worldview, cosmologies, and socio-cultural cotexts. [James Ford, Canada]	Accepted- we have separated the knowledge systems

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12506	1	21	0			Building on my above comment, the text profiles ILK and science as different, and consequnetly has sections focused on each. I would also propose a section focusing on where science and Indgenous knowledge can be combined / connected to reveal new understanding. [James Ford, Canada]	Accepted- We have done this in the SOD
16042	1	21	0	26	0	I am very pleased to notice the inclusion of a section which takes into account the importance of the different kinds of knowledge. Both knowledge systems are well described into this section. Still, I find lack of information in the sense of explaining and describing what the contributions of the Indigenous and Local Knowledge are. It is very specific and well developed for the scientific knowledge within this section, describing examples of how it contributes to all the research on cryosphere and oceans and climate change (ocean and cryosphere observations, paleoclimate evidence, modelling data, reanalysis data). Nevertheless, I am not able to find the same depth in the information on the main body of this section. After describing the ILK there is only a reference to a table and cross chapters in the document. I strongly encourage the writers to make more efforts to give knowledge systems and ILK specifically more relevance within the main body of the document. [Mariela Lopez-Gasca, Venezuela]	Accepted- We have done this in the SOD
22570	1	21	0			Reliability of Indigenous knowledge should be noted as subject to survival success as well. [Eva Kruemmel, Canada]	Taken into account- we do this without specifically saying 'survival'--but by implying it when we talk about how most people use it to navigate their world
22572	1	21	0			Indigenous knowledge addresses more questions than just impact on wildlife - it addresses questions with regards to the whole ecosystem, and how things are connected. [Eva Kruemmel, Canada]	Accepted- Table is gone.
15382	1	21	3	21	3	The term "poor" is probably not the best choice ; what about substituting with "inadequate" ? [Samuel Morin, France]	Accepted - text revised
19378	1	21	5	21	5	Alter to read: "This must work together with the global governance structures…", rather than 'in addition to' [Michelle A. North, South Africa]	Accepted - text revised
14180	1	21	8	21	11	no capital letters needed on first, second and third [Christopher Fogwill, UK]	Accepted - text revised
2890	1	21	9	21	11	A possible reference to include in these sentences is Pauw et al., 2018. These authors highlight that the Nationally determined contributions (NDCs) were key to implementing the Paris Agreement and the bottom-up approach allowed developing countries to include other priorities, such as adaptation and finance, thus creating political buy-in. Pauw, W.P., R. Klein, K. Mbeva, A. Dzebo, D. Cassanmagnago, A. Rudloff, 2018: Beyond headline mitigation numbers: we need more transparent and comparable NDCs to achieve the Paris Agreement on climate change. Climatic Change, 147, 23-29. [M. Dolores Garza-Gil, Spain]	Rejected - due to space constraint, could not add this.
70	1	21	10	21	11	"Second" and "Third" should not be capitalized. [Daniel Farinotti, Switzerland]	accepted - Text revised
1588	1	21	18			While the statements in the Executive Summary on ILK were way too short and probably misleading with respect to the actual objectives of the report, this section is way over the length and level of detail I would consider appropriate for this Special Report. I propose to focus very precisely on the issues at stake for people in Arctic and alpine situations. [Wolfgang Cramer, France]	Taken into account: we have worked to extensively revise the text and to clarify the main messages.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
22372	1	21	18	24	8	Section 1.7.1 Diversity of knowledge: Very important perspective. However, even in western society, there are population groups that share a worldview that is unlike the Scientific Knowledge worldview. The distinction is prevalent among deeply religious and faith-based societal groups, and it is difficult or nearly impossible to alter their worldview using Scientific Knowledge principles. Indeed, their prevailing worldview is often anti-science. This may actually comprise one of the major political obstacles to progress on addressing climate change. While the IPCC must continue to carry out its role in assessing the state of knowledge in the Scientific Knowledge context, the way it is communicated may need to be adapted to target audiences. [Gary Lagerloef, USA]	Taken into account - covered in Section 1.8.3, last paragraph.
5074	1	21	19	21	19	Add subsection, before 1.7.1, talking about: Updated climate change information variation process. [Essam Hassan Mohamed Ahmed, USA]	Rejected – unclear what the reviewer is suggesting.
2760	1	21	20	22	1	Subsection 1.7.1 is for a general report. It does not contribute to this report specifically. [Javier Martin-Vide, Spain]	Rejected- We speak generally because we are formally introducing IK & LK to the IPCC framing in this report and we also make specific cases for the SROCC context in the text and the figure and the CCB.
6166	1	21	20	26	36	Perhaps integrate Section 1.7.1 into 1.7.3 to avoid repetition and have all ILK together for easier readability [Regine Hock, USA]	Taken into account – text revised and section restructured
6168	1	21	20	27	20	I don't think an IPCC report is the right place for campaigning for better integration of ILK into science. At least for the cryosphere. >99% of all physical assessment statements later are based on 'hard-core' scientific methods (satellites, direct measurements …). ILK may be used in local communities for planing but it occupies disproportionately much space in the chapter, and is not balanced, especially the 'prescriptive' statements advocating for their wider use. Likewise we don't advocate for other measurement methods (e.g. future satellite missions) in this report. Much of the paragraphs dealing with ILK seem out of place and should be removed/shortened especially in light of the box that gives it additional emphasis. [Regine Hock, USA]	Taken into account: It is exactly because 99% of all infomration is based on scientific knowledge that it is critical to define IK and LK , to formally frame it in the IPCC so it is there from here on out. Text has been extensively revised to clarify message, remove prescriptive text, and provide more examples and linkages to the SROCC chapters.
2662	1	21	22	21	23	More descriptions should be provided about the local knowledge and its role in adapting to climate change [Mohammad Javad Zareian, Iran]	Taken into account - examples of LK added to 1.7 text and to the IK & LK CCB.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6052	1	21	22	21	37	The Inuit Circumpolar Council feels strongly that Indigenous Knowledge and local knowledge should not be lumped together. They are very different and distinct from one another and we would like the term "Indigenous and local knowledge - ILK" to be removed from this assessment and replaced with "Indigenous knowledge (IK)" (and adding "local knowledge" where appropriate). Indigenous knowledge is based on a specific culture and knowledge system, has its validation process and is passed forward from generation to generation, often thousands of years old. Local knowledge is aqcuired due to experiences and observations made by living in a specific place, but is not necessarily based on a knowledge system or a specific culture. These terms cannot be used interchangeably and lumping them here together would encourage readers to make the assumption that they are one in the same or at least very similar. Please therefore refer to Indigenous knowledge and local knowledge separately. The Inuit Circumpolar Council has a specific definition for Indigenous knowledge that we would be happy to provide. [Joanna Petrasek Macdonald, Canada]	Accepted- : We have now separated the two knowledge systems.
6276	1	21	22	27	20	Explanations and discussion of knowledge systems illustrate how technology, science and local knowledge are elements of understanding what is happening and how societies have responded to climatic changes in the past and what they may do in the future. This report fairly highlights where we have strong data sets and where there are gaps in our knowledge. For successful adaptation and protection of ecosystems, the monitoring and research into a variety of phenomena must be expanded. The role of Paleoclimate evidence is appropriately highlighted. The use of models and reanalysis data reflects the efforts of the IPCC to ensure information and analysis is strengthened. The integration of ILK and SK makes the report stronger. [Melinda Kimble, USA]	Accepted--Thank you
21332	1	21	22	21	33	Section 1.7 is important, and the first paragraph starts out well. But this is not followed up on the sub-sections that follow. Unclear what the main point is, and where this leads to. [Philippus Wester, Nepal]	Taken into account: we have worked to extensively revise the text and to clarify the main messages.
22566	1	21	22	21	37	Please do not mix Indigenous and local knowledge, those are different things. Indigenous knowledge is based on a specific culture and knowledge system, has its validation process and is passed forward from generation to generation, often thousands of years old. Local knowledge is aquired due to experiences and observations made by living in a specific place, but is not necessarily based on a knowledge system or a specific culture. It is very important not to mix the two, or use the terms interchangeably! Please therefore refer to Indigenous knowledge and local knowledge separately. We are happy to provide a definition for Indigenous knowledge that the Inuit Circumpolar Council has created. [Eva Kruemmel, Canada]	Accepted- We have separated the two knowledge systems.
24724	1	21	22	21	37	This section on Indigenous knowledge could use some serious updating to reflect the more current thoughts in this area. Specifically, a number of relevant papers are missing including (Weatherhead et al., 2010; Krupnik et al., 2010; Gearheard et al, 2010; Gearheard et al., 2017, etc.). And this sampling only covers some of the Arctic papers that are missing. [Elizabeth Weatherhead, USA]	Accepted- Thank you for your excellent suggestions and we have brought them in.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6642	1	21	24	21	24	I would substitute "is interacting with" by "impact on". This is because climate change is the consequence of the interactions between the components of the climate system in response to changes in radiative forcing. Thus to my opinion, it is perhaps more correct to say that climate change impacts on ocean and cryosphere evolution. [APECS Group Review, Germany]	Rejected- disagree-- it is importnat that it read 'is interacting with' because there are no one way processes here but they are dynamic and interacting
2932	1	21	25	21	27	I'm not sure the "most people" here is justified. Certainly, the examples provided do not indicate that the urban majority of the global population use an Indigenous or Local Knowledge system. [Robert Kopp, USA]	Taken into account- this helped us realize that we were not explicit enough about what local knowledge. We have rewritten accordingly so it is clear that most humans use an Indigneous use our expereicne and learned ways to negotiate the world
6644	1	21	32	21	32	I would add "mitigation" close to "adaptation" at the end of the sentence. I find in general that the concept of "mitigation" is not cited or used frequently. However, our adpation to climate change might also impact our ways of mitigation of climate change and our mitigation actions might also impact on our adpation to climate change. So this is a feedback. This is a concept that is not introduced in this part of the chapter and I would say that for a component like the cryosphere, responding very fast to climate change, this is specially true. [APECS Group Review, Germany]	Rejected- We are quoting someone here and so cannot add to what they said.
11030	1	21	35	22	7	This contrast of ILK and scientific knowledge simplifies both types of knowledge, and neglects much recent literature. Some ILK is based on the spirit world, on intuition and subjectivity, but other parts are highly empirical and even experimental. Nor is all science hierarchical, since the relations of different bodies of western or cosmopolitan science are often web-like, and contested. Arun Agrawal's 1995 articcle "Dismantling the Divide Between Indigenous and Scientific Knowledge" states "To productively engage indigenous knowledge in development, we must go beyond the dichotomy of indigenous vs. scientific," Even older ithe 1990 volume, edited by David C. Lindberg, Robert S. Westman "Reappraisals of the Scientific Revolution." These would be starting points to reconsider this table and discussion. [Ben Orlove, USA]	Accepted - text revised - Table removed
13364	1	21	35	21	37	Caution against this kind of blanket distinction. If science is the pursuit of knowledge, then IKS very much qualifies as scientific. Also, the distinction excludes other sciences (e.g. certain strand of Social Sciences) that do not conform to this characterisation of 'science'. [Debra Roberts and Durban Team, South Africa]	Accepted- text revised to addrss these issues.
16910	1	21	35	22	7	This kind of a general introduction of " knowledge systems" would seem to be out of scope, and not very releant to the assessment. [Markku Rummukainen, Sweden]	Accepted- Revised and reorganized statement and removed Table.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
24726	1	21	35	21	37	“Overall, scientific knowledge can often be characterized…” should be changed to “Historically, scientific knowledge has often been characterized…” and this section should be updated. The term “holistic” is a flashpoint for some and should—perhaps--be avoided unless it is more clearly explained. Local knowledge often does not include understanding from the whole Earth to explain observed phenomena; climate models are good at integrating lots of information across the globe. Which is a more holistic approach? This section also ignores some of the great benefits of Indigenous Knowledge including the ability to focus on aspects of the environment that are most important and the ability to extend the historical record of what has happened earlier than modern instrumental approaches can. [Elizabeth Weatherhead, USA]	Accepted- Revised and reorganized statement and removed Table.
2828	1	21	37			Amalgamation?? of understandings?? [Anne Guillaume, France]	Accepted- Revised and reorganized statement and removed Table.
72	1	21	40	22	1	Table1.1: Replace the two instances of "the universe" with "nature". [Daniel Farinotti, Switzerland]	Accepted- Removed Table.
248	1	21	40			Describe knowledge deficiency as provided by Ayyub and Klir (2006) [Bilal Ayyub, USA]	Rejected- Reference refers to modeling in Science whici is not relevant here.
2830	1	21	40	22	1	IMPORTANT - Table 1.1 : it is not clear if the table is a copy of a table found in the references or made from these references. I am arguing that column SK is NOT as objective as it is written, and cannot hide that it is a subjective statement of scientists. Here are some reasons: SK is NOT value free, this is an holistic thinking of scientists, it is valuable BECAUSE of its « scientific accountability by pairs ». Information transfer is not « relatively easy » this is a computer scientists view, just ask a scientist who does not use computers. Another aspect is totally forgotten in the list, « energy consumption ». And last but not least, the « nature of knowledge » may be more objective for SK than ILK, but there is quite some room to achieve « total objectivity » in SK, if only because SK is NOT error free (in its theories and in its logical building). [Anne Guillaume, France]	Accepted- Removed Table.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4648	1	21	40	32	5	The introduction to indigenous knowledge is a significant departure from AR5, even when covering many closely related topics (e.g., AR5 WGII Section 6.4). This change is critically important to get right if it is to be made. The present presentation in chapter 1 has some worrying aspects to me, both as a WGI author and as a US citizen. We must be very careful about grounding the basis of truth and facts. There are many present and historical examples where indigenous and minority considerations were not valued. It is a balance between these two realities, and an acknowledgement of the strengths of each approach that is sought, not a false dichotomy or assumed equivalence. The present introduction features a lot of value signaling, which will be important to some audiences, perhaps many that are new ones for the IPCC or ones that have felt excluded by past reports. However, I think some aspects of the present presentation are lacking in demonstrated value to WGI and WGII goals such as accuracy and sound governance, rather than an intention to honor traditions without direct application to UN goals. Some of the key moments in the writing that struck me were in Table 1.1, such as "multiple realities shaped by the diversity of human connections to the world" versus "one reality, knowable within probability". I believe that this is a false dichotomy including an openness to varying epistemology that is too wide. I think it opens the door to many groups that reject the reality of changes and probabilities associated with those changes by exploitation of regional, cultural, political, and religious concepts. To illustrate, readers of a particular inclination are likely to seize on the quotations on Line 30 of page 21: 'the plurality and heterogeneity of worldviews' (Obermeister, 2017) resulting 'in a partial understanding of core issues that limits the potential for locally and culturally appropriate adaptation responses', as an opportunity to take local and cultural license. What specifically distinguishes "our tradition requires nothing at all of us to protect the environment" or even worse "drill, baby, drill" from ILK? How does the present introduction to these topics assign value to various claims from a diversity of perspectives, or if it does not exclude any how is the system of governance engaged to balance these competing epistemologies? I think the intended subtext here is a protection of human rights argument at its core, but that argument is not made here or referenced to other works elsewhere, thus it is assumed. If this intended transformation toward including indigenous knowledge is to be a powerful and convincing one, it must demonstrate early on how the existence of multiple realities from an indignenous perspective actually enhances SROCC and in particular how it refines and strengthens practices in governance, equity, and sustainability. The case studies in Cross-Chapter Box 2 and later chapters do a better job of introducing the value of this approach. The ungrounded epistemological and ontological statements in the introductory chapter are not a good reflection of how these pieces come together in practice. In my opinion, the presentation assumes that values are held by the reader that are not shared widely outside of academia, rather than demonstrating the power of recognizing these differences and building governance in concert in particular cases or contexts, or by reference to other UN agreed statements of shared values (e.g., the UDHR or UNFCCC). The next line in the table, "guided by relational accountability" versus "value free", is a better in that it is clear (to me anyway) why relational accountability is a good reason to bring this knowledge in, but it is misleading in that science is not "value free", as science is built upon the value of experiments and the value of accurate predictions as clarified in the following section. Thus, "value" is being used as a term of art in this section, in a way that is not defined or referenced to agreed understand of value from a UN perspective. This inclusion of ILK in SROCC is a significant change from previous practice, which implies it is worth doing extremely well. Right now, I am not convinced that enough care has been taken in	Taken into account: Thank you for your thoughtful comments. We realize this is a delicate balance to frame the knowledge systems to represent them fully and with clarity and specificity. We have removed the table which presented many of the problems you are concerned with (I can only assume since your comment is for pages 21-40 in general and you do not specify exactly the language). We have worked hard on the SOD to address many of the topics you and other reviewers are pinpointing—issues of 'truth' and 'fact' , valuing all knowledge systems, avoiding value signaling, excluding anyone. We have also included language on rights and including multiple stakeholders and they empirical ways of knowing.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4736	1	21	40	22	2	1. The table is not appropriate - it intimates that SCIENTIFIC KNOWLEDGE and INDIGENOUS KNOWLEDGE are equivalent and ought to be considered equally. This is plainly wrong. The full basis of IPCC is on objective, evidence-based, analysis of facts. To say it is " another" way of knowing, equivalent to "spiritual, including the unexplicable" is non-sensical and deeply worrying. You cannot undervalue science in this way. 2. the reference to "sentient beings" in l. 22 comes out of the blue, has no context, and it is uncalled for. whether local ecosystems are imbued with sentient or non-sentient beings is irrelevant for the purpose of contextualising SROCC. 3. I fail to understand the defensive approach taken in this section to give the impression that we are politically correct in valuing local knowledge. Of course we value knowledge, local or not, provided it can be scrutinized and tested. Otherwise, local, indigenous or not, has no place in this report. [Manuel Barange, Italy]	Accepted- Removed Table.
13152	1	21	40	21	40	I would suggest to move Table 1.1 into Cross-Chaper Box 3 [Baerbel Hoenisch, USA]	Accepted- Removed Table.
13366	1	21	40	22	40	Table 1.1 It seems that this comparison in itself is a 'scientific' approach, and it would be interesting to consider what a comparison from the 'indigenous' perspective would look like. [Debra Roberts and Durban Team, South Africa]	Accepted- Removed Table.
13368	1	21	40	22	1	This table raises more questions than answers in terms of clarifying the differences between the two knowledge system - needs more explanation. [Debra Roberts and Durban Team, South Africa]	Accepted- Removed Table.
19104	1	21	40	21	41	add "idealized" or something similar in front of "scientific knowledge" [Anna Zivian, USA]	Accepted- Removed Table.
22356	1	21	40	22	1	Make capitalization consistent e.g. at beginning of each bullet point (slow and inconclusive, fast and more selective) [Handa Yang, USA]	Accepted- Removed Table.
6054	1	21	41			Table 1.1 is very concerning and must be extensively revised or removed. Was the information included in this table compiled with input from any Indigeous authors? It is extremely inappropriate to define and compare knowledge systems on the basis of three publications. Furthermore, the format of this table, unintentionally or not, sets Indigenous knowledge against scientific knowledge through a comparison. Perhaps most offensive is that in the row on 'Reason for doing the research', under IK it states the reason is to reconstruct a body of knowledge to enrich mainstream thinking. This is unacceptable. The 'reasons' for aquiring Indigenous Knowledge and 'doing the research' are much broader and more meaningful. For example, building and maintaining IK contributes to cultural integrity and survival in a climate and landscape where this knowledge is essential. Furthermore, the discovery aspect included under the Scientific knowledge heading also very much applies to IK. Discovering how the world works, why things are the way they are, the interrelatedness of systems, etc. are all reasons for IK research. In addition, I would strongly argue that IK is not always general, scientific knowledge is not always objective nor is it always value free, and the 'Ease of information transfer' and 'accessibility' rows are misleading. Publishing this table without direct Indigenous input is not appropriate. The Inuit Circumpolar Council has done much research and has much knowledge on the topic of IK and could provide appropriate input. [Joanna Petrasek Macdonald, Canada]	Accepted- Removed Table.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6156	1	21	41	21	41	cell: sicenitifc knowledge/reason for doing the research: this is one reason but in earth science probably not the dominant one [Regine Hock, USA]	Accepted- Removed Table.
22568	1	21	41			The reason for aquiring Indigenous knowledge is not just to reconstruct a body of knowledge to enrich "mainstream thinking"! It is often a question of survival - only successful hunters were able to survive! In some cases it is also a natural curiosity with regards to how things are connected, which is not different from the scientific reason. [Eva Kruemmel, Canada]	Accepted- Removed Table.
6654	1	22	0	22		Table 1 - "Kinds of questions that can be addressed" raw: to me, many concepts are missed up between the scientific knowledge and the ILK. I would move "rates of change" from the ILK column to the scientific column. This is because ILK is defined as a "qualitative" way of getting observations, while scientific measurements, based on and corrected by statistical approach can provide rates of change [APECS Group Review, Germany]	Accepted- Removed Table.
6656	1	22	0	22		Table 1 - "Kinds of questions that can be addressed" raw:I a not sure I understand "impact on wildlife", would it rather be "impact ON wildlife"? [APECS Group Review, Germany]	Accepted- Removed Table.
6658	1	22	0	22		Table 1 - "Kinds of questions that can be addressed" raw:"short-term natural variablity" of what? Climate, weather? [APECS Group Review, Germany]	Accepted- Removed Table.
24550	1	22	0			The section on characteristics of scientific knowledge appears as a high level treatment where it is unclear to what extent it is relevant and frames the assessments in the other chapters. [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: text has been extensively revised
15384	1	22	1	22	1	In the table, the sentence "Depending on data type, can be relatively inexpensive etc." should be rephrased. It is not correct to consider that instruments on weather stations are cheap. Each individual piece of equipment can be affordable, but running and maintaining extended networks of in-situ meteorological observations is far from cheap and is rather a considerable proportion of the budget of national weather services worldwide. I suggest rephrasing this entire mini paragraph in the table. Each satellite costs much more than each weather station, but there are thousands of weather stations around, with significant management and operational costs, so it would be unfair to consider one to be cheap and the other expensive. [Samuel Morin, France]	Accepted: table has been removed
6158	1	22	3	25	57	overlap with chapter 2, needs to be resolved where goes what. [Regine Hock, USA]	Accepted – text revised to delete overlap to Chap.2
6160	1	22	3	25	57	GRACE has revolutionized glacie/ice sheet mass change assessments and should be mentioned [Regine Hock, USA]	Accepted. A introduction to GRACE was included "Almost all monitoring of the Greenland and Antarctic ice sheets, and the sea ice coverage across the polar oceans, is based upon satellite observations which have allowed measuring the mass changes of the ocean, ice sheets, glaciers since 2002".
13370	1	22	3	22	7	The value of having this sub-heading in a report of this nature is not clear. It is quite misleading as the section deals only minimally with the characteristics of scientific knowledge. Also, is a description of scientific knowledge is warranted? Suggest the sub-section should be titled 'Advances in Scientific Knowledge of the Ocean and the Cryosphere'. [Debra Roberts and Durban Team, South Africa]	Taken into account - text and title are revised
24728	1	22	3	24	8	This is a good section to add a bit more on the value of Indigenous Knowledge. [Elizabeth Weatherhead, USA]	Taken into account: structure of section 1.8 has changed

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6282	1	22	5	22	7	This definition of "scientific knowledge" given here seems a little sloppy, or to be more precise, outdated and incomplete. A large portion of modern (perhaps post-modern?) physical, life, and social science involves non-reductionist analysis, modeling, and prediction of complex systems that are more than the sum of their parts - think about self-organized criticality, fractal pattern formation, cellular automata and agent-based models, complex adaptive systems, emergent behaviors, and so forth. Much of this is highly relevant to earth system studies. Giving a definition of scientific knowledge that neglects to acknoweldge a huge chunk of modern science undermines credibility. [Sean Fleming, USA]	Taken into account: this text has been removed
6646	1	22	9	22	10	"In situ observations of the ocean surface and for glaciers have increased in number and spatial coverage", where the following context introduces not only the ocean "surface" observations. Also the "number and spatial coverage" should be "temperal and spatial coverage", because the "number" (I think it means the sampling number) can indicate frequency or resolution. [APECS Group Review, Germany]	Taken into account - the whole paragraph was revised.
17714	1	22	9	22	21	One of the (brief) messages conveyed here is: we have long observation records with limited spatial coverage combined with relatively short observation records with large spatial coverage. The implications for the uncertainties in projections are paramount and should be stated here. Specific examples will be given further in this review [Hessel Voortman, Netherlands]	Rejected: specific discussion of how data availability affect particular assessments will be within the chapters where they are relevant
19152	1	22	10			In the observational programs, consider adding a reference to permafrost, through the Global Terrestrial Network for Permafrost (GTN-P). This is na IPA program together with GCOS. Check http://www.gtnp.org and the following reference: Biskaborn, B. K. , Lanckman, J. P. , Lantuit, H. , Elger, K. , Dmitry, S. , William, C. and Vladimir, R. (2015): The new database of the Global Terrestrial Network for Permafrost (GTN-P) , Earth System Science Data, 7 , pp. 245-259 . doi: 10.5194/essd-7-245-2015 [Goncalo Vieira, Portugal]	Accepted but modified - Detailed dscription on the data networks were removed to show general framing of cryospheric monitoring situations.
22358	1	22	10	22	10	observations of the ocean surface and for glaciers --> of glaciers? [Handa Yang, USA]	Accepted - revised
12372	1	22	11	22	11	"data e.g., (Boyer" or "data (e.g., Boyer"? [Sylvain Ouillon, France]	Accepted - revised
6648	1	22	12	22	14	Autnomous Underwater Vehicles (AUV) are not mentioned here, but there are really important for oceanographic measurements even though very expensive and thus not numerous [APECS Group Review, Germany]	Accepted
15386	1	22	12	22	15	I see nowhere a reference to snow monitoring either using in-situ data or from space. Material about this could be provided by Chapter 2 and Chapter 3 authors. [Samuel Morin, France]	Accepted -introduction of snow monitoring was included in coordination with Chap. 2.
22530	1	22	12	22	12	Since "Argo float" is not the name of instrument but the name applied to "profiling float" which is deployed under international Argo program, it is better to replace "Argo ocean float" with "profiling floats used in Argo program" as such. [Toshio Suga, Japan]	Accepted
23296	1	22	12	22	14	Since "Argo float" is not the name of instrument but the name applied to "profiling float" which is deployed under international Argo program, it is better to replace "Argo ocean float" with "profiling floats used in Argo program" as such. [Toshio Suga, Japan]	Accepted

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2832	1	22	14	22	15	It is misleading to say that « during recent decades….near globally-complete information ». This is only starting NOW, and the global coverage is NOT for all scales. There is a LOT of work and investment needed to get there. Also reference Dowell et al. 2013, cannot be found by the way it is quoted in the references list. [Anne Guillaume, France]	Taken into account: Text was modifiled.Dowell et al. 2013 was listed in reference list.
178	1	22	17	22	20	A few lines on palaeoclimate, that is good. But it touches this important subject just remotely. This is surely not enough and not doing justice to the importance of this subject. Elsewhere in the chapter the subject is fully ignored. [Sebastian Luening, Portugal]	Taken into account: paleoclimate text expanded in 1.8.1.2 and 1.4
6650	1	22	17	22	17	I don't know how "paleoclimate" is considered in the next chapters, however I would mention in the text, and not only in Figure 1.4 that in this report, paleoclimate spans olicy-relevant timescales frompre-industrial to near future. Thus I would reformulate the begining of the sentence by adding few words "Paleoclimate records of the last two centuries". [APECS Group Review, Germany]	Taken into account: paleoclimate text expanded in 1.8.1.2 and 1.4
3968	1	22	20	22	21	word missing 'Systematic ???? of' [Helene Hewitt, UK]	Accepted
4044	1	22	20	22	20	Minor typo. With the text “Systematic of…” suggest deleting the word "of". [Phil Watson, Australia]	Accepted
5206	1	22	20	22	21	What is meant by "Systematic of climate model experiments? I think there must be a typo - word missing or delete "of"? [Pauline Midgley, Germany]	Accepted
6652	1	22	20	22	22	Add "era" after "instrumental observations" [APECS Group Review, Germany]	Accepted
12340	1	22	20			"Systematic of", remove "of" [Eric Wolff, UK]	Accepted
13372	1	22	20	22	20	Check the sentence. It seems something is missing. [Debra Roberts and Durban Team, South Africa]	Accepted
14182	1	22	20			word missing between "Systematic' and 'of climate model'. Analayses? Comparisons? [Christopher Fogwill, UK]	Accepted
19380	1	22	20	22	21	"Systematic of climate model experiments…" doesn't make sense, please reword. [Michelle A. North, South Africa]	Accepted
21334	1	22	20	22	21	unclear sentence [Philippus Wester, Nepal]	Accepted
22360	1	22	20	22	21	Systematic of climate model… --> Systematic climate model… [Handa Yang, USA]	Accepted
23582	1	22	20	22	21	incomplete expression - please revise sentence [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
18618	1	23	0	23		SR15 choose another reference period 2005-2016 as a definition of the present day. It might be useful to use the same reference across reports [Roland Seferian, France]	Accepted: We now use 2006-2015 as present day for consistency
23152	1	23	0	23		Figure 1.4 is great, very informative. [Aimé Fournier, USA]	Accepted- Thanks
6660	1	23	1	23	1	"modelS outputS" [APECS Group Review, Germany]	Accepted
15468	1	23	2	23	3	I suggest revising the statement: "…models provide the only available data source.", because data that come from or are generated by models are not equivalent to observational data obtained by instruments. An alternative expression could be "models provide a useful tool" or "models provide the best scientific available tool". (This comment is very similar to the one corresponding to the sentence in lines 3-4, page 4 of this chapter). [Hernan Sala, Argentina]	Accepted - modified as suggested.
22362	1	23	4	23	4	Yet --> However, [Don't begin sentence with Yet] [Handa Yang, USA]	Accepted - modified as suggested.
23584	1	23	4	23	4	Please mention or provide examples of these "key regions" [Hans-Otto Poertner and WGII TSU, Germany]	Taken into account: text extensively revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6662	1	23	5	23	5	I would add a few words after "natural variability": "of these components" [APECS Group Review, Germany]	Taken into account: text extensively revised
4652	1	23	7	23	17	This is a good figure, but the units are confusing. Percent of domain needs to be clearer, as it could be interpreted that 100% of everything to do with the cryosphere is being measured by satellite since 1970. I think that's not quite what's intended. [Baylor Fox-Kemper, USA]	Accepted: The percent of domain is now defined in the figure caption, and representation of remote sensing data improved
12374	1	23	8	23	12	It may be important to add salinity in Figure 1.4? Remote sensing salinity is included in remote sensing, but statistics on salinity data should also be available from the World Ocean Atlas (WOA) [Sylvain Ouillon, France]	Accepted: temperature and salinity observations now shown together
12376	1	23	8	23	12	I understand that the number of ocean temperature data (0-1000m) per year decreased recently in the World Ocean Database. Wouldn't it be important to mention somewhere (maybe in the "supplementary Material for Fig. 1.4, page 72" that other sources of data have not being included, like the growing number of additional data provided by participatory science (think, e.g., to SST measured by Indian people all along the western Bay of Bengal)? [Sylvain Ouillon, France]	Taken into account: this figure is only able to show some representative examples
12378	1	23	8	23	12	Suggestion (to avoid any misunderstanding): to precize "Ocean temperature data" in Fig. 1.4 [Sylvain Ouillon, France]	Accepted
16912	1	23	8	23	17	Could the number of observations and suchlike be indicated in the figure for the observational and model simulation data series? The present representation gives only a qualitative view, and it does not come across how the available data compare to maximum availability. Also, is the reference domain for the glacier length observations the glacier area / number of glaciers / land are / other? [Markku Rummukainen, Sweden]	Taken into account: absolute maximum values labelled, and coverage defined in caption
2834	1	23	9	23	17	Please define RCP in full in the legend. [Anne Guillaume, France]	Accepted: RCP is defined in the caption.
6664	1	23	9	23	17	The y-axis of histogram depict the number of observations, which is better to put right by the histogram with approximate values. The chosen of color scale is uninterpretable, if the data coverages of different observations are extremely different, use the diverging color scheme and a discrete color scale with smaller intervals. [APECS Group Review, Germany]	Accepted: labels now given for maximum values, and colour scale changed
13278	1	23	9	23	17	RCP should be explicitly defined in the caption of the figure. [Katherine Bishop-Williams, Canada]	Accepted: RCP is defined in the caption of figure.
180	1	23	12	23	12	Figure 1.4 only starts at 1800 AD, which coincides with the coldest phase of the Little Ice Age, when mean temperatures deviated strongly negatively from the Holocene average and which therefore are hard to justify as a representative pre-industrial baseline. See discussion in Lüning & Vahrenholt 2017 (doi: 10.3389/feart.2017.00104) which should be cited for transparency reasons. The temperature level reached during the interval 1940–1970 may serve as a better reference level as it appears to roughly correspond to the average pre-industrial temperature of the past two millennia. The pre-industrial period should contain at least 1-2 natural warm phases in order to be representative. Placing the climate limits in an enlarged paleoclimatic context will help to demonstrate that the chosen climate targets are valid and represent dangerous extremes of the known natural range of Holocene temperature variability. [Sebastian Luening, Portugal]	Taken into account: compromise in choice of pre-industrial mentioned in 1.9.1. Reference added in 1.8.1.2

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
1784	1	23	12	23	17	Fig. 1.4: Projections of RCP8.5 and RCP2.6 would be too confsing to a common man! Can we select the better one? [Meer Ali, India]	Taken into account: The two were now introduced in the figure caption and also linked to 1.9.1 for a full description.
5212	1	23	12	23	12	Figure 1.4: strong useful Figure; even more so if ILK can be added in a consistent way [Pauline Midgley, Germany]	Taken into account: we considered this, but decided it would not add clarity to the figure
15388	1	23	12	23	12	Nice figure : however, there are several missing elements, such as "in-situ monitoring of the terrestrial cryosphere (snow in polar areas or high mountain areas, permafrost). Input from Chapter 2 and Chapter 3 authors could be provided, if need be. [Samuel Morin, France]	Taken into account: Due to the space limitation, we have to choose one most representative parameter for cryosphere: here we use glacier length data to represent.
6666	1	23	13	23	23	No mentions of Autonomous Underwater Vehicles here. It would deserve few words I think. [APECS Group Review, Germany]	Rejected-Due to the space limitation, we can't list all of the instruments here. This will be assessed by other chapters.
12380	1	23	16	23	17	"heights depict the number of obserations, parameters or simulations... expressed relative to the..." May we add "in linear scale" (or "in log-scale")? [Sylvain Ouillon, France]	Accepted: linear scale mentioned and absolute maximum values now indicated
6668	1	23	53	23	53	Do you know the ROSETTA-Ice project (http://www.ldeo.columbia.edu/res/pi/rosetta/)? It aims at reconstructing the bathymetry below the Ross Ice Shelf by means of gravimetric measurements. It is wroth mentioning it together with those project. It is still on-going. [APECS Group Review, Germany]	Taken into account: the revision of this section of text has removed references to individual projects, but this comment has been passed to chapter 3 for their consideration.
22950	1	24	0			section 1.7.2.1: continuous plankton recorder from ships of opportunity (60 year record) is not captured in this figure. this is significnat dataset from transport ships and ferries. https://www.cprsurvey.org/publications/published-papers/ [Jamie Shutler, UK]	Accepted: we are working to add CPR data to this figure
668	1	24	2	24	6	The availability of paleoclimate data is diminishing toward the end of the 20th Century. Although the rational is understood it may be benefitical to provide a short explanation of this effect in the subtitle of the figure. By doing so we can immediately address a potentially open issue and hopefully increase the confidence of the reader in the report. [Thomas Ackermann, Germany]	Accepted: this is now mentioned in 1.8.1.2
13374	1	24	6	24	6	Meant 2015 instead of 2105? [Debra Roberts and Durban Team, South Africa]	Accepted
12342	1	24	7	24	8	Do not consider including ILK in this figure. You'll just ruin it. Make a separate figure if you wish. [Eric Wolff, UK]	Accepted
17686	1	24	11			section 1.7.2.1 overlaps in parts with parts in later Chapters about observation methods and should be coordinated. All observation methods in Ch01? [Andreas Kääb, Norway]	Accepted - The section has been rewriten and the references were revised accordingly.
14184	1	24	13			standardizing [Christopher Fogwill, UK]	Rejected: UK English to be used

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
4046	1	24	17	24	17	The role of the Permanent Service for Mean Sea Level (PSMSL, 2018) and Systeme d'Observation Du Niveau Des Eaux Littorales (SONEL, 2018) are the key global data repositories for tide gauge records and associated vertical land motion estimates derived from GNSS, respectively and should be acknowledged accordingly. Relevant associated papers for reference material include Holgate et al. (2012) and Santamaría-Gómez et al. (2012). References: Holgate, S.J., Matthews, A., Woodworth, P.L., Rickards, L.J., Tamisiea, M.E., Bradshaw, E., Foden, P.R., Gordon, K.M., Jevrejeva, S., and Pugh, J., 2012. New data systems and products at the permanent service for mean sea level. Journal of Coastal Research, 29(3) pp.493-504. PSMSL, 2016. Permanent Service for Mean Sea Level (PSMSL) website, accessed 2 January 2016. URL: http://www.psmsl.org. Santamaría-Gómez, A., Gravelle, M., Collilieux, X., Guichard, M., Míguez, B.M., Tiphaneau, P., and Wöppelmann, G., 2012. Mitigating the effects of vertical land motion in tide gauge records using a state-of-the-art GPS velocity field. Global and Planetary Change, 98, pp.6-17. SONEL (Systeme d'Observation Du Niveau Des Eaux Littorales), 2018. URL: http://www.sonel.org/-Vertical-land-movement-estimate-.html [Phil Watson, Australia]	Accepted. We have included tide gauge data for sea level from PSMSL in the figure 1.4 and added PSMSL 2016 into the references.
23586	1	24	17	24	17	again, this monitoring method is not limited to mammals; e.g., birds, sharks, and turtles are also being instrumented, maybe use 'animal borne sensors e.g. marine mammals equipped with …' [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
22532	1	24	20	24	23	Since we also call a profiling float that sample to 4000 m a deep Argo float, it is better to repalce "6000 m" with "4000-6000 m". [Toshio Suga, Japan]	Accepted
6670	1	24	25	24	25	Not quite sure what "physical parameters" mean and why it is more extensive than the biological data. According to the following context, this sentence might not be needed. [APECS Group Review, Germany]	Accepted
13140	1	24	25	24	25	data "tend" [Baerbel Hoenisch, USA]	Accepted
18360	1	24	25	24	32	Kindly specify biogeochemical cycling of other nutrientsa and/or elements, e.g. C, N, H, S, P cycling [Suvadip Neogi, India]	Taken into account: C, O, nutrients are listed below with reference to Johnson et al. 2017. Because we are supposed to framing, we are not able to specifically list the available sampling for all elements. Specificly, H and S don't really fit in that sentence (biogeo, not geo).
21278	1	24	25	24	32	It talks about the sampling of plankton higher trophic levels. We should mention here the systematic use of the SAHFOS Continuous Plankton Recorde SAHFOS [Alejandro Souza, Mexico]	Taken into account: Chapter-1 decided to introduce the ocean/cryosphere observations in a general way, so we don't introduce the sepcific componants of the observation system. Those important projects will be assessed by other chapters.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16370	1	24	26	24	26	" (e.g., Talley et al., 2016))" Typographical error. Remove extra bracket ")" at the end of this citation. [Inga Smith, New Zealand]	Accepted
16176	1	24	28	24	28	Include peer-reviewed references here as well. For instance: Johnson, K. S., J. N. Plant, L. J. Coletti, H. W. Jannasch, C. M. Sakamoto, S. C. Riser, D. D. Swift, N. L. Williams, E. Boss, N. Haentjens, L. D. Talley, and J. L. Sarmiento, 2017. Biogeochemical sensor performance in the SOCCOM profiling float array. J. Geophys. Res. OCeans, doi:10.1002/2017JC012838. [Lynne Talley, USA]	Accepted
21280	1	24	34	24	42	I think in this paragraph there is a big omision of the UK efforts on this. The existence of the Ellet line, The efforts of RAPID, Rapid MOC, OSPAR, The Atlanctic Meridional Transect, the Drake passage and The Porcupine bank observatory are a bi omission [Alejandro Souza, Mexico]	Taken into account: Text extensively revised and shortened. For AMOC (RAPID, OSPAR etc), it will be discussed in chapter-6.
24730	1	24	34	24	41	This paragraph is good, but could be improved by specifically calling out the value of buoys to observing capabilities. There is also a recent paper by Weatherhead et al. in Earth's Future that addresses the needs for climate observations in support of the World Climate Research Programme's Grand Challenges including "Melting Ice and Global Consequences" and "Regional Sea Level Change and Coastal Impacts". The paper identifies the need for climate observations for three needs: long-term records, short-term studies (campaigns) and to aid in forecasting. [Elizabeth Weatherhead, USA]	Taken into account- Rejected - We didn't call out buoys specially because we think an intergrated ocean observation system including many instruments are required. But we did include a sentence to call out that " these different targeted observation system can potentially be planned in a comprehensive, focused manner required to adequately address the full range of climate needs" based on recent literatures. [MPC: this text did not survive in the last revision!]
5324	1	24	38	24	40	In terms of recently established sobservations systems should also mention OSNAP - reference Lozier, M. S. et al. Overturning in the Subpolar North Atlantic Program: A New International Ocean Observing System. Bulletin of the American Meteorological Society 98, 737-752 (2017) [Meric Srokosz, UK]	Accepted - the reference has been added.
1250	1	24	43	24	54	Seasonal snow cover is missing. A review of Arctic snow cover observing systems is provided in Brown et al. 2017a, cited in Chapter 3. You could say something like "The ability to monitor snow cover polar and mountain regions is constrained by the availability and limitations of the observing networks and satellite data streams, as well as by the availability and limitations in driving data (especially precipitation) for the physical snowpack models used in the growing number of atmospheric reanalyses and snow-cover reconstructions.(Brown et al. 2017a). [Ross Brown, Canada]	Taken into account: text has been substantially revised and shortened, with specific details on limitations to be provided by chapters as relevant to their assessments
5214	1	24	43	24	43	is "multiple centuries" really correct here? To my understanding multiple means several and thus would have to be more than two. The period from the early 1800s onwards which I believe is the case could be better described as "more than two centuries" [Pauline Midgley, Germany]	Rejected: Multiple is correct. Glacier length observations in some cases go back to the 1500s.
6162	1	24	43	24	55	move sentences so that all glacier sentences are together (currently it is glaciers, permafrost and then again ice (ice sheets) [Regine Hock, USA]	Accepted. Move permafrost to the end of this paragraph.
6164	1	24	43	24	47	GTN-G is important but in the last decade remote sensing has taken over. Regional glacie change assessments largely rely on satellite data, e.g. from ICESat, Tandem-X, GRACE etc). This should be acknowledged especially since this is a increasing development since AR5. [Regine Hock, USA]	Taken into account: no longer mentioned in revised text
15392	1	24	43	24	55	It is needed to provide information on in-situ seasonal snow measurements, totally absent from this section. Input from Chapter 2 and Chapter 3 can be provided if need be. [Samuel Morin, France]	Taken into account: text has been substantially revsied and shortened

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
21336	1	24	43	24	43	references need to be given for the long term in situ observations [Philippus Wester, Nepal]	Taken into account: no longer mentioned in revised text
15390	1	24	46	24	46	The NSIDC is a US organization, this should be mentioned somehow. It is not an organization with a global mandate, as far as I know,although it manages data from within and outside the USA. [Samuel Morin, France]	Taken into account: no longer mentioned in revised text
74	1	24	47	24	48	Please add "and thickness" to the list of "standardized observations" collected by the WGMS. (see http://www.gtn-g.ch/data_catalogue_glathida/) [Daniel Farinotti, Switzerland]	Taken into account: no longer mentioned in revised text
15394	1	24	53	24	53	"IceBridge, ADAP, IceCap" have little meaning out of their immediate community. References are needed. [Samuel Morin, France]	Taken into account: no longer mentioned in revised text
6672	1	24	55	24	55	There are some types of measurements miising here. I would add: subglacial topography, bathymetry below ice shelves [APECS Group Review, Germany]	AAccepted - dded measurements
14186	1	24	55			and ice-sheet velcocity [Christopher Fogwill, UK]	Accepted
11790	1	24	57	25	7	this paragraph is very general and some very vague statements within it. For example, "the large magntiude of natural variability" for Antarctica - in what parameters and what is the evidence based - e.g., accumulation or ocean-driven melting or ocean temperature? [King Matt, Australia]	Taken into account: text revised and shortened extensively
22956	1	25	0			line 39: its not 'also important' its 'critical' i.e. we have no other option. Suggest you update sentence to say 'Obseravtions are critical for enabling model development.' [Jamie Shutler, UK]	Accepted
14188	1	25	3			characterization [Christopher Fogwill, UK]	Rejected: UK English spellings to be used
22952	1	25	4	7		satellite capability/measurements that are missing and should be included are: surface wind speed, sea state, sea ice thickness and suspended particulates. See Shutler et al., (2016) for a detailed overview. http://journals.sagepub.com/doi/abs/10.1177/0309133316638957?journalCode=ppga [Jamie Shutler, UK]	Accepted: reference used and extended sligtly
22374	1	25	5	25	7	Add ocean surface salinity to the list of satellite capabilities. [Gary Lagerloef, USA]	Accepted - Text revised.
182	1	25	9	25	24	The subchapter "Paleoclimate Evidence" comes much too late and stays unspecific. Need to explain the pre-industrial natural patterns with alternating warm and cold phases as well as repetitive natural series of glacier retreat and advance. Failing to mention this suggests to the lay person that the pre-industrial climate might have been steady state - which was certainly not the case. Try to be more transparent. This is a good place to briefly introduce the Roman Warm period, Dark Ages Cold Period, Medieval Climate Anomaly, Little Ice Age and Current Warm Period. Authors also cite "Fischer et al., in review". This reference should be removed as it is not available to IPCC Special Report authors for checking. Who are co-authors, what is the content? Will it pass journal review? [Sebastian Luening, Portugal]	Rejected: Yes this is acceptable in FOD to cite submitted works and this was done following IPCC guildelines. Publication has now been accepted and published. New information on paleoclimate context has been added to 1.4
12344	1	25	15			"physical chemical and biological"? We have biological proxies such as diatom assmeblages in marine cores. [Eric Wolff, UK]	Accepted: this change has been made
13142	1	25	15	25	15	please add "biological" to the list of proxy carriers [Baerbel Hoenisch, USA]	Accepted: this change has been made
14190	1	25	15			utilize [Christopher Fogwill, UK]	Rejected- to use UK english
830	1	25	17	25	17	"come" be changed as "comes" [Kathiresan Kandasamy, India]	Accepted
6674	1	25	17	25	17	I would add "and micro-fauna" after "marine sediments" [APECS Group Review, Germany]	Rejected- micro-fauna is included in marine sediments

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6676	1	25	17	25	17	I would add "ice bubles" after "ice layers" [APECS Group Review, Germany]	Accepted
6678	1	25	20	25	20	I suggest to add "and their magnitude" after "ocean and cryosphere changes" [APECS Group Review, Germany]	Accepted
184	1	25	22	25	42	Need to acknowledge here that model perfomance for past millennia pre-Little-Ice Age is rather poor implying low confidence in models due to failed hindcast. Concealing this would be against the spirit of transparency [Sebastian Luening, Portugal]	Taken into account: we are unable to assess particular cases in chapter 1, but we do highlight the importance of paleoclimate data in testing models in section 1.8.1.2. Assessments are carried out within the other chapters.
19382	1	25	22	25	22	Is it really acceptable to cite a paper that is currently in review? [Michelle A. North, South Africa]	Rejected: Yes this is acceptable for FOD and was done following IPCC guildelines. Publication has now been accepted and published.
13144	1	25	23	25	23	please make "data" plural, here and throughout [Baerbel Hoenisch, USA]	Accepted - Text has been revised.
6284	1	25	26	25	41	This section is good, but it would benefit from some fine-tuning. As it stands, it risks confusing or annoying readers. For example, to most scientists and engineers as well as the general public, the term "data" is normally reserved for observational data, so it would be wise to change the title to "Modelling Products" and to change "only source of data on future ocean" on line 40 to "only source of information on future ocean." Also, in the phrase, "Testing models against observational and palaeoclimate data is also important for model evaluation" on lines 38-39, you may wish to consider strengthening the wording to "Successful testing of models against observational and paleclimatic data is also crucial for model evaluation and acceptance." Again, in most branches of science and engineering, a model is not considered valid as either an explanation of observed phenomena or as a preditive tool unless it can reproduce observational data with sufficient accuracy for the purpose at hand. Readers grounded in STEM fields other than numerical climate modeling might read the passage as it's currently written and see a big red flag here, but just a few minor wording adjustments can fix it. [Sean Fleming, USA]	Accepted - Suggestion accepted.
6680	1	25	28	25	28	I would add "or current" after "recent" [APECS Group Review, Germany]	Accepted
15396	1	25	28	25	42	Regional climate modelling, and more generally, downscaling, should be introduced here too. Examples can be found from Chapter 2. [Samuel Morin, France]	Accepted: RCM was introduced.
6682	1	25	29	25	29	"Recent progressES in modelS development haVE" [APECS Group Review, Germany]	Accepted
6684	1	25	29	25	29	Instead of "improvements of model resolution" I would specify more in details what this means: "improvements of spatial horizontal and vertical resolution" [APECS Group Review, Germany]	Accepted
6686	1	25	29	25	29	Similarly, because we generaly speak about "global scale" or "regional scale", I would reformulate "fine scale" with "local scale" to keep consistency with other scale processes [APECS Group Review, Germany]	Accepted
76	1	25	30	25	30	Mentioning "ocean eddies" is probably not the best option, since the sentence seems to refer to "climate models" (and neither to "ocean models" nor "coupled atmosphere-ocean models"). Mentioning "convection" could be an alternative. [Daniel Farinotti, Switzerland]	Accepted
6688	1	25	30	25	30	I would add and "short-term" after "local scale" because this part of the sentence refers to "ocean eddies" that are generally relatively short-term processes and also quite local [APECS Group Review, Germany]	Accepted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6690	1	25	30	25	30	"and IN the incorporation of ..." [APECS Group Review, Germany]	Accepted
6112	1	25	31	25	32	Yes, it is true that some models include ice sheet processes. However, this is not the norm. There may be interactions between Greenland Ice Sheet Mass lost, and Arctic and global climate change that are not reflected in most models. [Patrick Taylor, USA]	Agreed: We note here that the ice sheet is included in "some models".
6692	1	25	31	25	31	At the end the sentece, after "system", I would add "within a single numerical framework", otherwise "the incorporation of elements" at the previous line does not precise to what it is incorporated. [APECS Group Review, Germany]	Accepted
6694	1	25	34	25	34	I would substitue "idealised" by "approximated". "Idealised" implies that it cannot be "realistic", while models tends to reproduce the realistic cliamte system. But it is "approximated" because it lacks of full representation of processes or sometimes exiting observed processes are missing. [APECS Group Review, Germany]	Accepted
6696	1	25	34	25	34	I would add "of the climate system" after "idealised representations" [APECS Group Review, Germany]	Accepted
14192	1	25	34			idealized [Christopher Fogwill, UK]	Accepted- Changed to "Approximated"
16914	1	25	34	25	42	This sounds rather negative about models. AR5 (for example) assesses models as skillful in many respects. This also singles out models and a research method. Also observations give only a partial picture of the "truth" and are affected by biases (coverage, precision, analysis), paleoclimate data being especially challenging in this respect, compared to instrumental observations. [Markku Rummukainen, Sweden]	Taken into account- A substaitial revision on the model section was made. We believe the current version highlight the importance of models.
18620	1	25	34	25	34	idealized realization of what ? [Roland Seferian, France]	Taken into account- Changed to "approximated representations of the climate system"
6698	1	25	35	25	35	I would substitute "are affected" by "can be affected". This is because it is not systematically true that climate models have some biases. First of all because if ss, there are localised and not generalised to the whole planet. [APECS Group Review, Germany]	Accepted
6700	1	25	35	25	35	I would be more specific and substitute "model formulation" by "physical formulationS". "Model formulations does not mean anything. [APECS Group Review, Germany]	Accepted
6702	1	25	36	25	36	I would add "that approximate" before "physical processes". [APECS Group Review, Germany]	Accepted
18622	1	25	36	25	36	I don't think that Bopp et al. 2013 is an appropriate reference of supportng this statement. This paper documents the spread of some marine stressors but do not discussed model biases or modelling error in physical parameterization. Hawkins and Sutton BAMS (2009) might fit here because the authors depicted what drives spread in model projections (internal variability, scenario=external forcings or model response to external forcings). If the authors want to further develop uncertainties relative to biogeochemical model. Laufkotter et al. BG 2016 is a suitable reference for describing impacts of various biogeochemical parameterization; Séférian et al. GMD 2016 for impact of initial condition and Froelicher et al. GBC 2016 who use Hawkins et Sutton's framework on the marine stressors, a complementary view of Bopp et al. 2013 study. [Roland Seferian, France]	Accepted- Hawkins and Sutton (2009) is cited here
6704	1	25	37	25	37	I would add "missing procecesses and feedbacks" at the end of the sentence, after the references. [APECS Group Review, Germany]	Accepted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6706	1	25	38	25	38	I would add "and divergences" after "models errors" because models do not converge and do not have the same errors. Hence, the large spread between existing coucpled climate models as demonstrated by CMIP5 results. [APECS Group Review, Germany]	Accepted
6708	1	25	39	25	39	I would substitute "is also important" by "is a necessary step" because corss-comparison between data and models IS NECESSARY to put a weight and permance index to each models. [APECS Group Review, Germany]	Taken into account -This sentence is changed to "climate models are the best available scientific tool to project future ocean and cryosphere changes"
6710	1	25	39	25	39	modelS [APECS Group Review, Germany]	Accepted
1252	1	25	40	25	40	Maybe nitpicking here but the common practice is to define "data" as something that is observed… I think the word "information" would be more appropriate here and in a number of other places in this Chapter where the term "model data" is used. [Ross Brown, Canada]	Accepted- We use "model products" now
6712	1	25	40	25	40	"Climate models ARE" instead of "provide" because this term is used many time sin this paragraph, just to avoid repetitions [APECS Group Review, Germany]	Accepted
6714	1	25	40	25	41	I would cancel "including proving information on the outcomes" and substitute it by "in response of". [APECS Group Review, Germany]	Accepted
15470	1	25	40	25	40	Idem previous comment. I suggest to replace: "Climate models provide the only source of data on future ocean and cryosphere change…", by "Climate models are the best available scientific tool to project future ocean and cryosphere changes…". [Hernan Sala, Argentina]	Accepted
16178	1	25	44	25	57	Some in the ocean state estimation community would be piqued to see state estimation relabelled as reanalysis. I suppose it's ok, but perhaps you should consider mentioning it specifically. [Lynne Talley, USA]	A short explaination added.
15398	1	25	46	25	57	Regional reanalyses should be introduced here too. See examples in Chapter 2. [Samuel Morin, France]	Accepted- A short explaination added.
16916	1	25	46	25	50	It might add clarity if a distinction between climate models and global NWP models were made here. [Markku Rummukainen, Sweden]	Accepted- Regional reanalysis was introduced.
6716	1	25	48	25	48	"minimze modelS biaSES" [APECS Group Review, Germany]	Accepted- A table was added in the Annex to introduce different types of models.
6718	1	25	49	25	49	Wouldn't "spatial coverage" be better than "spatial resoluton" here? [APECS Group Review, Germany]	Accepted
6720	1	25	49	25	49	I woudl susbstitute "to produce" by "and thus" [APECS Group Review, Germany]	Accepted
16372	1	25	50	25	50	"ocean reanalyses" There are groups who refer to this as ocean state estimates. Suggest amending this to read as follows: "ocean reanalyses (also known as ocean state estimates)" [Inga Smith, New Zealand]	Accepted
6722	1	25	52	25	52	"skillS" [APECS Group Review, Germany]	Taken into account- text revised
606	1	26	0			After "Berardi, 2016)" add "becoming SILK" [William Clarke, Australia]	Accepted
5078	1	26	0	26	0	Guess it could add more valuable by "Take more about the indigenous highly experence towards local actions to adapt the natural climate change which was varying regarding to natural cyclies and how it could be useful for climate change knowledge integration". [Essam Hassan Mohamed Ahmed, USA]	Rejected- Undiscernable reviewer commen

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12512	1	26	1	26	36	There is a strong focus here on how IK can be used to detect change. Its also central to developing adaptation options and responding to change - see Pearce et al 2015 in Arctic for example, for how IK can be used for adaptation. [James Ford, Canada]	Accepted- added terms 'adapt' and also Pearce et al ref. thank you
4738	1	26	2	27	20	This follows on the previous comment, with identical tones. There are now 1.5 pages totally devoted to indigenous and local knowledge, as a way of defending their value. Non-indigenous, not-local knowledge has been expected to stand on their two feet through the chapter, based solely on the evidence they provide. However, suddenly we feel the need to close the door to evidence and write an essay on indigenous knowledge? Of course ILK is useful, especially to develop solutions that have buy-into and that dovetail well with long-standing behaviour and practices, but this can be said in one paragraph. To start ranting about how bridging scientific and ILK requires transdisciplinary approaches which addresses multiple disciplines, etc. etc. is out of place in a chapter to contextualize SROCC. You are undermining evidence in so doing! Maybe it is true that "...all systems of knowledge are valid...", but are not certainly equal! [Manuel Barange, Italy]	Rejected- The reviewer does not understand our objective. We are formally introducing IK & LK to the IPCC framing in this report and we also make specific cases for the SROCC context in the text and the figure and the CCB. Furthermore we discuss various approaches to how to utilize there knowledge systems.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6056	1	26	2	27	20	Again, it is of utmost importance that the term 'ILK - Indigenous and local knowledge' is NOT used in this report but rather that the distinction between the two is clear and they are included as separate from one another. Indigenous Knowledge is systematic, encompasses unique methodologies, analysis, and evaluation processes. It is passed on from generation to generation and continues to be built upon today in a living process. Within this knowledge and within Indigenous communities is a repository of detailed observations and analysis processes regarding the widest variety of ecological, physical, and biophysical conditions and systems. These systems in the Arctic include weather, climate, ocean, ice, and wildlife. Changes in the Arctic, and subsequent response, cannot be fully understood without Indigenous Knowledge. This does not all apply to local knowledge. ICC is also very opposed to language such as "integrate" in describing the role of Indigenous Knowledge. The word 'integrate' suggests that IK can be integrated into scientific reports as an after thought, once these reports are well underway which is offensive. Rather, IK should play a role from the very beginning. Both IK and scientific knowledge systems have unique methods and must be used in tandem. ICC supports language of "utilization" of Indigenous knowledge, together with science, but not its "integration" into science. This all connects to the question of how IK is utilized in IPCC reports. There are appropriate ways this can be done which necessitates direction from and partnership with Indigenous Peoples throughout the entire process (recalling the United Nations Declaration on the Rights of Indigenous Peoples - UNDRIP). 'Integrating' IK via publications from non-Indigenous authors is not appropriate. Nor is referencing how IK has been integrated in past assessment reports as well as other reports like IPBES which only serve to provide weak and poor examples. Past reports and IPBES have not included IK or Indigenous Peoples in the way that they want to be included, (ie. in a way that upholds UNDRIP). Line 29-30 on p. 26 notes that "there are limitations in the ability to accurately, effectively and authentically collect ILK in a manner acceptable for IPCC assessments." and further down "appropriate documentation" is noted. This captures the core of the issue. WHO is collecting 'ILK' and WHAT is deemed acceptable/appropriate for IPCC reports and WHY? This section makes a strong case for resources to go towards direct effort to address this limitation and these questions. And this MUST be in partnership with Indigenous Peoples. The Inuit Circumpolar Council is happy to have this discussion and will continue to push this point on the IPCC platform, IPBES platform, and other international scientific/research platforms. For example, we would like to see something like an IPCC task force dedicated to this issue, or a methodology developed in partnership to address this issue. All this to say, the inclusion of	Accepted- We have done both items: 1) we have separated IK & LK and 2) we have replaced all uses of the term 'intergate ' with 'utilize' or 'use'
6286	1	26	2	27	20	Nice job on including traditional/local/indigeneous knowledge! [Sean Fleming, USA]	Accepted- thank you!
13376	1	26	2	26	2	See comment on sub-heading 1,7,2. The same concern applies here. [Debra Roberts and Durban Team, South Africa]	Taken into Account- We have renames the section titles.
18400	1	26	2	26	36	What role does heritage play in ILK's integration with climate science? Recognition of substantial time scales which may be reflected in relevant anthropological or archaeological datasets, as well as intangible heritage (community memory, oral histories, etc), should be mentioned in addition to benefits from contemporary ILK (as described in Cross-Chapter Box 3). [Jeneva Wright, USA]	Taken into account: an example of timescales (e.g. 7000 year+ oral histories that corroborate sea level rise from an Indigenous perspective in Australia) is now given in 1.8.2

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
22574	1	26	2	26	57	Please see comments above - do not mix Indigenous knowledge and local knowledge! Please also don't try to "integrate" Indigenous knowledge into scientific reports after the fact. Ultimately, both ways of knowing have their own methods and while they can be used together, Indigenous knowledge should not be "fitted" or "integrated" into science. We rather speak of "utilization" of Indigenous knowledge, together with science, but not its "integration" into science. There are ways how Indigenous knowledge can be collected and used in IPCC reports, but it has to be done properly. One example would be to use fuzzy cognitive mapping, in a co-production of knowledge approach. In any case, it is important that the knowledge holders are part of the analysis and the verification of the results. For examples of the use of fuzzy cognitive mapping, please see papers such as Berkes and Berkes, Futures 41 (2009) 6–12, Özesmi and Özesmi, Ecological Modelling 176 (2004) 43–64, and Giles et al, Social Science & Medicine 64 (2007) 562–576. [Eva Kruemmel, Canada]	Accepted- We separated the knowledge systems and we have replaced all references to 'integrating' to utilizing'. We also add 'fuzzy cognitive mapping' and the three references-- thank you!
20922	1	26	4	26	5	Since the report recommand detailed documentation of ILK, it would be good to add a result of such recent documentation: "According to a recent research and detailed documentation from 2012 and since ever of IK of reindeer herders of eastern Siberia, Evenki TEK is not just a block of information and practices transmitted from generation to generation. Nor is it intuitive or embedded into practices': it is as conceptual (that is to say, it contains many concepts), theoretical, and analytical as a science; it contains a lot of “know how”, hypothesising, and predictions. Indeed, some cognitive operations can be compared to “modelling (Lavrillier and Gabyshev 2017, pp. 19-21, 177-178, 438-449, 456-457)." (References: Lavrillier A. & S. Gabyshev, 2017 An Arctic Indigenous Knowledge System of Landscape, Climate, and Human interactions. Evenki Reindeer Herders and Hunters, Studies in Social and Cultural Anthropology, Kulturstiftung Sibirien, Fürstenberg/Havel, Germany 467p.) [Alexandra Lavrillier, France]	Accepted- Thank you- we have included the references since all are relevant to the text.
20908	1	26	9	26	9	After "Orlov et al., 2014"" could be good to add "Lavrillier and Gabyshev 2017" (references: Lavrillier A. & S. Gabyshev, 2017 An Arctic Indigenous Knowledge System of Landscape, Climate, and Human interactions. Evenki Reindeer Herders and Hunters, Studies in Social and Cultural Anthropology, Kulturstiftung Sibirien, Fürstenberg/Havel, Germany 467p.) [Alexandra Lavrillier, France]	Accepted- Thank you- we have included the references since all are relevant to the text.
12508	1	26	15	26	15	Note that the Ford et al ref only focuses on Indigenous knolwdge, not local knowledge [James Ford, Canada]	Taken into consideration- Noted however this fact does not change anything
13378	1	26	15	26	15	How is it possible to establish when the point of complete use of indigeneous knowledge in climate change assessment is attained? Suggest you consider highlighting the limited use of IK to avoid ambiguity. [Debra Roberts and Durban Team, South Africa]	Accepted- changed wording
16918	1	26	15	26	16	The sentence "Keyword references…" does not say very much. How extensive were such references would be more informative, for example. [Markku Rummukainen, Sweden]	Accepted- Changed 'keyword references' to 'references'

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
20910	1	26	15	26	15	After "..incompletely examined and incorporated (Ford et al., 2016b)" add "in both research and policy (Lavrillier and Gabyshev 2018)" (References: Lavrillier A. and S. Gabyshev 2018, An Emic Science of Climate: a Reindeer Evenki Environmental Knowledge and the Notion of an Extreme Process of Change, in A. Lavrillier, A. Dumont, D. Brandisauskas (eds) Human-environment relationships in Siberia and Northeast China: Skills, Rituals, Mobility and Politics among the Tungus Peoples, accepted, EMSCAT, 49). Also possible to add Nakashima et al 2012 (Nakashima, Douglas J., Kirsty Galloway McLean, Hans D. Thulstrup, Ameyali Ramos Castillo, and Jenifer T. Rubis 2012. Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation. Paris/Darwin: United Nations Educational, Scientific and Cultural Organization and United Nations University.) - It was largely quoted in the IPCC 2014 with good statement on these stopics. [Alexandra Lavrillier, France]	Accepted- Thank you- we have included the references since all are relevant to the text.
6724	1	26	17	26	17	substitue "people" by "population" [APECS Group Review, Germany]	Accepted- done
6726	1	26	18	26	18	I would add "demographic" before "concentration" other wise "concentration is unspecified. [APECS Group Review, Germany]	Accepted- done
6728	1	26	22	26	22	I woudl add "In this case for example,". This is because this refer to a specific case whiel there exist many form and applications for ILK. [APECS Group Review, Germany]	Accepted- done
20914	1	26	22	26	22	The series (books of papers) of publications about ILK on changes in Ecosystem services, edited from the ILK task-Force of UNESCO for IPBES, should be quoted here. Among others there is the one on Europe and Central Asia (including Fennoscandia and Siberia) Assessment - M. Roué and Z. Molnar (eds.), Indigenous and Local Knowledge of Biodiversity and Ecosystems Services in Europe and Central Asia: Contributions to an IPBES regional assessment. Knowledge and Nature 9. UNESCO: Paris, p. 111-128. All these publications are available on the site of LINKS / UNESCO program http://www.unesco.org/new/en/natural-sciences/priority-areas/links/related-information/publications/all-books-and-reports/ [Alexandra Lavrillier, France]	Accepted- added this text and citations: "In 2018, all four assessments of the Intergovernmental Platform on Biodiversity and Ecosystem Services {IPBES, 2018 #485}{IPBES, 2018 #486} {IPBES, 2018 #487}{IPBES, 2018 #488} demonstrated the contributions that IK and LK make {Roué, 2017 #525}{Diaz, 2015 #265}{Díaz, 2018 #283}."
6730	1	26	23	26	24	Once again, what about adpation and mitigation for biodiversity? It is not mentioned here. [APECS Group Review, Germany]	Rejected- Text has been revised and wording this comment was attached to is gone.
20912	1	26	24	26	24	Why not quoting Wheatherhead 2010 and papers of Gearhaerd Shari, or from Ealat project results that give strong examples on how ILK and Sciences can be complementary? [Alexandra Lavrillier, France]	Rejected- The paragraph the revieer is referring to focuses on utilizing diversre knowledge systems in international policy and assessments. Therefore, the references they refer to do not fit here. However, We have used the references elsehwere in these sections.
21294	1	26	26			Can <iincompletely> bereplaced with <partially>? [Sanjay Chaturvedi, India]	Accepted- changed-- thankyou!
12510	1	26	29		30	Statement belies the fact that there is a lot of peer reviewed research on various aspects of ILK which meets IPCC criteria. See Savo et al 2016 in Nature CC for example. This statement wss valid for AR5, but now it is more of how do we bring in IK that is not captured / is not amenable to being captured in peer reviewed articles [James Ford, Canada]	Accepted- changed the sentence- thank you!

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
20916	1	26	31	26	32	This is contradicting the IPCC report 2014 on Adaptation A, p.1001 that gives strong examples of successful calibration between ILK and Sciences - I am wondering wether a nuance should be done. [Alexandra Lavrillier, France]	Rejected- The AR5 Box 18-5 that the reviewer refers to talks about cases in which the knowledge systems detect the same phenomenon and not to what we are discussing here which is changing IK & LK into categorical data.
5076	1	26	42	26	42	For 1.7.4 Integrating Indegenous and local knowledge and scientific knowledge: [Essam Hassan Mohamed Ahmed, USA]	Rejected- undiscernable comment
12514	1	26	42	26	57	More recent refs needed. [James Ford, Canada]	Accepted- There are now more recent citations
20918	1	26	46	26	48	In the liste of references, please add for Siberia "Crate and Fedorov 2013 (Crate, S. A. & A. N. Fedorov 2013 A methodological model for exchanging local and scientific climate change knowledge in northeastern Siberia, Arctic 66 (3), pp. 338-350.) ; Lavrillier and Gabyshev 2017 (Lavrillier A. & S. Gabyshev, 2017 An Arctic Indigenous Knowledge System of Landscape, Climate, and Human interactions. Evenki Reindeer Herders and Hunters, Studies in Social and Cultural Anthropology, Kulturstiftung Sibirien, Fürstenberg/Havel, Germany 467p./) [Alexandra Lavrillier, France]	Accepted- done
78	1	26	53	26	53	remove "-" in "context-and" [Daniel Farinotti, Switzerland]	Rejected- Content and culture are two different and both critical aspects so we will keep them both.
13380	1	26	55	27	10	Be careful not to conflate interdisciplinarity with Transdisciplinarity. Suggest (Choi BC1, Pak AW.Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness. URL https://www.ncbi.nlm.nih.gov/pubmed/17330451) is a useful resource to be consulted. [Debra Roberts and Durban Team, South Africa]	Accepted- Clarified further to say: "Working across disciplines (interdisciplinarity) {Klenk, 2015 #275}, or engaging multiple stakeholders, including affected communities, local and regional representatives, policy makers, managers, and organisations (transdisciplinarity) {Burnham, 2016 #277} are approaches used to bridge across knowledge systems {Strang, 2009 #276}."
16044	1	26	55	56	26	I would recommend a change in this sentence: interdisciplinary OR transdisciplinary, to interdisciplinary (AND or AS WELL AS) transdisciplinary. These two concepts are different among themselves and both equally necessary and important for the bridging of both types of knowledge. [Mariela Lopez-Gasca, Venezuela]	Rejected- Disagree. If we change it to 'and' we are implying the need to do both which is not always necessarily true. And the phrase 'as well as' implies the same thing.
14194	1	27	6			etc. (period after' etc') [Christopher Fogwill, UK]	Accepted- done
20920	1	27	6	27	8	After "Castree et al., 2014" could be good to add for Siberia "Lavrillier and Gabsyhev 2017; p 10-59, 451-458. (Lavrillier A. & S. Gabyshev, 2017 An Arctic Indigenous Knowledge System of Landscape, Climate, and Human interactions. Evenki Reindeer Herders and Hunters, Studies in Social and Cultural Anthropology, Kulturstiftung Sibirien, Fürstenberg/Havel, Germany 467p./) [Alexandra Lavrillier, France]	Rejected- This citation does not belong here-- but we are using it in other parts of this section.
13246	1	27	12	27	21	Section 1.7 discusses knowledge systems. The integration of ILK is also discussed in this section. Consideration and discussion of the importance of the knowledge-attitude-behaviour spectrum should be included after the statement on 'perceiving the environment and acting within it' in order to affect change. [Zelina Zaiton Ibrahim, Malaysia]	Rejected- not able to locate a citation that uses this approach in a relevant way to climate change. Also it is more about behavior change which is not our topic
13382	1	27	12	27	20	A word on the approach adopted in this reported should be added. [Debra Roberts and Durban Team, South Africa]	Rejected: We have everything about approaches adopted in this report in the section following this one (1.8) and so we do not have it here (1.7).
6732	1	27	18	27	18	"Multiple Evidence Based approach", approach should be capitalized, too. [APECS Group Review, Germany]	Rejected: This text no longer exists in the Chapter.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6170	1	27	25	27	36	The chapter would be easier to read if the scope of the chapter and what it is about was introduced much earlier and not after 27 pages of text. [Regine Hock, USA]	Taken into account: section 1.1 has been revised extensively, but section 1.10 is still required to bridge to the subsequent chapters.
12516	1	27	25	27	29	if the focus is on using IK / LK why isn't humanities research also drawn upon? [James Ford, Canada]	Accepted: text revised in 1.9.2
6734	1	27	33	27	36	The sentence structure need to be rearranged and put in simple order to make reader easily understand what are in AR6 only and what are in Special Report. And maybe focus more on "what are in Special Report" instead of "what are not in Special Report". [APECS Group Review, Germany]	Accepted: text revised in 1.10
12382	1	27	34	27	34	"Report and not in this Special"? [Sylvain Ouillon, France]	Accepted
15400	1	27	36	27	36	It is probably a good location to indicate and/or reiterate that seasonal snow and permafrost outside polar areas and high mountain areas will be covered in AR6 rather than SROCC. [Samuel Morin, France]	Taken into account: this is mentioned in 1.10
16800	1	27	46	27	56	The Detection and Attribution analysis is here introduced. This type of analysis is used in different chapters: chapter 4, Sect. 4.2.2.6.1; Sect. 4.2.2.6.2; Sect. 4.2.2.6.4; Sect. 4.3.3.1.4; chapter 6, Sect. 6.4; Sect. 6.5; Sect. 6.6 among others. In terms of methodologies' developements, chapter 1 only refers to Bindoff et al. (2013) and Cramer et al. (2014). Due to the importance of the attribution analysis for different issues throughout the report, I find beneficial to provide more details on the existing methodologies on that matter and potentially on the debate in the community about the appropriate methodologies for addressing various stakeholder needs and scientific limitations (Otto, 2017). If relevant, a cross chapter Box should be envisaged with possible references: - Knutson, T., J.P. Kossin, C. Mears, J. Perlwitz, and M.F. Wehner, 2017: Detection and attribution of climate change. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I. U.S. Global Change Research Program, Washington, DC, USA, pp. 114-132, doi: 10.7930/J01834ND. - Otto, F. E. (2017). Attribution of weather and climate events. Annual Review of Environment and Resources, 42, 627-646. - Stott, P. A. et al., 2016: Attribution of extreme weather and climate-related events. Wiley Interdisciplinary Reviews: 16 Climate Change, 7 (1), 23-41, doi:doi:10.1002/wcc.380. [cited in Chapter 6] [Jeremy Rohmer, France]	Accepted: we don't have space to expand upon these methodologies, but have revised the text in section 1.3 in response to this comment, and added the suggested citations.
18242	1	27	46	27	56	This discussion is very incomplete when it comes to risk (not hazard). Please add a discussion on risk attribution. See for instance Cramer et al. 2014 in AR5 WG2, as well as Huggel et al. 2013 in Nature Climate Change, Bouwer 2011 in BAMS, where the roles of exposure and vulerability as drivers/components for attribution are discussed. [Laurens Bouwer, Netherlands]	Taken into account: revised chapter now mentions importance of framing climate change information around risk (e.g. section 1.4, section 1.9.3, CCB-4)
17716	1	27	47	27	47	In an ever changing system such as the climate, "normal" is necessarily an arbitrary choice that should be clearly defined and explained [Hessel Voortman, Netherlands]	Accepted: text revised in section 1.3
18244	1	27	49	27	49	Add a reference to Figure 1.1d. [Laurens Bouwer, Netherlands]	Taken into account: detection and attribution text moved to section 1.3/Figure 1.1

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
17718	1	27	51	27	51	Uncertainty in attribution is important for decision-making and should be communicated more clearly and explicitly [Hessel Voortman, Netherlands]	Taken into account: we do not have space to eleborate on this specific topic, but CCB-4 deals with uncertainty and decision making
12384	1	28	4	28	4	"(e.g., soil formation…)"? [Sylvain Ouillon, France]	Accepted
13146	1	28	4	28	4	please correct: e.g., [Baerbel Hoenisch, USA]	Accepted
6114	1	28	11	28	11	extra space after the word "life" [Patrick Taylor, USA]	Accepted
12048	1	28	15	28	32	EVA's fundamental weakness is that in giving a financial value to a critical system it neglects to account that if the system disappered the underlying store of value ascribed is bogus as the economic system would then collapse and with it purchasing power of the financial valuation…Like valuing ones heart…and trading it in for a year in the Ritz Carlton. The fundamental conflict we have is that of consuming natural resources in an effort to create cash (an imaginary instrument used as a store of value to trade for goods and services whose very creation is 100% reliant on a functioning ecosystem). Human development is supposed to be a by product of this process. In terms of climate and protection of civilisation and its growth we have a WWII moment. The financial solutions are there to solve climate but need to focus over much longer time frames. Future generations would far prefer to inherit debt used to finance long lived energy infrastructure than the elimination of real factors of production or equilibrium SLR's in the tens of meters. [Michael Casey, Germany]	Noted: we do not understand what is being request in this comment.
23588	1	28	23	28	23	Statement should read "marine and cryospheric", not just "marine" [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: change made to section 1.6
5218	1	28	24	28	26	verb missing in this sentence [Pauline Midgley, Germany]	Accepted: sentence corrected
12386	1	28	24	28	26	Is there no shortage of a verb or some words? [Sylvain Ouillon, France]	Accepted: sentence corrected
16920	1	28	24	28	26	Not a complete/clear sentence. What is meant? [Markku Rummukainen, Sweden]	Accepted: sentence corrected
18460	1	28	24	28	26	This sentence does not seem complete. [Anette Jönsson, Sweden]	Accepted: sentence corrected
19384	1	28	24	28	26	The sentence "The paradigm of sustainable development…" is incomplete, please rework. [Michelle A. North, South Africa]	Accepted: sentence corrected
23264	1	28	24	28	26	Editorial. Incomplete sentence. [Y. Jeffrey Yang, USA]	Accepted: sentence corrected
23590	1	28	24	28	26	incomplete sentence - please revise [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: sentence corrected
18246	1	28	31	28	31	Please add a reference to the excellent chapter on decision making in AR5 WG2 (Chapter 2 - Jones et al. 2014). [Laurens Bouwer, Netherlands]	Accepted: citation added to section 1.6
6736	1	28	41	28	51	Some examples of vulnerable groups (e.g. women and girls) are inappropriate, which might be misunderstood as discrimination. I know these examples are referenced to Oppenheimer et al. (2014), which has the sampling regions of developing countries, this should be mentioned before giving the examples. I'll suggest to shift the last sentence of "Importantly, …" to the beginning of this paragraph. [APECS Group Review, Germany]	Taken into account: wording of this section has been clarified in revised text (section 1.5.2.3)
12518	1	28	41	28	51	Need to also acknolwedge that while Indigenous peoples may be uniquely at risk, they are also resilient to many changes, with resilience lying in Indig knowledge systems, cultural and belief systems etc (see Pearce et al 2015 or Ford et al 2015 in NCC for Arctic examples) [James Ford, Canada]	Taken into consideration. Text removed.
16070	1	28	41	28	44	Sexual orientation is another basis for social exclusion that may affect climate vulnerability [Nathan Ross, New Zealand]	Taken into consideration by author team. This ifalls within "and other factors". Text merged with section 1.5.2.3

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
80	1	28	42	28	44	By all means I don't see how "ocean and cryosphere change" could affect "women and girls" more than (I have to speculate) "males and boys"... If the statement is kept, an explanation should be provided (similarly as what is done for "indigenous populations"). [Daniel Farinotti, Switzerland]	Taken into account: wording of this section has been clarified in revised text (section 1.5.2.3)
12388	1	28	48	28	48	"due" or "due to"? [Sylvain Ouillon, France]	Accepted: text rewritten and merged with section 1.5.2.3
13384	1	28	48	28	48	Add 'to' before 'existing' [Debra Roberts and Durban Team, South Africa]	Accepted: text rewritten and merged with section 1.5.2.3
13280	1	28	49	28	51	There seems to be a missing word or puncuation in this sentence. It does not read corerctly as it is presently written. [Katherine Bishop-Williams, Canada]	Accepted: text rewritten and merged with section 1.5.2.3
21338	1	28	49	28	51	unclear sentence [Philippus Wester, Nepal]	Accepted: text rewritten and merged with section 1.5.2.3
12390	1	28	50	28	50	"or" or "and"? [Sylvain Ouillon, France]	Accepted: text rewritten and merged with section 1.5.2.3
2836	1	28	53	30	9	Please, reduce text and include diagrams to better explain [Anne Guillaume, France]	Taken into account: The baselines/time periods are included in Fig.1.3. We add a new plot in Appendix to show the scenarios (SRES, RCP and SSP)
21252	1	28	53	30	22	You may consider linking section 1.8.2 to rest of AR6 by involving authors from other AR6 reports here to ensure consistency on scenarios. [Jan Fuglestvedt, Norway]	Agreed, we provide links to AR5 or SR1.5 for consistency.
21254	1	28	53	30	22	you may mention that more scenarios will be avilable for assessment by the WGI and II reports. [Jan Fuglestvedt, Norway]	Rejected: chapter-1 is to frame the tools used in SROCC, so including these message would cause confusion "why they are not used in this report?" and it requires more explainations (simple because they are not available to use).
608	1	29	0			After "other IPCC reports." add "This baseline will tend to underestimate environmental changes that have occurred because of human factors, as it substantially omits factors such as the rise of agriculture and the early use of coal." [William Clarke, Australia]	Taken into account: short-coming was discussed in the paragraph. And a sentence added after "other IPCC reports": "SROCC uses (wherever possible) the 1850–1900 pre-industrial baseline, which is a compromise between data coverage and representativeness of typical pre-industrial forcing conditions."
610	1	29	0			Should the "1850-1990" reference be "1850-1900"? [William Clarke, Australia]	Accepted
2664	1	29	1	29	10	The concept of PaloClimate Data is not well-defined. Is it a database or an information processing method? [Mohammad Javad Zareian, Iran]	Taken into account: This has been introduced in section 1.8.1.2
11630	1	29	1	29	10	Millenial time scales and projections and irreversibility should also be discussed, given that hazards of sea level rise, crysphere, and biogeochemical systems peak millennia after forcing stabilisation. [Fortunat Joos, Switzerland]	Accepted: A paloclimate perspective has been included in section 1.4, and sections 1.1 and 1.3 highlight issues of irreversibility
22240	1	29	1	29	2	The first sentence of this paragraph is more difficult to read through than it should be. I suggest a slight re-wording; perhaps "The time scales of ocean and cryosphere change vary from days to decades to centuries to many millennia." [Andra Garner, USA]	Accepted
6738	1	29	8	29	8	I would add "or uses global climate model outputs to initialize regional simulations" after "global climate models" [APECS Group Review, Germany]	Accepted

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
186	1	29	12	29	22	The chosen reference period 1850-1900 (1990?) is assumed by the authors to “approximate ‘pre–industrial’ conditions”. This assumption is incorrect. The pre-industrial climate of the past 10,000 years has been characterized by significant natural variability, including an alternation of marked warm and cold phases. A thorough review of past temperatures shows that the temperature level reached during the interval 1940-1970 serves as a better reference level as it appears to roughly correspond to the average pre-industrial temperature of the past two millennia. See Luening & Vahrenholt 2017 (doi: 10.3389/feart.2017.00104). On an even longer timescale of the past 10,000 years, the Holocene average temperature corresponds to the temperatures reached 1970-2000 (Luening & Vahrenholt 2017). It is therefore incorrect to state, the period 1850-1900 corresponds to average pre-industrial conditions. [Sebastian Luening, Portugal]	Taken into account: The choice of this period is a compromise between data coverage and representativeness of typical pre-industrial solar and volcanic forcing conditions. And also this period is chozen to be consistent with SR1.5 and AR5.
12050	1	29	12			Please define the word "slow" in this section in context of page 3 line 20 to 23. [Michael Casey, Germany]	Taken into account: "slow" was removed here, since it is an unclear word
24732	1	29	12	29	50	This entire page is very, very good. It is well thought out and well described. The discussion of baseline issues is very good; the choice of 2031-2050 and 2081-2100 makes this report easily integrated into results from other efforts. Great choices! [Elizabeth Weatherhead, USA]	thanks!
6740	1	29	14	29	40	There are no descriptions about the time periods of 1900-1985 and 2015-2030. If the "present-day" period is too short to prevent the oscillation modulation, why not put it in 2005-2030? Then the descriptions about PDO, which has some problems, can be removed. PDO is not completely resulted in trend of global atmospheric warming, the PDO explanation is not mentioned or misinterpreted from England et al. (2014). [APECS Group Review, Germany]	Rejected: It is not possible to use 2015-2030 as "present-day" period, because there is no observations after 2018. PDO is refered to its regulation on ocean heat redistributions, which is removed in the new version of our report.
6288	1	29	18	29	19	"greenhouse gas concentrations and surface temperatures had already started to rise during this interval" - sure, but as phrased, this passage implies that the former was the only cause of the latter during the 1850-1900 period, which of course isn't quite true - at least not across the Northern Hemisphere, where recovery from the LIttle Ice Age was also an important factor as well. Might it be better to just come out and say what seems to be the essential point here - that climate is dynamic, and the choice of 1850-1900 as a baseline period is simply a convenient and, in some general sense, neutral choice during which we had adequate data and before GHG warming really started in earnest? [Sean Fleming, USA]	Accepted: The choice of this period is a compromise between data coverage and representativeness of typical pre-industrial solar and volcanic forcing conditions. Text revised to specify compromises in choices.
4572	1	29	22	29	22	1850-1990 is certainly not the period for the pre-industrial base-line. It should probably read 1850-1880. [Jean-Pierre Poitou, France]	Accepted, should be 1850-1900
5136	1	29	22	29	22	1990 should read 1900. [Sai Ming Lee, China]	Accepted
12392	1	29	22	29	22	"1850-1990" or "1850-1900"? [Sylvain Ouillon, France]	Accepted
15402	1	29	22	29	22	1850-1990 to be replaced by 1850-1900 I believe. [Samuel Morin, France]	Accepted
16922	1	29	22	29	22	The period is probably referenced wrong (preindustrial is not the same as 1850-1990). [Markku Rummukainen, Sweden]	Accepted
21340	1	29	22	29	22	Is the pre-industrial baseline from 1850 to 1990, or from 1850 to 1900? [Philippus Wester, Nepal]	Accepted

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18362	1	29	24	29	32	Please check: Present day reference setting is critical for the assessment. Here 11 year (2005-2015) reference setting seems short and may be modulated by climatic anomalies and natural variability. [Suvadip Neogi, India]	Taken into account: Yes, present day reference setting is critical.This report chooses 2006-2015 because of multiple reasons: (1) Consistent with 1.5 special report. (2) This period is the one with best ocean and cryosphere data coverage: for example Argo network achives near-global coverage (see Annex Figure for data coverage) and there are GRACE satelite revolutionzied glaciers/ice sheet and sea level changes. (3) And there are some studies showing that properly dealing with natural variability does not impact the definition of the reference. Text has been revised and additional references included.
3970	1	29	26	29	32	As stated in this paragrah. A 10 year period taken as indicative of present day conditions seems highly risky given the potential interdecadal variability that could bias a single decade. I would prefer 1996-2015 to be used. [Helene Hewitt, UK]	Taken into account: Please find my response above (comment #18362)
4740	1	29	34	29	36	A near term interval 2030-2050 would not really be useful for SDG policy-relevant, as the SDGs have to be achieved by 2030 at the latest (some 2020), so policy needs to be completed now. [Manuel Barange, Italy]	Taken into account: We agree with the reviewer that “2030-2050” as “near-term” Is not maximally helpful for planning how to incorporate climate change into the SDG planning. However, the scientific constraints on model performance, where 10 years forward a model is still influenced by initial parameetersations, limitd what is possible to project. SDG planning can still take into account the trends that emerge from projections within the IPCC “near term”, even if accurate and precise projectons are not available for the period 2018-2030.
6116	1	29	35	29	36	why not use SDG for Sustainable Development Goals? You define it above. [Patrick Taylor, USA]	Accepted
19386	1	29	46	29	46	Cite Figure 1.1b after 'Time of Emergence' [Michelle A. North, South Africa]	Accepted
21158	1	29	46	29	46	what is the 'time of emergence'? Is this expected to be the time at which it is expected to see a significant different in a change from what might be expected from natural variability? How is it to be useful in a risk management framework? Is a 100 year ToE something we don't need to worry about? Would that be true if the required adaptation response needed to occur 95 years in advance of the ToE if it occurred? Would be good to have some explanation here of what it is and how it would be used/interpreted. [Andrew Constable, Australia]	Taken into account: This is discussed in section 1.3, which is cited here, and it is defined in both section. The Mora et al reference provides an example linking ToE to ecosystems. Further details are described with relevant examples where ToE appears in the chapters.
22364	1	29	46	29	46	"Time of Emergence", --> "Time of Emergence," [move comma inside quotes] [Handa Yang, USA]	Accepted
23592	1	29	46	29	46	Please provide a simple, few-word explanation for ‘Time of Emergence’ and refer to Box 5.1 in Chapter 5 [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
14196	1	29	47			characterizing [Christopher Fogwill, UK]	Accepted
12820	1	29	52	30	8	Please add the incremental ocean heat storage by 2100 for each sceanrio and compare to global annual energy usage at present. [Michael Casey, Germany]	Taken into account: We decided to put in the GHGs radiative forcing and the associated net radiative imblance in the earth system during the recent period for comparison, to save some space and also to be more understandable

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24734	1	29	52	30	22	This section, also, is very, very good. I particularly like the paragraph describing the RCPs and how they are complemented by the SSPs. (Page 1-30, L17-22) Great job! [Elizabeth Weatherhead, USA]	Thanks!
82	1	29	53	29	53	remove "-" [Daniel Farinotti, Switzerland]	Accepted
12394	1	29	53	29	53	Why a "-"? [Sylvain Ouillon, France]	Accepted
15404	1	29	53	29	53	extraneous "-" character [Samuel Morin, France]	Accepted
15472	1	29	53	29	53	Delete "-". [Hernan Sala, Argentina]	Accepted
6742	1	29	54	30	8	I always feel very confused when reading the discussions of RCPs in IPCC report. People who read IPCC might not read the reference of Moss et al. (2008), give more details or practical examples about what are the radiative forcing pathways, what are those socioeconomic development and changes. Also give a referenced value of current total radiatve forcing (e.g. ~0.9 W/m^2 net absorbed) for comparison. [APECS Group Review, Germany]	Accepted. We improved the current introduction, and then added more information including a plot in the Appendix. A referenced value of current net radiative forcing and also current GHGs radiative forcing are given.
13148	1	29	56	29	56	"RCP" has already been used earlier in this report and should be defined there as well [Baerbel Hoenisch, USA]	Taken into account. We still decided to put the full name here because the previous RCP is in a figure caption (Fig. 1.4).
23594	1	29	57	30	1	revise sentence structure [Hans-Otto Poertner and WGII TSU, Germany]	Accepted
22242	1	30	1	30	1	Omit "extended by". [Andra Garner, USA]	Accepted
22366	1	30	1	30	15	This would be better explained by a plot [Handa Yang, USA]	Accepted: A plot added in the Appendix
13150	1	30	3	30	3	replace "forcin in 2100" by "forcing by the year 2100" [Baerbel Hoenisch, USA]	Accepted
6744	1	30	6	30	6	I would add a reference here: "Schellnhuber, H. J., Rahmstorf, S., & Winkelmann, R. (2016). Why the right climate target was agreed in Paris. Nature Climate Change, 6(7), 649.", after Rogelj et al., 2018. [APECS Group Review, Germany]	Accepted
6746	1	30	10	30	15	The scenarios of SRES such as B1, A1B, A2, A1FI are not mentioned and explained anywhere else. [APECS Group Review, Germany]	Taken into account: due to the limitation of the word count, we decided to remove B1, A1B, A2, A1F1 from the main texts, however, a new scenario inter-comparison plot is added in Annex and these pathways are introduced there.
5220	1	30	11	30	12	suggest providing some brief justification here for the use of SRES scenarios [Pauline Midgley, Germany]	Accepted, this is simply related to the availability of the literatures
832	1	30	12	30	12	delete "scenarios" after "(SRES)" [Kathiresan Kandasamy, India]	Accepted

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17720	1	30	24	30	57	The methods for establishing the quantitative expressions remain unclear. Without further explanation the quantitative expressions should be interpreted as qualitative indications of likelihood, irrespective of the fact that they are expressed in numbers. It is unclear what concept of uncertainty is adopted here. Considering the mix of data, model results and expert knowledge, reviewer is of the opinion that a Bayesian (subjective) concept of probability is the most suitable in this context. It appears that throughout the report, uncertainties are underestimed and hence the likelihood of results is overestimated. Important sources of uncertainty are knowledge uncertainty (uncertainty stemming from the necessity that a model is simpler than reality) and statistical uncertainty (uncertainty stemming from the fact that samples are too small to draw firm conclusions, either about extremes or about effects in the far future). No indication is found throughout the report that these sources of uncertainty have been incorporated and have thus influenced the likelihood estimates [Hessel Voortman, Netherlands]	Accepted: text and figure revised extensively to clarify process
23154	1	30	31	30	31	"ambiguously defined concepts or terminology" really? If correct, this would be embarrassing. [Aimé Fournier, USA]	Taken into account: text revised extensively
23156	1	30	31	30	31	"data" should be "data or model formulations or model parameters" [Aimé Fournier, USA]	Taken into account: text revised extensively
2838	1	30	32			« Certainty levels that CAN be based… » A definition has to be precise and « can » here is not required and may give the feeling that IPCC calibrated language is no so calibrated and is not to be trusted. [Anne Guillaume, France]	Accepted: text revised extensively
14198	1	30	32			behavior [Christopher Fogwill, UK]	Rejected: UK English spellings used for IPCC
6290	1	30	36	30	43	This passage appears to make the mistake - a common mistake, but a fundamental technical error nonetheless - of confusing p-values with confidence intervals. This should be corrected. It's important to maintaining the credibility of the report with a statistically literate audience. [Sean Fleming, USA]	Accepted: text revised extensively
24736	1	30	36	30	37	This section makes a common mistake in describing uncertainty based on observations. The statistical uncertainty is easily derived, but the measurement uncertainty—particularly the components that can add to drift over long periods of time—are not directly called out in this section. Statistical uncertainty reported in papers is often complemented by an introductory section that addresses the measurement uncertainty, but then is absent from the final conclusion. This report could improve on this by adding even a single sentence along the lines of: “In addition to statistical uncertainty, each observing system has uncertainty that contributes to the conclusions about long-term change; whenever possible both types of uncertainty are addressed.” [Elizabeth Weatherhead, USA]	Taken into account: material added on expert judgement that can account for additional uncertainty beyond observations/models
2840	1	30	37	30	38	ERROR, replace « occurring by chance », by « NOT occurring ». If it occurs, this may be as part of normal climate variability or because of climate change, mathematical statistics and probability can’t make the difference. IPCC language takes this into account and likelihood is based on intervals, >95% in this case, and this includes 100%, saying « by chance » suggests that you replace >95% by =95% which is NOT IPCC language. [Anne Guillaume, France]	Taken into account: this text removed in revisions of this section

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14200	1	30	38			colon instead of semi-colon [Christopher Fogwill, UK]	Accepted: text extensively revised
84	1	30	39	30	39	"statistical certainty" should read "statistical confidence". [Daniel Farinotti, Switzerland]	Accepted: text revised accordingly
86	1	30	41	30	43	Well, I would say that a "95% confidence interval" is far more common (as also acknowledged in the preceding Lines 37-38). Following the wording used in the sentence, that would then be a "2.5-97.5% confidence interval". [Daniel Farinotti, Switzerland]	Accepted: text and figure extensively revised.
2842	1	30	43			Is it "likely" or « very likely » according to IPCC? [Anne Guillaume, France]	Accepted: this has been corrected
16924	1	30	43	30	43	This can sound a bit confusing - use of "likely" here as a more "relaxed" expression than in the IPCC-uncertainty meaning. Reword? [Markku Rummukainen, Sweden]	Accepted: text oand figure in this section extensively revised for clarity
88	1	30	53	30	53	A word of clarification why the term "deep" is used would be very helpful. [Daniel Farinotti, Switzerland]	Taken in to account: Cross Chapter box and the glossary now provide text to define deep uncertainty
23158	1	30	53	30	53	"rate, timing and scale" should be "rate, timing, scale and magnitude" [Aimé Fournier, USA]	Accepted: text changes to "rate, timing and magnitude"
23266	1	31	0			It is helpful to have statistical likelihood assigned to the IPCC uncertainty terms. I wonder if this statistical range is followed in the terminology use in chapters. I could not see any quantitative evidence in places they are used. If the term is qualitative, as normally used, then please consider proper revisions. [Y. Jeffrey Yang, USA]	Taken in to account: Figure 1.4 has been extensively revised to better explain the process of assigning confidence and/or likelihood statments using IPCC calibrated language.
12346	1	31	1			"while extended by Extended" doesn't quite make sense [Eric Wolff, UK]	Accepted: text has been revised
24738	1	31	1	31	12	I am very happy to see the continuation of likelihood descriptors. Very helpful! There is now a set of references from peer reviewed literature that can describe how effective these are. If you want to include those, it can add credibility to the use of these words. [Elizabeth Weatherhead, USA]	Thank you
250	1	31	2			Table 1.2 (a) Likelihood is a type of uncertainty but not the only type. See the works of George Klir, and Ayyub and Klir (2006). Uncertainty is defined as deficiency in information. [Bilal Ayyub, USA]	Taken in to account: text uses accepted (published) IPCC calibrated language definitions
90	1	31	5	31	5	I take it that this is not treatable, but for consistency reasons with the wording "virtually certain", the "exceptionally unlikely"-term should be called "virtually excluded". [Daniel Farinotti, Switzerland]	Rejected: wording as defined in accepted IPCC calibrated language
6748	1	31	5	31	6	The intervals of likelihood are weird, I think it should be 99-100%, 95-99%, 90-95%, etc.? [APECS Group Review, Germany]	Rejected: intervals are as defined in referenced literature. Figure and text extensively revise to improve clarity.
13282	1	31	6	31	9	The text in Table 1.2b is not reader friendly and is thus not accessible to some viewers. Another stylistic choice should be made to increase readability for those with vision impairments. (i.e. black writing on dark grey background has minimal contrast) [Katherine Bishop-Williams, Canada]	Accepted: Figure shading has been changed
17722	1	31	7	31	8	It is of extreme importance to specify the meaning of the term "agreement". Agreement between models and observations is a clear contributor to likelihood. Agreement between studies in itself is not [Hessel Voortman, Netherlands]	Taken in to account: this aspect is part of the "consistency" element of "agreement"
18524	1	31	7	31	7	shading makes this hard to read as it lowers the contrast [Angelika Renner, Norway]	Accepted: Figure shading has been changed
22576	1	31	7	31	8	Upper right corner of table/graphic is very hard to read (black letters on very dark background). [Eva Kruemmel, Canada]	Accepted: Figure shading has been changed
92	1	31	14	31	17	The wording "storyline" looks unfortunate to me: The report is not telling "stories", after all, but a malicious reader could see that implied in the wording. [Daniel Farinotti, Switzerland]	Rejected: "Storyline" is part of the approved outline for SROCC Chapter 1

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2844	1	31	14	32	5	as mentioned earlier, in a time of fake news, « storyline » is a very inappropriate word to keep using . Please use a scientific word, « structure of this report… » [Anne Guillaume, France]	Rejected: "Storyline" is part of the approved outline for SROCC Chapter 1
2690	1	31	16	31	16	Ocean and Cryosphere in a Changing Climate' sholld be 'ocean and cryosphere in a changing climate'. [Kentaro Hayashi, Japan]	Accepted: we now use the SROCC acronym
13248	1	31	16	31	22	I consider that the Section 1.9 text in the first sentence of the first paragraph and first sentence of the second paragraph, is better placed in section 1.1, as it states the content of the SR in line 16, that is, to assess the current knowledge; and that it is 'framed around geographic or climatic aspects where the oceans and/or cryosphere are particularly important for ecosystems and human systems'. This may be compared to the statement in section 1.1, paragraph 3, which states only that the SR recognises the interconnectivity of the ocean and cryosphere. [Zelina Zaiton Ibrahim, Malaysia]	Accepted: Section 1.1 has been revised extensively to improve this.
24740	1	31	16	31	19	The storyline approach is very good. The choice of questions to focus the chapters: “how and why they are changing; what, where and for whom…” are excellent. [Elizabeth Weatherhead, USA]	Thank you
15406	1	31	22	31	23	The introduction to Chapter 2 could be discussed with Chapter 2 authors ; it is probably interesting to refer here to the WMO definition of High Mountain Areas : This chapter adopts the definition of high mountain regions as “mountain areas where seasonal or perennial cryosphere is present and poses a potential and serious risk to society related to water scarcity and disaster resilience” as resolved by the 69th Executive Council of the World Meteorological Organisation (WMO) in 2017." [Samuel Morin, France]	Take in to account: chapter 1 is only able to provide a broad overview and worked with the chapters to develop these. Detailed definitions/boundaries need to be described within the relevant chapters.
14202	1	31	25			characterized [Christopher Fogwill, UK]	Rejected: IPCC used UK English spellings
12396	1	31	29	32	1	The Integrative Cross-Chapter Box 5 is introduced in the same way and at the same level than chapters 2 to 6, it is a bit embarrassing to the reader. May I suggest to change this sentence into: "The multitude of ways in which these Low Lying regions are vulnerable to the impacts of O & C change is further highlighted in the integrative Cross-Chapter box 5"? [Sylvain Ouillon, France]	Accepted: text revised accordingly
2846	1	33	0	72		Sorry, I just did not feel like reading more and I had already spent a lot of time reading and reviewing the first 32 pages. But I’ll be happy to read a second draft. [Anne Guillaume, France]	Noted.
12524	1	33	0	33		Cross chapter box 1 is confusing. The title is "IPCC Conceptual Risk and Resilience Framework" but the box doesn't develop a framework; rather, it defines key terms used in the report and explains why they are used. It is more a discussion of key concepts and definitions used in the chapters than a framework. [James Ford, Canada]	Accepted -- the title of the box has been changed
21032	1	33	0	34		This isn't really a "Box" this is body text. And it’s the real framing of the report. Should come earlier. [Thomas Wagner, USA]	Taken into consideration -- the text of the box has been changed to read rather like a box.

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21160	1	33	0			Box 1 - I didn't find this box helpful. I felt that the jargon could simply be summarised as 'pathways' if a word is needed that is different from human responses [to climate change]. I think the box at present more describes the types of aspirations that might be had but the terms will be collapsed to acronyms that only those in the field will understand. I don't think it will not support easy communication of the actions required to successfully mitigate and/or adapt to climate change. I know this comment will not be received well but, as a scientist that works in policy, I have a long experience to know that acronyms and jargon do not help achieve consensus. [Andrew Constable, Australia]	Taken into consideration -- the box has been heavily revisesd to cut jargon, provide more context, is easier to communicate and emphasizes on response action
1590	1	33	1			I strongly question the meaningfulness of this entire cross-chapter box. It contains some interesting discussions that could be held in the scientific literature, but essentially provides no guidance whatsoever for the understanding of the topics dealt with in this Special Report. [Wolfgang Cramer, France]	Taken into consideration -- the box has been heavily revisesd to provide stronger guidance for othe understanding of the topics dealt with in this report
10404	1	33	1			Cross-Chapter Box 1: an earlier description of this box (p. 13, ll 42-43) refers to a definition of 'risk'. I missed a clear definition in Chapter 1 and terms 'Risk', 'Impact' and 'Hazard' appear to be used interchangibly when, for example, referring to ocean acidification. Thus a clear and distinguishable definition of risk could be a useful addition to this section. [APECS Group Review, Germany]	Taken into consideration -- a clearer introduction to these terms is no provided along with additonal referencing to the glossary.
10406	1	33	1			Cross-Chapter Box 1: There is a contradiction between the definition of 'resilience' in the beginning of the box (p. 33 ll 13-15: "in ways that maintain the system's essential function, identity and structure") and the description of 'climate resilient development pathways' that in its framewok includes 'transformative adaptation' which implies "fundamental changes in the attributes and configurations of a system or process" (p. 34 ll 34-35). From a policy-maker perspective, which system functions, identities or structures can strengthen resilient solutions, and which are less essential and could most likely be adapted and changed? An example or case would be helpful here. [APECS Group Review, Germany]	Taken into consideration -- this contradiction has been resolved.
23408	1	33	1	35	11	Cross Box 1 (Conceptual risk and resilience framework): the risk is not explained, the box starts with resilience. This entire text is hardly comprehensible to a non-deep-specialist. Please rewrite? [Inga Koszalka, Germany]	Taken into consideration -- the entire box has been heavily restructured and reworked.
23598	1	33	1	36	56	This is a very interesting, informative, and well-written CCB. There is some room for improvement regarding cross-referencing to sections in other chapters [Hans-Otto Poertner and WGII TSU, Germany]	Accepted -- crossreferencing has been added.
13250	1	33	3	33	12	The Cross-Chapter Box 1 title is Conceptual Risk and Resilience Framework, however, only resilience is discussed here. I suggest the title should only be for the resilience framework since the risk framework hasbeen discussed in section 1.4, unless the intention is to integrate the two concepts together in this box. At present only residual risk is mentioned here. However residual risk has not been previously discussed in section 1.4. Adaptation is discussed [Zelina Zaiton Ibrahim, Malaysia]	Taken into consideration -- the box has been restructured to cover risk.
18248	1	33	3	33	3	Title: Why is this conceptual? It is the framework applied and used here by IPCC, so I would remove the word "conceptual". [Laurens Bouwer, Netherlands]	Accepted.

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16384	1	33	10	34	24	Thank you for this very informative box on reislience and risk. However, I'm wondering if some direct literature exploring reislience and vulnerability would be of assistance: Miller et al. 2010 Resilience and Vulnerabiity Ecology and Society 15(3) ARticle 11 [Margot Hurlbert, Canada]	Accepted -- reference has been added even it is pre-AR5.
10408	1	33	11	33	12	"...humans, hence, highlighting the importance of resilience" - this does not follow from the previous sentence. I suggest the following replacement: Since climate change adds stress and shokcs to the ocean and the cryosphere, resilience is an important analytical and normative concept for understanding and guiding the trajectories of social-ecological systems. [APECS Group Review, Germany]	Taken into consideration -- the text has been revised to accomodate for a change along the suggested lines.
18250	1	33	12	33	12	What does trajectories mean here? I suppose these are "development trajectories" [Laurens Bouwer, Netherlands]	Accepted
23596	1	33	12	33	15	Please verify whether this conforms with the definition for resilience given in the final SR15 and (future) SROCC glossaries [Hans-Otto Poertner and WGII TSU, Germany]	Taken into consideration -- coherency with SR1.5 and the SROCC glossary has been achieved.
10428	1	33	15	33	15	The definition of resilience given here is very similar to that of Walker et al., 2004. Walker et al., 2004 is already mentioned in the references. [APECS Group Review, Germany]	Taken into consideration -- The quite old Walker et al. 2004 definition had been a foundation for earlier IPCC definitions which we draw on here.
12520	1	33	23	33	34	it is stated "However, despite these concerns, 'resilience thinking' invites an emphasis on system dynamics, 26 often not captured in conventional risk and vulnerability analyses, such as tipping points, regime shifts, the 27 role of fast and slow variables, feedbacks, cross-scale interactions, system complexity, uncertainty and 28 emergence, surprise, and the potential of human agency in transforming a social-ecological systems and their 29 trajectories." I would argue that these charactersitics are also shared by vulnerability assessments - see some of the fundamental conceptual work on vulnerability for example. Empirically many of these system dynamics are not captured (see Fawcett et al 2017 in GEC) in vulnerabiltiy work, but the same is also true of resilience approaches too. Critiuqes applied to resilience approaches not noted here (see work of Kelman for example or Ribot) include that resilience doesn't focus on the underlying power structures that create vulnerability. Moreover, isn't the discussion of resilience here merely captuirng what those in the vulnerability field call adaptive capacity? [James Ford, Canada]	Taken into consideration -- the text has been revised to take-up these arguments.
10410	1	33	26	33	30	"often not captured in conventional risk and vulnerability analyes" needs a reference. [APECS Group Review, Germany]	Taken into consideration -- the text has been changed in response to review comment 12520
20958	1	33	29	33	29	"agency" ? Or: "action" ? [Claudio Richter, Germany]	Taken into consideration -- agency is the more encompassing term to be used here.
20960	1	33	29	33	29	"transforming a social-ecological systems": omit "a" [Claudio Richter, Germany]	Accepted.
18252	1	33	30	33	30	Again, "development trajectories" [Laurens Bouwer, Netherlands]	Taken into consideration -- the text has been revised.
23600	1	33	31	33	32	consider referring to the other chapters, here [Hans-Otto Poertner and WGII TSU, Germany]	Accepted -- Reference to other chapters has been added
10412	1	33	32	33	32	Delete "action" [APECS Group Review, Germany]	Accepted.
13284	1	33	32	33	32	There is an extra word in this line that does not fit. [Katherine Bishop-Williams, Canada]	Accepted -- the text has been changed.

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20962	1	33	32	33	32	"in at the low-lying coast" should read: "on the low-lying coast" [Claudio Richter, Germany]	Accepted -- the text has been changed.
18254	1	33	33	33	33	Unclear what "navigate" means: rather "avoid or reduce damage and risks" [Laurens Bouwer, Netherlands]	Rejected -- the idea here is that shocks can not always fully be avoided; hence, they need to be navigated.
13252	1	33	36	33	38	The new concept of resilient development pathway is introduced and may be better described elsewhere in its own box, instead of being under a cross-chapter Box on Risk and Resilience. [Zelina Zaiton Ibrahim, Malaysia]	Rejected -- the concept of climate resilient development pathways is closely linked to the concepts of risk reduction and resilience which are also discussed in this box. Hence, the pathways concept is introduced in the box as well in an integrative manner.
13322	1	33	36	35	16	Some reorganization of Box 1 is suggested as the Box title does not reflect the terms and concepts discussed. This Box is on Risk and Resilience, however, the adaptation term is used in Figure 2 together with risk only; and in Figure 1 (Line 7, page 34) the terms adaptation, mitigation and resilience are used without the risk term. Resilience, adaptation, residual risk is discussed in the text disjointedly. It would be advantegeous to have a diagram linking the concepts to be discussed all on one figure first. [Zelina Zaiton Ibrahim, Malaysia]	Accpeted -- the title of the box has been changed and the box has undergone major reorganization.
14204	1	33	36			climate resilient develeopment pathways' (needs inverted commas) [Christopher Fogwill, UK]	Rejected -- the term has been used in previous IPCC reports withoug inverted commas.
19390	1	33	36	33	36	Either italicize or otherwise highlight with inverted commas the 'climate resilient development pathways' here where they are mentioned for the first time. [Michelle A. North, South Africa]	Rejected -- the term has been used in previous IPCC reports withoug inverted commas.
10414	1	33	37	33	37	"A relatively new concept" please cite the source where the concept was first mentioned. [APECS Group Review, Germany]	Accepted -- reference has been added.
19392	1	33	40	33	40	Either italicize or otherwise highlight with inverted commas the 'adaptation pathways' here where they are mentioned for the first time. [Michelle A. North, South Africa]	Rejected -- the term has been used in previous IPCC reports withoug inverted commas.
6118	1	33	46	33	46	is a development corridor that same as a development pathway? I would recommend not bringing about a new term that means the same as a previous terms. It just adds confusion. Now I see corridor used in the Figure for this box. I think it would be good to define it in the text where it is used. [Patrick Taylor, USA]	Taken into consideration -- the term is clearly introduced now.
18256	1	33	57	33	57	Please specify "activism", activism to do what? [Laurens Bouwer, Netherlands]	Taken into consideration -- the term has been erased.
612	1	34	0			Change "retching-up" to "ratcheting-up" [William Clarke, Australia]	Accepted

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
13386	1	34	0			This figure does not communicate well. The brown area represents adaptation and mitigation. In the top panel this starts small, then increases and is called "effects of not doing anything". In the bottom panel it starts out big and then shrinks? What shrinks? The "effects of not doing anything"? the "effects of doing something"? What do the lines between the people groups represent? Pathways? Inter-connections? Options? If the overall message is "if we fail to act, the corridor for climate-resilient development pathways gets narrower; as the effects of climate change multiply, we will have fewer and fewer options to adapt", then does this requires a diagram at all? It is an understandable statement that doesn't necessarily need a picture. [Debra Roberts and Durban Team, South Africa]	Taken into consideration -- the figure has been heavily reworked in response to these comments.
2666	1	34	1	34	10	There is no clear explanation regarding the relationship between climate flexibility and air pollution control capacity. [Mohammad Javad Zareian, Iran]	Rejected -- the topic of air pollution control capacity goes beyond the mandate of this box.
4654	1	34	4	34	5	I just don't understand this figure. What are the wedges? What are the footprints/clumps of people? Why are they connected by blue squiggly lines? Is time on the x axis and why isn't it labeled? [Baylor Fox-Kemper, USA]	Taken into consideration -- the figure has been heavily reworked in response to these comments.
10250	1	34	4	34	5	Cross-Chapter Bos 1, Figure 1. The width of the space above 'Today' should be illustrated exactly the same in the Figure 1's 'World without effective climate action' and 'World with effective climate action'. Both futures start with the same today. [APECS Group Review, Germany]	Taken into consideratoin -- the figure has been heavily reworked to also cater for this comment.
10416	1	34	4			Cross-Chapter Box 1 Figure 1: not all elements of this figure are clear. The way I interpret this schematic is that effective climate action increases the diversity of climate-resilient development pathways (presumably reducing the risk by having more adaptation and mitigation options available). However, the group symbols and the lines between them need to be defined. What does a line exiting the corridor (and into one of the wedges) represent? What does the group-of-people symbol represent? [APECS Group Review, Germany]	Taken into consideration -- the figure has been heavily reworked in response to these comments.
10666	1	34	12	34	14	The adaptation definition has to include not hazardous processes: ocean level rising for many countries is not a crisis, but a large problem. Ice shinking in the Polar Ocean provides lots of opportunities for fishery and shipping - using them is also adaptation. [Oxana Lipka, Russian Federation]	Taken into account -- the definition of adaptation has been changed so as to also include the possibility that new options are tapped into.
18258	1	34	12	34	14	Adaptation also includes modification of hazard, not just exposuer and vulnerability. See also lines 18-19 on this same page. [Laurens Bouwer, Netherlands]	Taken into account -- the definition has been changed accordingly.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
22578	1	34	13	34	14	Should this not be "avoid" the hazards? I.e., I would define adaptation rather as "a process in which the exposure and vulnerability of human and natural systems is reduced to avoid the hazards emerging from climate change-driven changes in the ocean and cryosphere." Or, it would need to read: "Adaptation, in the context of this report, is a process in which the exposure and vulnerability of human and natural systems to the hazards emerging from climate change-driven changes in the ocean and cryosphere is reduced" - but this is a rather long and complicated sentence. [Eva Kruemmel, Canada]	Taken into accound -- The definition has been changed. But many hazards cannot be avoided, hence, vulnerability and exposure has to be reduced in order to reduce risk.
10418	1	34	17	34	17	Write out what "It" refers to. [APECS Group Review, Germany]	Accepted -- the text has been changed anyhow in the revision process.
23602	1	34	17	34	22	Please specify to which section(s) in Chapter 4 you are referring to [Hans-Otto Poertner and WGII TSU, Germany]	Taken into consideration -- this sentence has changed in line with other revisions.
10252	1	34	19	34	20	The human-specific example "(e.g., by reducing urban flooding through flood retention areas)" reduces human risk but also reduces ecological adaptation. I suggest an example that increases the potential for human and ecological adaption and a reduction in human and ecological risk such as "to decarbonize the economy" from Line 33. [APECS Group Review, Germany]	Taken into consideration -- but decarbonization is linked to climate change mitigation rather than adaptation.
6120	1	34	24	34	34	It isn't clear to me what you mean by "residual risks." I am unfamiliar with this term of art. I would recommend defining it here for those that may been clarity. [Patrick Taylor, USA]	Accepted. Text revised.
10420	1	34	24	34	25	The high confidence, high agreement statement needs to be further supported with regard to different adapation- or IPCC emission scenarios. It would help to define, or give an example of a residual risk. [APECS Group Review, Germany]	Accepted. Citations added
10422	1	34	28	34	29	"have increasingly been linked": this statement needs a reference. The references at the end of the sentence only attest to the "emerging debate on loss and damage", not to the relationship between loss and damage and residual risk. [APECS Group Review, Germany]	Accepted. Text revised.
16926	1	34	28	34	29	To say "have increasingly been linked" would seem to require more recent references than 2013. (Not least as loss and damage as a negotiation area was agreed within UNFCCC in late 2013). [Markku Rummukainen, Sweden]	Accepted -- newer literature has been added.
18260	1	34	29	34	29	Authors may wish to add newer literature on Loss & Damage, including the book by Mechler et al. 2018 (http://www.springer.com/us/book/9783319720258); Boyd et al. 2017 Nature Climate Change, doi:10.1038/nclimate3389; and others. [Laurens Bouwer, Netherlands]	Accepted -- newer literature has been added.
18262	1	34	29	34	29	Also, the Box could include why Loss & Damage is relevant, and what the FCCC mechanism on L&D (WIM) aims to address. Or it could refer to other parts of Chapter 1, or Chapter 6, where L&D is further addressed. [Laurens Bouwer, Netherlands]	Accepted -- reference to FCCC has been added.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10254	1	34	30	35	5	The paragraph begins with "Much of the literature published since AR5". However, the liteature includes three Solecki et al., 2017, three Pelling et al., 2015, and an OBrien et al. 2012 (who is a co-author on Pelling et al. 2015). I suggest the following replacement (extensive grammatical edits have also been made): "Much of the literature published since AR5 has emphasized the need for societal transformations to enable climate change mitigation (most notably to decarbonize the economy; Riahi et al., 2017) and adaptation (e.g., Pelling et al., 2015; Few et al., 2017). Transformative adaptation is therein understood to imply fundamental changes in the attributes and configurations of a system or process (O'Brien, 2012), e.g., a legal system or cultural convention for development planning and risk reduction. It becomes necessary when incremental adaptation through limited gradual adjustments and the retching-up of existing adaptation practices cannot reduce risks and impacts to an acceptable level. Transformative adaptation therefore commonly involves fundamental modifications of policies, policy-making processes and cultural values (Pelling et al., 2015). Examples of human-ocean adaptions include the accomodation of salt-water intrusion (Renaud et al., 2015) and the retreat of megacities from coastlines (Solecki et al., 2017)." [APECS Group Review, Germany]	Accepted. Text revised.
17242	1	34	31	35	11	Consider adding the concept of rist tolerance/risk appetite of decision makers/society/people as it contributes to transformational thinking of risks and what impacts to avoid pre-emptively through planned adaptation and what to be left for contingency plans and arrangements. [Iulian Florin Vladu, Germany]	Comment taken into account. This is addressed in the discussion around tranformational vs incremental adaptation
6122	1	34	37	34	37	I don't think you mean to use the word "retching-up" but "ratcheting-up". Look the work retch up on dictionary.com [Patrick Taylor, USA]	Accepted. Text revised.
14206	1	34	37			retching-up' is not the correct phrase here! 'ratcheting-up' may be what you're looking for! [Christopher Fogwill, UK]	Accepted. Text revised.
16374	1	34	37	34	37	"retching-up" This means vomitting. I do not think that is what is meant here. I am guessing that the phrase that was intended was: "ratcheting-up" [Inga Smith, New Zealand]	Accepted. Text revised.
19106	1	34	37	34	37	"ratcheted", not "retched" [Anna Zivian, USA]	Accepted. Text revised.
19394	1	34	37	34	37	"…'retching-up' of existing adaptation pathways…" is not appropriate scientific terminology, please modify [Michelle A. North, South Africa]	Accepted. Text revised.
13388	1	35	0			CC box1 Fig 2: This figure is misleading. Hazards (storms, sea level rise) will continue to get worse, even if we stop all emissions today (according to text). What we can do is reduce vulnerability and reduce exposure, and slow down the growth of the hazards so they increase less than they might otherwise. Vulnerability and Exposure need to be reduced considerably for risk to shrink. The situation is more like (see picture attached). The concepts of 'residual risk' is not very helpful when thinking about the future. [Debra Roberts and Durban Team, South Africa]	Accepted. Figure revised.
19108	1	35	6	35	9	two editorial changes: collaboration with; "considering the" instead of "viewing at the" [Anna Zivian, USA]	Accepted. text revised
19396	1	35	6	35	6	Alter to read as follows: "Transdiciplinary research, a collaboration of actors…" [Michelle A. North, South Africa]	Accepted. text revised.

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10256	1	35	8	35	11	This sentence is unclear. I suggest the following replacement: "However, this field of research is young and the gap between the body knowledge and the transformation of actions related to climate change." [APECS Group Review, Germany]	Taken into consideration -- this sentence has been erased in the revision process.
19398	1	35	9	35	9	Alter to read as follows: "…many questions remain unresolved, particularly in view of the persisting gap…" [Michelle A. North, South Africa]	Taken into consideration -- this sentence has been erased in the revision process.
10424	1	35	13			Cross-Chapter Box 1 Figure 2 - This schematic is not necessary. What seems to be represented here is "transformative adaptation can reduce residual risk more effectively than incremental adaptation", though such a general statement is not currently supported by the text. [APECS Group Review, Germany]	Taken into consideration -- the figure and text have been revised.
17244	1	35	13	35	14	Figure 2 is really difficult to understand and it could convey the key messages better. Suggest further improvement and better visual linkages with figure 1. [Iulian Florin Vladu, Germany]	Accepted. Figure revised.
634	1	35	16			Cross-Chapter Box 1, Figure 2:The figure suggests that (incremental and transformative) adaptation can reduce all dimensions of risk: hazard, exposure and vulnerability. However, adaptation only affects exposure and vulnerability, whereas the reduction of the (climatic) hazard is the focus of mitigation policy. Please modify the figure to clarify this rather fundamental issue. [Hans-Martin Füssel, Denmark]	Taken into consideration -- the figure and text have been revised. However, in some contexts adaptation can have an effect on hazard intensity as well, e.g. mangrove plantations which reduce wind and wave intensity.
13254	1	35	16			Figure 2 is in a Box on Risk and Resilience Framework, however, the term resilience does not appear in the figure. [Zelina Zaiton Ibrahim, Malaysia]	Accepted. The figures have been revised.
13286	1	35	16	35	16	The caption for cross-chapter box 1, figure 2 is not sufficiently descriptive for the reader to effectively receive the message. Perhaps comments on the dotted-line spaces around the schematics on the right-hand side and why they vary in size would improve clarity. [Katherine Bishop-Williams, Canada]	Accepted. Figure and caption revised.
18462	1	35	16	35	16	Cross-Chapter Box 1, Figure 2 need a lot more explanations in the Figure text. [Anette Jönsson, Sweden]	Accpted. Figure and text revised.
23604	1	35	16	35	16	Cross-Chapter Box 1, Figure 2: This Figure is based on the risk concept presented in the SREX SPM, right? I suggest mentioning this. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted. Text revised.
24552	1	35	16			Figure considers how vulnerability changes depending on adaptation capacity, by changes in propeller surface. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted. Figure and text revised.
10426	1	35	19			A reference to the Arctic Resilience Report would be appropriate, since it contains much information and case-studies relevant to policy makers: Carson, M. and G. Peterson (eds). (2016). Arctic Resilience Report. Arctic Council, Stockholm Environment Institute and Stockholm Resilience Centre, Stockholm. http://www.arctic-council.org/arr. [APECS Group Review, Germany]	Accepted. reference added.
10430	1	37	1			Cross-Chapter Box 2: The three cases illustrate different forms of adaptive governance solutions. It would be instructive to also discuss a case involving a mitigation effort, such as Carbon Capture and Storage which requires collaboration between governments and the private sector. Presumably, mitigation requires a tighter legal framework than adaptation solutions. [APECS Group Review, Germany]	Rejected - out of scope of present report

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16072	1	37	1	41	30	Another useful case study might be regarding the climate change migration of the Carteret Islanders and the governance of that process. See Sophie Pascoe "Sailing the Waves on Our Own: Climate Change Migration, Self-Determination and the Carteret Islands" (2015) 15(2) QUT Law Review 72. [Nathan Ross, New Zealand]	Rejected - space allocation did not allow more cases to be included
17384	1	37	3	37	3	Good to see terms "oceans, coasts and cryosphere" used. Nice and clear about 3 different parts covered in the document. [Helen Kettles, New Zealand]	Taken into account - Thanks
23606	1	37	3			Include (How) has governance been addressed in AR5. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted - text revised
23608	1	37	3			Please include cross-references/links to other SROCC chapters [Hans-Otto Poertner and WGII TSU, Germany]	Accepted - text revised
13390	1	37	7	37	7	Not clear how helpful it is to use 'governance' to define 'governance' [Debra Roberts and Durban Team, South Africa]	Accepted - text revised
10258	1	37	11	38	1	Line 11: "diverse case studies of - the international law of the sea;" and Cross-Chapter Box 2, Figure 1: the complexity of governance of the ocean, coasts and the cryosphere titles Case Study 1 as "Arctic Council". The International Law of the Sea and the Arctic Council are not the same. The text on Line 11 should be updated to reflect the contents of "Cast Study 1 - Multi-level Regulatory Interactions and Informal Actors for the Ocean and Cryoshere". [APECS Group Review, Germany]	Accepted - text revised
19110	1	37	11	38	32	several minor editorial changes needed [Anna Zivian, USA]	Accepted - text revised
19400	1	37	11	37	11	The first case described in this paragraph does not match Case Study 1 in Figure 1 or its description on page 38. Please revise [Michelle A. North, South Africa]	Accepted - figure revised
22368	1	37	11	37	11	diverse case studies of - the international law... [extraneous hyphen -] [Handa Yang, USA]	Accepted - text revised
16386	1	37	16	37	29	In this box environmental governance is defined including governance and institutions. This is inconsistent with the definitions on page 20. On page 20 climate governance is defined. I suggest governance be defined, institutions be defined and then environmental governance and climate governance (or whichever is most appropriate for the report) [Margot Hurlbert, Canada]	Accepted - text revised
10432	1	37	24	37	26	A similar definition of 'institutions' is already given in the main text (p 20 ll 41-42), but with a different reference. [APECS Group Review, Germany]	Accepted - In both places - definition was revised
4742	1	37	32	37	36	Note that transboundary solutions in marine issues (especially fisheries) are not new or unknown. There are business as usual. Some of this arrangements (e.g. mackerel and herring between Norway, European Union, Faroe and recently Island; sardine between Mexico, USA and Canada, etc.) work well and some are tensioned when environmental conditions change. Climate Change may make them more contentious and dynamic, but they are not new. The creation of RFMOs, including Tuna Commissions, are another example. It is important to bring this knowledge to bear, for example through one case study of fisheries. The current case studies are very specific and look like exceptions rather than the norm. [Manuel Barange, Italy]	Taken into account - text revised a bit but due to lack of space, full comment could not be incoprorated
23610	1	37	32	37	32	'user' sounds as if this refers to individual conflicts. Suggest to clarify the meaning here. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted - text revised
18466	1	37	36	37	39	The first part of this sentence is hard to understand as it is formulated now. See if it can be reformulated. [Anette Jönsson, Sweden]	Accepted - text revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
5080	1	37	42	37	42	Talk more about: The civil socity responsibilities, activities and capacities under climate change phenomina. [Essam Hassan Mohamed Ahmed, USA]	Accepted - text revised
94	1	38	1	38	1	Fig. 1: (1) The acronyms "UNCLDS" and "EEZ" lack definition. (2) It looks like a label is missing on the double-sided arrow on the top-right part of the figure. [Daniel Farinotti, Switzerland]	Accepted - text revised
4656	1	38	1	38	15	This figure has too much text that is far too tiny for visually impaired folks like me. [Baylor Fox-Kemper, USA]	Accepted - figure revised a nd one more figure added
10436	1	38	1			Cross-Chapter Box 2 Figure 1: this figure emphasizes the role of governments and regulation, but from the case studies it appears that local and regional actors are important as well, as are participatory (as opposed to legal or regulatory) processes. A table that provides examples of global, regional and local types of governance across the three geographical regions (mountains, oceans, cryosphere) would be just as helpful. [APECS Group Review, Germany]	Accepted - figure revised a nd one more figure added to bring in clarity
10438	1	38	1			Cross-Chapter Box 2 Figure 1: The box on the far right "untraditional environmental governance" needs to include an example(s) of 'beyond-the-state' actors on local to global levels. This could be part of the table/matrix mentioned in the previous comment. [APECS Group Review, Germany]	Accepted - figure revised a nd one more figure added to bring in clarity
10440	1	38	1			Cross-Chapter Box 2 Figure 1: The bottom-right box "vertical + horizontal integration" needs more explanation. Consider answering whether this a desirable solution? What is to be integrated here? And in what form (legal, participatory etc.)? [APECS Group Review, Germany]	Accepted - figure revised a nd one more figure added to bring in clarity
10442	1	38	1			Cross-Chapter Box 2 Figure 1: What does the arrow above the three boxes on the right side signify? [APECS Group Review, Germany]	Accepted - figure revised a nd one more figure added to bring in clarity
10444	1	38	1			Cross-Chapter Box 2 Figure 1: Clarify the meaning and relevance of the 'Mean High Tide' and 'Mean Low Tide' markers. [APECS Group Review, Germany]	Accepted - figure revised a nd one more figure added to bring in clarity
10446	1	38	1			Cross-Chapter Box 2 Figure 1: The font is too small to read when printed on A4 paper. [APECS Group Review, Germany]	Accepted - figure revised
24742	1	38	1	38	1	Might the creators of this figure consider separating the figure into two figures. Currently, the text is hard to read and so the figure doesn't communicate well. Quite possibly, the creators may want to re-order the numbering of the case studies (this would require re-ordering the case studies in the text) so that the case studies are ordered in the figure from left to right. [Elizabeth Weatherhead, USA]	Accepted - figure revised a nd one more figure added to bring in clarity
17386	1	38	3	38	3	Great to see casestudies. Be good to include afew more of these. [Helen Kettles, New Zealand]	Rejected - Thanks but space constraint doesnt allow more cases to be included
15408	1	38	13	38	13	This use of the term "monitoring" may contradict the defintion in the glosssary, where "monitoring" appears to be related mostly to monitoring of GHG emissions by each country. [Samuel Morin, France]	Accepted - text revised
6058	1	38	17			Indigenous Peoples must be capitalized. [Joanna Petrasek Macdonald, Canada]	Accepted - text revised
22580	1	38	17			It would be very much appreciated if you could capitalize "Indigenous Peoples" and add the plural (since it is not about singular "people" but all of them ("Peoples")). [Eva Kruemmel, Canada]	Accepted - text revised

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2294	1	38	18	38	24	Local and regional mitigation—inspired and supervised by the Arctic Council—can avoid warming and lead by example for reducing emissions, especially of SLCPs. (Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017; Arctic Monitoring and Assessment Programme (AMAP) (2015) AMAP ASSESSMENT 2015: METHANE AS AN ARCTIC CLIMATE FORCER.) [Kristin Campbell, USA]	Accepted - text revised
2420	1	38	18	38	24	Local and regional mitigation—inspired and supervised by the Arctic Council—can avoid warming and lead by example for reducing emissions, especially of SLCPs. (Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017; Arctic Monitoring and Assessment Programme (AMAP) (2015) AMAP ASSESSMENT 2015: METHANE AS AN ARCTIC CLIMATE FORCER.) [Durwood Zaelke, USA]	Accepted - text revised
12918	1	38	18	38	24	Local and regional mitigation—inspired and supervised by the Arctic Council—can avoid warming and lead by example for reducing emissions, especially of SLCPs. (Arctic Council Secretariat (2017) EXPERT GROUP ON BLACK CARBON AND METHANE: SUMMARY OF PROGRESS AND RECOMMENDATIONS 2017; Arctic Monitoring and Assessment Programme (AMAP) (2015) AMAP ASSESSMENT 2015: METHANE AS AN ARCTIC CLIMATE FORCER.) [Gabrielle Dreyfus, USA]	Accepted - text revised
22582	1	38	18	38	24	This paragraph could describe the Arctic Council better. What is very special about this intergovernmental forum is the specific inclusion/seat of "Permanent Participants", which are 6 Arctic Indigenous organizations that have a special standing next to the 8 Arctic states. This way, Arctic Indigenous Peoples have the opportunity to directly sit at a table with ministers, and to better influence research and decision making taking place in the Arctic Council. [Eva Kruemmel, Canada]	Accepted - text revised
10260	1	38	22	38	22	Line 22: "…is too small to deal with global and transnational impacts of climate change". The Arctic Council is an "intergovernmental forum promoting cooperation, coordination and interaction among the Arctic States, Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic" (https://www.arctic-council.org/index.php/en/about-us), meaning that the Arctic Council does focus on the transnational impacts of climate change by sharing climate-resilient adatpation and mitigation strategies. I suggest the following replacement "…is too small to deal with global impacts of climate change". [APECS Group Review, Germany]	Accepted - text revised
10262	1	38	24	38	24	The Arctic Climate Impact Assessment should be cited. Citation: Arctic Climate Impact Assessmenet. 2004. Impacts of a Warming Arctic-Arctic Climate Impact Assessment. ISBN 0521617782. Cambridge, UK: Cambridge University Press. [APECS Group Review, Germany]	Rejected - due to cap on references
10458	1	38	26	39	52	For these three cases, it would be helpful to refer to the residual risks as such. In this paragraph, please explicitly answer which residual risks were minimized by the presented governance solutions. [APECS Group Review, Germany]	Rejected - this is taken up on CCB on risks

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10448	1	38	30	38	31	"As glaciers retreat … irrigation water." Please cite a reference for this statement. [APECS Group Review, Germany]	Accepted - text revised
6060	1	38	33			It is unclear why the Arctic Council is suddenly mentioned here without previous reference. Furthermore, the following description of networks and governance structures does not accurately capture the Arctic Council. Unique to the Arctic Council is that in this intergovernmantal forum, 6 Permenant Partcipants have seats and are included as euqals at the table. These Permenant Participants are Arctic Indigenous organizations and through this forum, Indigenous Peoples of the Arctic can influence research and decision making. It is an exemplary and unique model that cannot be lumped with others as it is here. [Joanna Petrasek Macdonald, Canada]	Accepted - text revised
10450	1	38	35	39	1	Please specifiy what sort of organization the AKDN is (e.g. an NGO, network, coalition), and how it interacts with other governance actors and in what way the broadened base of communities benefits the network's interests and goals. Please use consistence terminology when refering to AKDN. [APECS Group Review, Germany]	Accepted - text revised
10452	1	39	2	39	2	In what way are landslides expected to increase (e.g., intensity, frequency). How are ranfall and its effects projected to change under climate change? [APECS Group Review, Germany]	Acceted - text revised
10454	1	39	2	39	2	Please reference the study that found that climate change derived "incessant rains" were causing landslides. [APECS Group Review, Germany]	Accepted - text revised
96	1	39	7	39	8	The last sentence seems somewhat out of context and should either be better embedded or removed. [Daniel Farinotti, Switzerland]	Accepted - text revised
10790	1	39	12	39	12	… coastline experiences significant coastal erosion due to climate change.' How do we know that this change is due to climate change? No evidence is given. In many places coastal erosion is a function of many non-climate processes, including changes in regional climates, changes in sediment supply and anthropogenic interventions [Thomas Spencer, UK]	Accepted - text revised
10668	1	39	20	39	28	A particvipatory approach is good to have a positive response from citizens. To develop and apply real measures it is better to use a scientific-based approach. [Oxana Lipka, Russian Federation]	Accepted - text revised
24744	1	39	30	39	37	This brief paragraph is very good and appropriate. [Elizabeth Weatherhead, USA]	Thanks
10456	1	39	31	39	37	Are these different cases examples of climate-resilient solutions, residual risks, or both? That is, do they maintain the essential function, identity and structure of the societal systems involved? [APECS Group Review, Germany]	Accepted - text revised
10264	1	39	32	39	37	On Line 33 "network governance structures" are referred to a specific cases. On Line35 "networks" are attributed to "all" the cases. The term and concept of "network" on Line 33 should be replaced with a more specific term. [APECS Group Review, Germany]	Accepted - text revised
10460	1	39	49	39	51	Please move the Ostrom, 2007 citation from Line 51 to 49, as the citation should follow "design principles". [APECS Group Review, Germany]	Accepted - text revised

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
24746	1	39	50	39	52	“More empirical research is needed to determine which of these…”. I’m not sure this issues should be singled out for the “More research is needed..” line. I also wonder if “More research is needed…” is appropriate for IPCC. Every group has their pet project for funding. These words in a paper are fine; in an international report are perceived as a singled out endorsement. This may be the right pace to summarize the Weatherhead et al. paper in Earth’s Future (2017) and quote the paper as to needed observations to support the WCRP Grand Challenges including those on melting sea ice and regional sea level change. [Elizabeth Weatherhead, USA]	Accepted - text revised
22328	1	40	57	40	58	Citation Parveen et al. 2015: It should read: Erdkunde 69 (1), 69-85, doi: 10.3112/erdkunde.2015.01.05 [Marcus Nüsser, Germany]	Accepted - Reference revised
4744	1	42	0	44		If we are going to have three more pages of indigenous knowledge as a box then it is only right the language is significantly reduced in pages 26 and 27 [Manuel Barange, Italy]	Noted: we have worked to make text more concise and include more examples and chapter linkages to demonstrate why IK and LK are valuable additions in SROCC
1592	1	42	1			The cross-chapter box on ILK reinforces my impression that the topic takes way too much space in the report and is, at the same time, way too little focused on the actual objective of the report. I suggest a full reconsideration of these aspects, aiming for a well-targeted clarification of these issues in mountain and arctic regions. [Wolfgang Cramer, France]	Noted: we have worked to make text more concise and include more examples and chapter linkages to demonstrate why IK and LK are valuable additions in SROCC

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6062	1	42	1	46	8	The amount of content allocated to Indigenous Knowledge (IK) in this overall report is encouraging and a right step towards appropriate recognition and utilization of IK (which has been significantly lacking in global assessments such as IPCC reports). However, this cross-chapter box contains several problematic content issues and is overall inappropriate to include without having any Indigenous authors. The box ideally would be entirely authored by Indigenous Peoples but at the very least should be co-authored with Indigenous scholars and/or practitioners. The problematic content is as follows: 1) Indigenous knowledge and local knowledge cannot be lumped together. To repeat my previous comments: Indigenous knowledge and local knowledge are very different and distinct from one another. Indigenous knowledge is based on a specific culture and knowledge system, has its validation process and is passed forward from generation to generation, often thousands of years old. Local knowledge is acquired due to experiences and observations made by living in a specific place, but is not necessarily based on a knowledge system or a specific culture. These terms cannot be used interchangeably and lumping them here together would encourage readers to make the assumption that they are one in the same or at least very similar. Please therefore refer to Indigenous knowledge and local knowledge separately. The Inuit Circumpolar Council has a specific definition for Indigenous knowledge that we would be happy to provide. 2) It is not appropriate to use the language 'integrate' when referring to IK...rather please use 'utilize'. Again, to repeat previous comments: 'Integrate' suggests that IK can be added into scientific reports as more of an after thought, once the reports are well underway and this is not appropriate. IK has a role from the very beginning, which is what true co-production of knowledge captures. Both IK and scientific knowledge systems have unique methods and must be used in tandem. ICC supports language of "utilization" of Indigenous knowledge, together with science, but not its "integration" into science. This all connects to the question of how IK is utilized in IPCC reports. There are appropriate ways this can be done which necessitates direction from and partnership with Indigenous Peoples throughout the entire process (recalling the United Nations Declaration on the Rights of Indigenous Peoples - UNDRIP). 'Integrating' IK via publications from non-Indigenous authors is not appropriate. Nor is referencing how IK has been integrated in past assessment reports as well as other reports like IPBES which only serve to provide weak and poor examples. Past reports and IPBES have not included IK or Indigenous Peoples in the way that they want to	Accepted: We have now separated ILK into IK & LK. We have removed all references to 'integration' and changed them to 'utilization' or 'using' or other such phrases that communicate using the systems in concert.
15410	1	42	1	46	8	The cross chapter box on ILK seems to be duplicating some of the material found in section 1.7. [Samuel Morin, France]	Taken into Account: For the SOD we have worked on making these two texts complimentary and not redundant--
22584	1	42	1	46	8	While it is good to see Indigenous knowledge recognized overall in the report, I find it very difficult to have such a box (or general text) about Indigenous knowledge here that is not authored (or at least co-authored) by Indigenous Peoples, and in particular Indigenous knowledge holders. One important part (as mentioned above) is that Indigenous knowledge and local knowledge should not be lumped together. [Eva Kruemmel, Canada]	Taken into acount: we are working with several CAs who are knowledge holders and will document their participation.
23612	1	42	3			This box could briefly suggest how local knowledge could be better integrated (not only recognised through peer reviewed literature) in global assessments such as IPCC. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted: We have developed the CCB more fully for the SOD and brought these aspects in.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
19066	1	42	9	42	31	Introduction should include discussion of why indigenous and local knowledge is needed. In many developing countries, there is a lack of long-term scientifically collected data which means that ILK may be the only way of gaining information. This is often the case in small islands and sea level rise in particular. See for instance: Beckford, C. (2018). Climate change resiliency in Caribbean SIDS: building greater synergies between science and local and traditional knowledge. Journal of Environmental Studies and Sciences, 8(1), 42-50. [Carl-Friedrich Schleussner, Germany]	Taken into account: We have developed the CCB greatly since the FOD and do make the case clearly for the need for IK and LK.
10670	1	42	12	42	12	Please change UNEP (old name) to UN Environment (present short name) [Oxana Lipka, Russian Federation]	Accepted: Done
10276	1	42	16	42	16	There is just one reference by Ford et al., 2016, please omit the "a". [APECS Group Review, Germany]	Taken into acount: sentence gone-not relevant anymore
10278	1	42	17	42	17	The Section referring to should be 1.7.3 not 1.7. [APECS Group Review, Germany]	Accepted: Thank you!
10280	1	42	20	42	21	The reference given here is very specific on a Malaria drug and refers to its discovery by indigenous knowledge as a "legend". Please find a more appropriate (additional) evidence for the statement made here. [APECS Group Review, Germany]	Accepted: Original reference removed and more general one inserted.
6064	1	42	21			The wording "but the need to engage ILK in environmental and climate management is relatively recent" frames Indigenous Knowledge as separate from environmental and climate management which ignores the fact that Indigenous systems of governance and management exist and have been built on Indigenous knowledge for millenia. This wording would likely be read with the assumption that Indigenous Peoples are not involved, let alone leading, environmental and climate management which is very untrue in the Arctic. And in situations where this is the case, it should be questioned and strongly critiqued. [Joanna Petrasek Macdonald, Canada]	Accepted: We have revised the statement to say: "global environmental and climate management is relatively recent" -- so by adding the term 'global' we get across what we intended.
10266	1	42	21	42	26	Line 21: "For example, Alaskan Inuit, who rely on bowhead whales for subsistence, formed the Alaska Eskimo Whaling Commission in response to a scientific report that erroneously estimated the bowhead whale population in decline. This commission faciliated a recount using the visual, sonic, and aerial observations of Indigenous knowledge, deliving an accurate population estimate indcating a stable population (Huntington, 2000: 1272)." There are capitalisation and historical inaccuracies. I suggest the following replacement: "For example, Alaskan Inuit, who rely on Bowhead whale for subsistence, formed the Alaska Eskimo Whaling Commission (AEWC) in response to a scientific report that underestimated the Bowhead whale population. The AEWC faciliated an independent and accurate population count using Indigenous knowledge from whaling captains (Huntington, 2000: 1272." [APECS Group Review, Germany]	Accepted: We have revised the account accordingly. Thank you!
10282	1	42	26	42	26	This sentence is not clear. Instead of just writing "ILK holders integrate systems", please be more specific, e.g., ILK holders integrate traditional and scientific knowledge, if this is what is meant here. [APECS Group Review, Germany]	Accepted: We have changed the wording.
10370	1	42	26	42	26	E1a - Do page numbers need to be included in the reference from Huntington, 2000? [APECS Group Review, Germany]	Accpeted: We have removed page number since it is not a direct quote

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10284	1	42	27	42	29	The citation from Bartlett et al., 2012, is not entirely correct. It should read"[...] with the strengths of Western [scientific] knowledges and to using both these eyes [...]". [APECS Group Review, Germany]	Accepted: We have changed the wording to reflect the reviewer's comment and the author's work
10286	1	42	29	42	30	To be consistent with the reference it should say "weaving together" rather than "weaving back and forth" here. [APECS Group Review, Germany]	Accepted: We have changed the wording to reflect the reviewer's comment and the author's work
6066	1	42	33	43	3	It is inaccurate to suggest that the important contributions of IK are limited to observations, responses and governance. These are only three of many important contributions and it should be noted that Indigenous Knowledge encompasses unique methodologies, analysis, and evaluation processes. It isn't a problem to focus on three but it should not be written in a way that suggests these three aspects are the extent of what IK can contribute. [Joanna Petrasek Macdonald, Canada]	Accepted: We have revised the phrase accordingly
10268	1	42	34	42	36	This sentence is unclear. I suggest the following replacement: "ILK contributes methodologies for observing, responding and governing climate change in the ocean and cryosphere. Subsequently, these three contributions can inform planning, implementation, evaluation and modification of activities." [APECS Group Review, Germany]	Accepted: We revised the phrase accordingly based on reviewer comment #1751 and this one.
10288	1	42	38	42	40	The first half of the sentence does not fit to the second as glacier extents and sea ice are no "processes". [APECS Group Review, Germany]	Accepted: We have changed second use of 'processes' to 'phenomena'
10290	1	42	38	42	39	Reference refers to Section 1.2 but this section does not discuss observations of these phenomina, suggest refering to Section 1.3.1 which discusses changes in a social context or rewriting to better show why Section 1.2 is the correct reference. [APECS Group Review, Germany]	Taken into Account: This was a placeholder for cross-chapter references that we have now filled out as such: "Section 2.1, 3.2, 3.4, 4.3.2, 5.5.3.2.1.4, 6.8.3"
19402	1	42	40	42	42	Rework sentence to better convey the point. "While indigenous…continuously" (over centuries?), "researchers are…" only beginning to accumulate knowledge in recent decades, is that the point? If it isn't a comparison between the two groups, then remove the 'while' and rework the sentence. [Michelle A. North, South Africa]	Taken into account: e have retained the 'while' since it is a comparison.
19404	1	42	44	42	46	Sentence structure is illogical, please rework [Michelle A. North, South Africa]	Accepted: Broke up the sentence into two.
10270	1	42	46	42	47	Line 46: "…and sometimes integrated with scientific knowledge (Nusser and Schmidt, 2017)". I suggest the following replacement: "…and sometimes integrating with scientific knowledge (Nusser and Schmidt, 2017; Johnson et al. 2016)". Johnson et al., 2016 is a critical piece of literature on the Arctic and co-produced by the Indigenous and scientific communities. Areas of expertise covered by Johnson et al, 2016 include: Terms, The role of Indigenous knowledge, Involvement of community members, Data collection methods and approaches, Engage IK and co-produce observations, Inform decision-making and natural resource management, Develop data management protocols for CBM and IK. Citation: Johnson, N., Behe, C., Danielsen, F., Krümmel, E. M., Nickels, S., & Pulsifer, P. L. (2016). Community-based monitoring and indigenous knowledge in a changing arctic: a review for the sustaining arctic observing networks. Sustain Arctic Observing Network Task, 9. [APECS Group Review, Germany]	Accepted: Done-- thankyou

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10272	1	42	54	42	55	This sentence is unclear. I suggest the following replacement: "ILK supports the incorporation of customary Indigenous and local institutions into decision-making and policy-making about climate issues (Karlsson and Hovelsrud, 2015). [APECS Group Review, Germany]	Accepted: Done-- thankyou
16388	1	42	54	42	57	Governance is discussed and specifically the role of ILK in governance. An acknowledgement of Indigenous governance as distinct from the other definitions referred to in other sections of the chapter would be appropriate. See Suzanne von der Porten, Canadian Indigenous Governance Literature, A Review12,AlterNative, an International Journal of Native Peoples, Sage. [Margot Hurlbert, Canada]	Accepted: Added wording to this effect- thank you
24748	1	42	54	42	56	“ILK supports the incorporation of Indigenous and local institutions…”. This anthropomorphizes a type of knowledge. Perhaps reword. [Elizabeth Weatherhead, USA]	Accepted: Added wording to this effect- thank you
10292	1	42	56	42	57	Consider to present more than one single example. [APECS Group Review, Germany]	Accepted: Added wording to this effect- thank you
13392	1	42	57	42	57	Adding 'decolonised' to the sentence muddies the point being made. The argument can be sustained without insertating this word. [Debra Roberts and Durban Team, South Africa]	Accepted: Removed wording to this effect- thank you
10294	1	43	6	43	9	This is a very convoluted sentence. It would probably become more readable if it was split in two. [APECS Group Review, Germany]	Accepted: Revised sentence to make more readable
19406	1	43	7	43	7	Delete "many of which continue today" to simplify an overly long and multi-part sentence [Michelle A. North, South Africa]	Accepted: Revised sentence to make more readable
10296	1	43	9	43	28	This paragraph is going back and forth between "ILK is flourishing" and "ILK is in decline". It would benefit from a clearer structure first giving examples for "ILK in decline" and then for "ILK is vital and dynamic" (or the other way around). [APECS Group Review, Germany]	Taken into Account: :We start with the sentence that states it is flourishing in some places and is in decline in others, follwed by examples of decline-- then the next paragraph shows examples of flourishing . . .
10298	1	43	13	43	13	How do these "reductions in ILK" manifest themselves? [APECS Group Review, Germany]	Taken into account: Sentence rewritten to clarify
19408	1	43	14	43	14	Place "particularly in households with higher levels of education" in parentheses to make the sentence flow more easily - also consider deleting "a team including an Aymara researcher" because this sentence is very cumbersome (or rework sentence) [Michelle A. North, South Africa]	Taken into account: Sentences rewritten to clarify
10300	1	43	19	43	23	In the reference it reads that tartary buckwheat is on decline overall and the author only suggests that the Yi "may be able to market it as health food" not that this is common practice already. [APECS Group Review, Germany]	Taken into account: Sentences rewritten to clarify
10302	1	43	23	43	28	This seems to be the wrong reference. The paper describes fertilizing possibilities to fight hunger in Sub-Saharan Africa, not the central Andean region of Peru. [APECS Group Review, Germany]	Accepted: Correct author and year, wrong reference. Corrected-- thanks!
10372	1	43	25	43	25	E1a - Rewrite 'members of Indigenous' to 'members of an Indigenous' [APECS Group Review, Germany]	Accepted: Done
19410	1	43	25	43	25	Add 'an' in front of "Indigenous local NGO" [Michelle A. North, South Africa]	Accepted: Done
10304	1	43	36	43	39	Aswani and Ruddle, 2013, is advocating the integration of customary governance with government agencies but do not state that this is common practice already. [APECS Group Review, Germany]	Accepted: Correct. This sentence has been rewritten and this reference was removed
10306	1	43	39	43	42	"adaptation to climate change" is not mentioned as a main objective in the reference provided here. [APECS Group Review, Germany]	Accepted: Correct. This sentence has been rewritten and this reference was removed

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10308	1	43	42	43	46	In the first half of this convoluted sentence it says that the impact of the LMMAs cannot be assessed while in the last bit it states all the positive impacts they have. This is inconsistent. [APECS Group Review, Germany]	Accepted: Correct. This sentence has been rewritten and this reference was removed
10310	1	43	42	43	43	This reference does not study the impact of the LMMAs but the compliance to the LMMAs. [APECS Group Review, Germany]	Accepted: Correct. This sentence has been rewritten and this reference was removed
6068	1	43	48	44	8	The Inuit Circumpolar Council is very happy to see the that the Pikialasorsuaq Commission is included as an example here! The Commission is certainly an exemplary model for Inuit-led research and the on-going work to build on the recommendations, such as establishing an Inuit Management Authority, is also creating a model for Indigenous-led management in this unique region. While the information included here is accurate and we're happy to have it in, we were surprised to see it included without having been contacted to have a discussion or even be notified that the IPCC report would like to showcase this work. While we understand the intention was to highlight this as a good example, we are very disappointed not to have had the oportunity to contribute to preparations and drafting of text about an ICC project. This is a good example where the importance of partnership with Indigenous Peoples and Indigenous Organizations could have been demonstrated through co-authorship but falls short. There are certain aspects that ICC would like clarified (ex. the polynya's productivity doesn't simply support the subsistence economy…it supports much more (line 50-51)…there is also an important connection to health that is not recognized here or in the chapter overall). It is essential that this section be communicated in the way ICC would like it communicated (this raises issue of information ownership and control). Furthermore, there are several larger problems we have with Ch. 1 that are also captured in this cross-chapter box (particularly around language) that we feel must be addressed. It would be inappropriate to showcase an ICC project within a larger text that ICC (currently) does not support. So while we are happy to see this included here in the first draft, we would expect the authors to invite ICC to co-author this cross-chapter box or at the very least provide edits/comments specific to the Piki. Comm. text as we would like to see it included. [Joanna Petrasek Macdonald, Canada]	Accepted: Thank you for the positive feedback on including and correctly reflecting this Inuit-led publication. IPCC authors must assess credible knowledge from published sources and free of specific interest or "knowledge ownership and control" issues. However, we agree very much that Indigenous Knowledge holders should be involved in integrated assessments including on global climate change such as the IPCC. Indeed, our efforts in SROCC are intended to prepare for improved engagement in the AR6 and beyond. It was time pressure that did not allow us to seek Indigenous co-authorship for the Pikialasorsuaq case study for the FOD (while for other aspects of the box these contacts were established). At the time of writing this response, contact with ICC has been made to explore possible co-authorship. We have added wording on the wider significance of the polynya for Indigenous communities (culture, health and wellbeing) but also refer p44 ll3-4 and to Chapter 3 where more details are given.
10672	1	43	48	43	57	All examples about Arctic were taken from Inuit society. Nothing about Russian sector of Arctic, perhaps because of the scope of authors - nobody can read and use Russian language literature to include ILK information. Please change this disbalanse and add innformation about Chukchi or Nenets people, for example, which are not less vulnerable and depended of ocean resources, than Inuit people. [Oxana Lipka, Russian Federation]	Taken into account: The comment refers to a case study specific to Indigenous Knowledge in the geography of the North Water Polynya (from p 43, l 38, to p 44, l 8), so including reference to other geographies and peoples does not fit the scope of this section. However, we appreciate the reviewer's main point to balance better and have included reference to key literature from … that addresses Indigenous Knowledge and /or Local Knowledge in the context of climate change or a dynamic (ecological, social, including economic) environment in the Russian Arctic at position…. Alternatively: As the reviewer mentions Russian literature that would allow considering and assessing Indigenous knowledge in eth Russian Arctic a is not accessible to us and we recognize this gap in knowledge.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10312	1	43	50	43	54	This sentence is very long and hard to follow. It would be easier to read if it was divided in two, e.g., "Adjacent Inuit communities depend on the polynya's biological productivity for their subsistence economy (Hastrup et al., 2018). They rely on […]". [APECS Group Review, Germany]	Accepted: Sentence now two.
10314	1	43	54	43	56	The reference give to support this statement is actually much more cautious, saying it could be "perhaps a system in transition". [APECS Group Review, Germany]	Taken into account: We have re-formulated more cautiously.
14208	1	43	54	43	55	the sea-ice bridge north of the Pikialasorsuaq has not formed as reliably as in the past due to climate change' Reference that attributes this to cliamte change? [Christopher Fogwill, UK]	Taken into acount: We have removed language indicating attribution
10378	1	44	0	46		Section: References: - Some References have up to 4 author names listed wheras others have et al after 1 author name. Make this more consistent. [APECS Group Review, Germany]	Taken into account: We are working towards greater consistency in the references.
10316	1	44	10	44	12	Reference missing. [APECS Group Review, Germany]	Accepted: REFERENCE ADDED and the FIGURE of 40 Mn is Corrected as 32 Mn
10318	1	44	12	44	13	None of the given references supports the statement of "increasing glacial and water-induced disasters" due to climate change. [APECS Group Review, Germany]	Accepted: We have retained Shestha as it does talk about glacial lake outburst flood and added two more references. Mukherji, A., Molden, D., Nepal, S., Rasul, G., & Wagnon, P. (2015). Himalayan waters at the crossroads: issues and challenges. Nie, Y., Liu, Q., Wang, J., Zhang, Y., Sheng, Y., & Liu, S. (2018). An inventory of historical glacial lake outburst floods in the Himalayas based on remote sensing observations and geomorphological analysis. Geomorphology, 308, 91-106.
10320	1	44	15	44	15	The study by Orsatti, 2010, is about a region in Italy, not the Himalayas as discussed in this paragraph. [APECS Group Review, Germany]	Accpeted: Removed the reference
10322	1	44	15	44	18	For improved readability this sentence could be rewritten as follows: "Rains upstream of Gandaki cause flooding in downstream areas of Bihar, India. Local communities' knowledge […]". [APECS Group Review, Germany]	Accepted: Split sentence in two
10376	1	44	19	44	19	E1a - Remove the space in 'and/or' to be more consistent with Page 44 Line 25 [APECS Group Review, Germany]	Accpeted: Done
10324	1	44	20	44	21	In Acharya and Poddar, 2016, "Halla" ("noise" in Bhojpuri language) is described as the noise caused by people shouting and the collapse of the first houses. [APECS Group Review, Germany]	Taken into acount: Revised sentecne.
5216	1	44	25	44	25	"compliment" should be "complement" [Pauline Midgley, Germany]	Accepted: Done
24750	1	44	25	44	25	Change “compliment” to “complement”? [Elizabeth Weatherhead, USA]	Accepted: Done
22338	1	44	48	44	49	Carey et al. 2015 reference incomplete [Marcus Nüsser, Germany]	Accepted: Done
10374	1	45	9	45	9	E1a - Expand ICC in Reference list [APECS Group Review, Germany]	Accepted: Done
614	1	47	0			Recent studies have found that climate sensitivity that includes slow feedbacks is likely currently to be around 5C and increasing over time. [William Clarke, Australia]	Noted - We agree but the historical case is limited to discussion of fast-feebacks.
1594	1	47	1			This cross-chapter box contains interesting thoughts, but is it really required for a Special Report on the cryosphere and the oceans? [Wolfgang Cramer, France]	Noted - However, this cross-chapter box is an important addition here in SROCC because the term deep uncertainty is used in discussions of ice sheet and sea level rise projection and policy responses in the literature assessed, and yet has not been defined or explained in previous IPCC reports.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
23614	1	47	1	51	51	This Cross-Chapter Box is interesting and well-written, and explains the issue very well. However, it is quite long and still contains many placeholders. Please shorten the text by revising the word count, or consider removing one of the case studies. [Hans-Otto Poertner and WGII TSU, Germany]	Accepted - text shortened and placeholders removed
23616	1	47	1	51	51	Try to refer to specific sections in other Chapters of SROCC where possible, rather than citing the entire Chapter. Please be more precise and consistent in the way sections in other Chapters or Boxes are referred to. [Hans-Otto Poertner and WGII TSU, Germany]	Noted.
23618	1	47	1	51	51	To round up the thematic content of this Box: are there any examples for Deep Uncertainty in High Mountain Areas? [Hans-Otto Poertner and WGII TSU, Germany]	Noted - there are some examples from High Mountains, however in the interest of text limitations we are focusing on case studies and SROCC chapters where Deep Uncertainty is explicitly or directly mentioned. Cross references to Deep Uncertainty and this box are mentioned in Chapter 2 'High Mountains'.
24752	1	47	1	51	1	This box addresses a concept that is relevant to this assessment. Unfortunately, as currently written, this box confuses, rather than adds clarity. As a few examples, the first line (L9-11) "…land minimize losses demand a dynamic interaction with the system." What system? The Earth system? The political system? The sentence on L13: "Deep uncertainty manifests itself where parties do not know or cannot agree on: (1) appropriate conceptual models…; (2) the probability distributions…". This is just not true. Often, Deep Uncertainty occurs when feedbacks are not well understood and when expert judgment is not in good agreement with model output, as is described in Cases A and B and Page1-47, L 45-48, respectively. The examples (Cases A-D) are poorly written: in the first three cases, too much detail is offered—which do not support the earlier paragraphs about causes of Deep Uncertainty) and Case D has such poor writing, that the point is missing ("Hazards in the context of multi-risk include single events, rendered more extreme by climate change and those comprised of multiple events that coincide or occur in sequence (ie compound events)"). The discussion of hazards often uses non-standard language. For example, Page 1-49, 43: "Future hazards under a changing climate may be currently so rare that they lie outside…". Do the authors mean "Likelihood of future hazards..?" I strongly suggest that the authors abandon giving a lengthy tutorial on the subject and make this box one quarter of its current length or pull in a new author who can address this topic more appropriately. [Elizabeth Weatherhead, USA]	Noted - text has been substantially revised since FOD to not only shorten it but also make concepts and objective of the box clearer.
19112	1	47	8	47	19	cite also Douglas and Wildavsky 1982 -- good two by two on page 5 [Anna Zivian, USA]	Accepted. Citation added
10330	1	47	9	47	32	In order to be more in line with the heading of this cross-chapter box, the "additional detail on 'confidence'" should come first in this paragraph. [APECS Group Review, Germany]	Noted - 'confidence' was suggested as an addition to correspond with the current guidance note, however this may be revised given that we do not elaborate on the use and integration of 'deep uncertainty' in the context of the (IPCC) confidence language guidance note to authors.
14210	1	47	10			minimize [Christopher Fogwill, UK]	Editorial - corrected.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2934	1	47	11	47	11	I suggest noting that deep uncertainty is another name for ambiguity (e.g., Ellsberg, 1961) or Knightian uncertainty (Knight, 1921) -- it is not a new concept. [Robert Kopp, USA]	Accepted - references added to indicate legacy/historical context - however, in the interest of text length and need to avoid encyclopedic statements and references, we may not be able to account for all possible terms and concepts to describe what is meant here in this box under 'deep uncertainty'.
10326	1	47	11	47	17	These two sentences appear very repetitive. The second one is (almost) literary citing the reference and should therefore be put in citation marks. [APECS Group Review, Germany]	Editorial - revised for SOD.
14212	1	47	11			Deep uncertainty (no capital 'U' needed) [Christopher Fogwill, UK]	Editorial - revised for SOD.
18264	1	47	24	47	24	Please clarify what "possibilities" refers to: impacts, processes, outcomes? [Laurens Bouwer, Netherlands]	Noted - this refers to outcomes, more specifically, text will be revised to clarify.
18266	1	47	25	47	25	Please replace "development" with "application". [Laurens Bouwer, Netherlands]	Accepted - text revised accordingly
10328	1	47	26	47	26	There is just one reference by Mastrandrea et al., 2010, please omit the "a". [APECS Group Review, Germany]	Editorial - This endnote problem with merged libraries has been corrected
14214	1	47	34			no need for captial 'L' in 'literature' [Christopher Fogwill, UK]	Editorial - text revised for SOD.
10380	1	47	40	47	40	E1a - Change to lower case 'u' in the word use [APECS Group Review, Germany]	Accepted - this is now changed in the text.
6522	1	47	41	47	43	The lack of understanding about the physical process so-called “aerosol-cloud interactions” induces the highest uncertainty when estimating the anthropogenic impact on climate change. I wonder why it is not emphasized here. [Chamara Rajapakshe, Sri Lanka]	Rejected - This case study is about climate sensitivity, not projected temperature change
10382	1	47	45	47	45	E1a - Does climate sensitivity need to be inside quotation marks? [APECS Group Review, Germany]	Editorial - Quotation marks removed
10332	1	47	50	47	52	To strengthen the statement of this sentence, "However" should be replaced by "On the contrary". [APECS Group Review, Germany]	Noted - "however" removed
5222	1	47	54	47	54	likely in italics is used in past IPCC works to indicate the probabilistic likelihood described in Table 1.2 which is >66% [Pauline Midgley, Germany]	Accepted - Reviewer is correct. This section has been rewritten so that numerical values from Uncertainty Guidance have been removed. Section 1.8.3 also more clearly defines the use of likelihood language for assessing ends of distributions (e.g. >66%) or for assessing central distributions (e.g. 17-83%).
10334	1	47	54	47	54	The probability range classified as "likely" is not 17-83% but 66-100%. [APECS Group Review, Germany]	Accepted
10336	1	47	54	47	54	The term "high confidence" should also be explained, i.e. as "high agreement and medium evidence" or "medium agreement and robust evidence" according to Fig. 1 in Mastrandrea et al., 2010. [APECS Group Review, Germany]	Noted - however, this section has been rewritten to be a direct quote from AR5. We cannot recharacterize the confidence determination.
14216	1	47	54			likley' defined in Table 1.2 as >66%. How do these two definitions of 'likely' relate to each other? [Christopher Fogwill, UK]	Accepted
616	1	48	0			"595" shuld be "5-95" [William Clarke, Australia]	Accepted
618	1	48	0			Is "teleconnections" the right word? [William Clarke, Australia]	Noted - however, we cannot find this material in this text.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2296	1	48	2	48	18	Reference the potential for extreme SLR that is possible from ice-sheet destabilization and melt. (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Kristin Campbell, USA]	Noted - We thank the reviewer for these suggestions but details of ice sheet processes have been removed - we now refer to chapter 4 for this information.
2422	1	48	2	48	18	Reference the potential for extreme SLR that is possible from ice-sheet destabilization and melt. (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Durwood Zaelke, USA]	Noted - We thank the reviewer for these suggestions but details of ice sheet processes have been removed - we now refer to chapter 4 for this information.
12920	1	48	2	48	18	Reference the potential for extreme SLR that is possible from ice-sheet destabilization and melt. (Xu Y. & Ramanathan V. (2017) Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PROC. NAT'L. ACAD. SCI. 114(39):10315–10323; Hansen J., et al. (2017) Young people's burden: requirement of negative CO2 emissions, EARTH SYSTEMS DYNAMICS 8:577–616; Committee to Prevent Extreme Climate Change (2017) Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change; Kopp R. E., et al. (2016) Tipping elements and climate–economic shocks: Pathways toward integrated assessment, EARTH'S FUTURE 4:346–372.) [Gabrielle Dreyfus, USA]	Noted - We thank the reviewer for these suggestions but details of ice sheet processes have been removed - we now refer to chapter 4 for this information.
19412	1	48	2	48	2	Dynamic, not dynamical [Michelle A. North, South Africa]	Noted - however, 'dynamical' is the term used in AR5.
10384	1	48	6	48	6	E1a - Does a page number for the Reference "IPCC, 2001" need to be included? [APECS Group Review, Germany]	Editorial - Specificity is important here but page may be moved to reference in copy editing.
10338	1	48	9	48	11	Which climate projection/emission scenario does the given range refer to? [APECS Group Review, Germany]	Noted - "across RCPs" added to text to explain
15952	1	48	11	48	12	I believe there is a typo (595%) on line 12, where the sentence should actually read "AR5 also used expert judgment to re-characterize the very likely (5-95%) range of the model estimates as the likely (17–83%) range…" [Tim Riding, New Zealand]	Accepted - see also response to comment 5222.
4010	1	48	12	48	12	"very likely (595%) range" --> "very likely (5-95%) range" [Sarah Doherty, USA]	Accepted - see also response to comment 5222.
5224	1	48	12	48	12	some confusion (and a typo) here: (595)% should presumably be (5-95%) I think there is a misunderstanding of the use of likely in IPCC calibrated language which is being confused with statistical significance. Furthermore this is not what the citation from Church et al says, as I understand it [Pauline Midgley, Germany]	Accepted - see also response to comment 5222.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10340	1	48	12	48	12	The probability range classified as "very likely" is not 595% but 90-100%. [APECS Group Review, Germany]	Accepted - see also response to comment 5222.
10342	1	48	12	48	12	The probability range classified as "likely" is not 17-83% but 66-100%. [APECS Group Review, Germany]	Accepted - see also response to comment 5222.
12580	1	48	12	48	12	The interpretation of the likely range as being the 17-83% range of the full probability distribution is different from the IPCC official definition that is a range with a probability of 66% or more. These 66% do not need to be symetric. In fact previous IPCC authors made explicit that it is not necessarily symetric. Clark et al. 2015 (10.1007/s40641-015-0024-4): " As an example, reporting a likely range of projected sea level rise of 0.2 to 0.8m means that it is likely (i.e., at least 66%probability) that sea level will lie within the 0.2 to 0.8 m uncertainty range, and a probability of 33 % or less that it will lie outside that range (not necessarily symmet- rically distributed)." [Dewi Le Bars, Netherlands]	Accepted - see also response to comment 5222.
15412	1	48	12	48	12	595 % to be replaced by 5 - 95 % I believe. [Samuel Morin, France]	Accepted - see also response to comment 5222.
15474	1	48	12	48	12	Typo in "(595%)". [Hernan Sala, Argentina]	Accepted - see also response to comment 5222.
16376	1	48	12	48	12	"595%" Typographical error. I think this should read: 5-95% [Inga Smith, New Zealand]	Accepted - see also response to comment 5222.
18922	1	48	12	48	12	(595%) should be (5-95%) [Jonathan Tinker, UK]	Accepted - see also response to comment 5222.
19414	1	48	12	48	12	Please correct the percentage (595% must be a typo) [Michelle A. North, South Africa]	Accepted - see also response to comment 5222.
21342	1	48	12	48	12	(595%) should be (95%)? [Philippus Wester, Nepal]	Accepted - see also response to comment 5222.
23620	1	48	12	48	12	This should read "5–95%", not "595%" [Hans-Otto Poertner and WGII TSU, Germany]	Accepted - see also response to comment 5222.
10344	1	48	13	48	14	The correct citation would be "literature suggests (with medium confidence) that this contribution would be several tenths of a metre." [APECS Group Review, Germany]	Noted - AR5 restated this phrase several times with slight variations. The reviewer's version appear on p.1173. The version in this draft appears on p.1174. We have corrected the citation accordingly.
2298	1	48	22	48	30	Given the context of this section being on uncertainty, a potential option for a case study would be to look at the potential for emissions of both CO2 and methane from different soil types. (Knoblauch C., et al. (2018) Methane production as key to the greenhouse gas budget of thawing permafrost, NATURE CLIMATE CHANGE 8:309–312; compare with Schädel C., et al. (2016) Potential carbon emissions dominated by carbon dioxide from thawed permafrost soils, NATURE CLIMATE CHANGE 6:950–953.) [Kristin Campbell, USA]	Noted - references have been considred for this case.
2424	1	48	22	48	30	Given the context of this section being on uncertainty, a potential option for a case study would be to look at the potential for emissions of both CO2 and methane from different soil types. (Knoblauch C., et al. (2018) Methane production as key to the greenhouse gas budget of thawing permafrost, NATURE CLIMATE CHANGE 8:309–312; compare with Schädel C., et al. (2016) Potential carbon emissions dominated by carbon dioxide from thawed permafrost soils, NATURE CLIMATE CHANGE 6:950–953.) [Durwood Zaelke, USA]	Noted - references have been considred for this case.

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
12922	1	48	22	48	30	Given the context of this section being on uncertainty, a potential option for a case study would be to look at the potential for emissions of both CO2 and methane from different soil types. (Knoblauch C., et al. (2018) Methane production as key to the greenhouse gas budget of thawing permafrost, NATURE CLIMATE CHANGE 8:309–312; compare with Schädel C., et al. (2016) Potential carbon emissions dominated by carbon dioxide from thawed permafrost soils, NATURE CLIMATE CHANGE 6:950–953.) [Gabrielle Dreyfus, USA]	Noted - references have been considred for this case.
10386	1	48	30	48	30	E1a - Remove ']' [APECS Group Review, Germany]	Noted
16378	1	48	32	48	43	The following section does not do justice to the range of proposed explanations or the level of deep uncertainty around them: "Proposed explanations for the expansion of Antarctic sea ice include a dynamical response to strengthening and southward migration of the Southern Ocean westerly winds (Holland and Kwok, 2012), teleconnections with mid-latitudes (Purich et al., 2016) or ocean freshening from Antarctic land ice loss (Bintanja et al., 2013), with the pattern of Southern Ocean overturning circulation delaying the development of anthropogenic warming in the Southern Ocean (Armour et al., 2016). Large year-to-year variability combined with short observational records may also be masking the detection of anthropogenic trends in Antarctic sea ice extent (Jones et al., 2016)." Below is a quote from Pauling et al. (2017) that better captures the literature on this: "Satellite observations of Antarctic sea ice extent have shown an overall slight increase over time in recent decades (Parkinson & Cavalieri, 2012), in stark contrast to the rapid decline seen in the Arctic (Cavalieri & Parkinson, 2012). This increase has not been reproduced by models in the Coupled Model Intercomparison Project phase 5 (CMIP5) (Zunz et al., 2013). Proposed reasons for the discrepancy between models and observations include meridional wind (Holland & Kwok, 2012), stratospheric ozone depletion (Turner et al., 2009) (although the studies of Bitz and Polvani (2012) and Sigmond and Fyfe (2010) found that this caused sea ice loss), internal variability (Polvani & Smith, 2013; Turner et al., 2016; Zunz et al., 2013), and freshwater input from ice shelf melt (Bintanja et al., 2013, 2015) (although the studies of Swart and Fyfe (2013) and Pauling et al. (2016) found that this had no significant effect on the rate of change of sea ice area with	Noted - however, Antarctic sea ice case study has been removed due to space constraints

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16380	1	48	32	48	43	References for above comment (part 1): Bintanja, R., van Oldenborgh, G. J., Drijfhout, S. S., Wouters, B., & Katsman, C. A. (2013). Important role for ocean warming and increased ice-shelf melt in Antarctic sea ice expansion. Nature Geoscience, 6(5), 376–379. https://doi.org/10.1038/ngeo1767 Bintanja, R., van Oldenbrough, G. J., & Katsman, C. A. (2015). The effect of increased fresh water from Antarctic ice shelves on future trends in Antarctic sea ice. Annals of Glaciology, 56(69), 120–126. https://doi.org/10.3189/2015AoG69A001 Bitz, C. M., & Polvani, L. M. (2012). Antarctic climate model response to stratospheric ozone depletion in a fine resolution ocean climate model. Geophysical Research Letters, 39, L20705. https://doi.org/10.1029/2012GL053393 Cavalieri, D. J., & Parkinson, C. L. (2012). Arctic sea ice variability and trends, 1979–2010. The Cryosphere, 6(4), 881–889. https://doi.org/10.5194/tc-6-881-2012 Holland, P. R., & Kwok, R. (2012). Wind-driven trends in Antarctic sea ice drift. Nature Geoscience, 5(12), 872–875. https://doi.org/10.1038/NGEO1627 Parkinson, C. L., & Cavalieri, D. J. (2012). Antarctic sea ice variability and trends, 1979–2010. The Cryosphere, 6(4), 871–880. https://doi.org/10.5194/tc-6-871-2012 [Inga Smith, New Zealand]	Noted - however, Antarctic sea ice case study has been removed due to space constraints

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
16382	1	48	32	48	43	References for above comment (part 2): Pauling, A. G., Bitz, C. M., Smith, I. J., & Langhorne, P. J. (2016). The response of the Southern Ocean and Antarctic sea ice to fresh water from ice shelves in an Earth System Model. Journal of Climate, 29(5), 1655–1672. https://doi.org/10.1175/JCLI-D-15-0501.1 Pauling, A.G., Smith, I.J., Langhorne, P.J., Bitz, C.M. (2017). Time-Dependent Freshwater Input From Ice Shelves: Impacts on Antarctic Sea Ice and the Southern Ocean in an Earth System Model. Geophysical Research Letters, 44(20):10454–10461, doi: 10.1002/2017GL075017. Polvani, L. M., & Smith, K. L. (2013). Can natural variability explain observed Antarctic sea ice trends? New modeling evidence from CMIP5. Geophysical Research Letters, 40, 3195–3199. https://doi.org/10.1002/grl.50578 Sigmond, J. C., & amd Fyfe, M. (2010). Has the ozone hole contributed to increased Antarctic sea ice extent? Geophysical Research Letters, 37, L18502. https://doi.org/10.1029/2010GL0440301 Swart, N. C., & Fyfe, J. C. (2013). The influence of recent Antarctic ice sheet retreat on simulated sea ice area trends. Geophysical Research Letters, 40, 4328–4332. https://doi.org/10.1002/grl.50820 Turner, J., Comiso, J. C., Marshall, G. J., Lachlan-Cope, T. A., Bracegirdle, T., Maksym, T.,…Orr, A. (2009). Non-annular atmospheric circulation change induced by stratospheric ozone depletion and its role in the recent increase of Antarctic sea ice extent. Geophysical Research Letters, 36, L08502. https://doi.org/10.1029/2009GL037524 Zunz, V., Goosse, H., & Massonet, F. (2013). How does internal variability influence the ability of CMIP5 models to reproduce the recent trend in Southern Ocean sea ice extent. The Cryosphere, 7, 451–468. https://doi.org/10.5194/tc-7-451-2013. [Inga Smith, New Zealand]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
10346	1	48	33	48	36	A suggestion to increase the readability of this sentence would be; "Climate models produce long-term declines in sea ice around Antarctica as a response to anthropogenic climate change, yet observational records of Antarctic sea ice change document a small but significant increase in Antarctic sea ice since the availability of continuous satellite data in 1979." [APECS Group Review, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
10388	1	48	36	48	36	E2 - Jones et al., 2016 - is this Jones et al 'a' or Jones et al 'b'? [APECS Group Review, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
16320	1	48	36	48	36	The assessment of the Antarctic trend as being significant can only be robust if we have a robust understanding of the internal variability that would determine the significance of the trend. I don‘t believe this to be the case and suggest removing the term „significant“ here. [Dirk Notz, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
18468	1	48	37	48	41	Very long sentence interrupted by references which all together makes it hard to read. Please consider to reformulate. [Anette Jönsson, Sweden]	Noted - however, Antarctic sea ice case study has been removed due to space constraints

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
10390	1	48	43	48	43	E2 - Jones et al., 2016 - is this Jones et al 'a' or Jones et al 'b'? [APECS Group Review, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
10348	1	48	46	48	48	The part "including tourism and research station resupply" could be placed in parentheses and/or moved to the end of the sentence. [APECS Group Review, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
10350	1	48	50	48	54	The phrase "where lower catches are allowed" is unclear. [APECS Group Review, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
23622	1	48	51	48	51	Suggest including acronym "CCAMLR" even though it only occurs once in this Box [Hans-Otto Poertner and WGII TSU, Germany]	Noted - however, Antarctic sea ice case study has been removed due to space constraints
10352	1	49	1	49	5	This sentence combines two very broad research questions (processes that affect ice-sheet stability, extent of change) with one very specific yes-or-no question. This structure could probably be improved. [APECS Group Review, Germany]	Noted - however, this material has been removed in revision.
10354	1	49	4	49	5	The references cited here do not report a total for the anticipated sea level rise but instead quantify sea level rise rates and total glacier retreat rates, respectively. [APECS Group Review, Germany]	Noted - however, this material has been removed in revision.
14218	1	49	5			space needed between '1 m' [Christopher Fogwill, UK]	Noted - however, this material has been removed in revision.
18268	1	49	5	49	7	Beyond this likely range, the ES of Chapter 4 mentions the dynamic contribution of AIS, as well as the possible mechanism of MICI (still a hypothesis). Both points should be also addressed here. Especially MICI is specifically addressed by CHapter 4 as a deep uncertainty. [Laurens Bouwer, Netherlands]	Noted - The revision of this section has replaced the former rather detailed presentation with a more concise reference to Chapter 4 discussion, especially of MISI. In light of chapter 4 revisions, MICI is implied in the discussion of processes affecting SLR beyond the likely range and beyond 2100 but givien the elimination of most detail, we do not feel a mention of MICI is needed here.
5228	1	49	6	49	6	acronym GMSL only used once in this chapter (here) so spell out [Pauline Midgley, Germany]	Noted - GMSL removed
10366	1	49	6	49	6	The acronym GMSL has not been previously defined in this cross-chapter box. [APECS Group Review, Germany]	Noted - GMSL removed
10392	1	49	6	49	6	E1a - GMSL needs to be defined as acronym not used previously in Cross-Chapter Box [APECS Group Review, Germany]	Noted - GMSL removed
15476	1	49	6	49	6	The acronym "GMSL" has not been previously defined in the SROCC. I suggest to include its definition at least once. [Hernan Sala, Argentina]	Noted - GMSL removed
20964	1	49	10	49	10	replace "are resilient to" with "take into account" [Claudio Richter, Germany]	Accepted - Reviewer suggestion implemented
10356	1	49	15	49	17	The phrase "outcomes with probability outside the likely range" is unclear. Does this refer to what is commonly called a "worst-case scenario"? [APECS Group Review, Germany]	Noted - Material rephrased for clarity.
16928	1	49	15	49	17	This has already been said in the text above. Remove to avoid duplication? [Markku Rummukainen, Sweden]	Noted - Text rewritten to avoid duplication
18270	1	49	15	49	15	Add reference to Chapter 6. [Laurens Bouwer, Netherlands]	Noted - Placeholder inserted for reference to appropriate chapter 6 section
10358	1	49	19	49	26	This last part of the paragraph is not well connected to the rest of the text. They could be moved up to improve this paragraph's structure. [APECS Group Review, Germany]	Noted - The entire section has been shortened and rewritten in a way that we believe better connects this last part of the paragraph to the rest.
2300	1	49	28	49	32	Could elaborate more here with some of the information covered in Chapter 6, particularly the information included in Cai et al 2016. [Kristin Campbell, USA]	Accepted - Cai et al, 2016 is now cited in the context of future tipping points contributing to deep uncertainty

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
2426	1	49	28	49	32	Could elaborate more here with some of the information covered in Chapter 6, particularly the information included in Cai et al 2016. [Durwood Zaelke, USA]	Accepted - Cai et al, 2016 is now cited in the context of future tipping points contributing to deep uncertainty
2936	1	49	28	50	2	"Multi-risk" does not have the construction of an English-langugage noun; it is an adjective, and needs to be accompanied by a noun to be grammatical. Moreover, the definition of "multi-risk" is very hard to trace. [Robert Kopp, USA]	Noted - the term multi-risk has been changed to compound risk throughout
10360	1	49	28	49	28	Are "cascading impacts" the same as "compound events"? If yes, why not call it so to be consistent with the header of the paragraph? [APECS Group Review, Germany]	Noted - have added reference to Zschleischler et al; 2018 who state that the effects of multiple coincident or sequential hazards cause major impacts referred to as compound events
10362	1	49	28	50	2	Throughout the paragraph: Should it be "multi-risk" or "multi-risks"? [APECS Group Review, Germany]	Noted - we are now using the term 'compound risks' (plural)
12924	1	49	28	49	32	Could elaborate more here with some of the information covered in Chapter 6, particularly the information included in Cai et al 2016. [Gabrielle Dreyfus, USA]	Noted - Cai et al, 2016 is now cited in the context of future tipping points contributing to deep uncertainty
16930	1	49	28	49	28	Should consider explaining the concept of "multi-risk" already here, not only a reference to Chapter 6. [Markku Rummukainen, Sweden]	Noted - changed term to compound risk and have provided a brief explanation
19114	1	49	28	50	2	would be nice to have a sentence or two on lessons from this case study [Anna Zivian, USA]	Accepted - this has now been added
2938	1	49	29	49	29	"the intraction of hazards with exposure and vulnerability" is just "risk" in the standard IPCC usage; why does a new, clunky, neologism need to be employed? [Robert Kopp, USA]	Noted - we have modified and shortened the first paragraph
14220	1	49	35			characterized [Christopher Fogwill, UK]	Editorial - this has been corrected
10394	1	49	43	49	43	E1a - Move the word 'be' to after 'currently' [APECS Group Review, Germany]	Noted - paragraph is substantially rewritten
10396	1	49	48	49	48	E2 - Reference to Box 6.1 - No Box 6.1 in this Chapter, consider adding Chapter number along with Box number [APECS Group Review, Germany]	Accepted
10364	1	49	57	50	2	Are there any additional measures for the caused damage besides the "reduction in anticipated growth of the gross state product"? This may not be a very palpable unit for some readers. [APECS Group Review, Germany]	Noted - have added estimated total damage costs
10398	1	50	1	50	2	C2 - No reference given for this statistic. Can this be backed up? [APECS Group Review, Germany]	Noted - references added
10400	1	50	31	50	34	E1a - Remove additional Church et al reference, the reference from Lines 35-38 is in a better format [APECS Group Review, Germany]	Noted.
10402	1	51	7	51	10	E2 - References have 'a' and 'b' after them but these are not in the text (See comments 20 and 21 above) [APECS Group Review, Germany]	Noted - This reference is no longer cited, and endnote library issues have been resolved
10368	1	51	9	51	10	Jones et al., 2016a and 2016b refer to the same publication. [APECS Group Review, Germany]	Noted - This reference is no longer cited, and endnote library issues have been resolved
12824	1	52	1	52	46	Suggest to reorder the FAQ (FAQ 1.1 and FAQ 1.3 are about ocean/cryosphere impact on climate and climate change impact on oceans/cryosphere - more logical to put these next to each other. The other three (FAQ 1.2, 1.4 and 1.5) are mainly about people - they could perhaps be reconciled into one or two questions. The five FAQ do not touch upon the importance of the ocean (especially) and the cyrosphere with respect to nature / environment / biodiversity - this big omission should be rectified; at a minimum the FAQ 1.2 could be modified to e.g "How are the ocean and cryosphere significant for people and nature?" [Stephen Cornelius, UK]	Accepted; reordering done in FAQ development

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Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
21302	1	54	27			The discussion in the text is related to Arctic and permafrost. Please take a closer look at the reference to Adams et al. 2013, which relates to Bangladesh. [Sanjay Chaturvedi, India]	Taken into account: this reference is no longer cited in the revised chapter.
15478	1	56	60	56	60	Delete this line. The dot "." seems to be the full stop of the previous line. [Hernan Sala, Argentina]	Accepted: citation formating corrected
16802	1	57	8	57	8	the term "Vulnearability" should be vulnerability [Jeremy Rohmer, France]	Accepted: citation formating corrected
15480	1	57	9	57	10	Check if this reference is properly written. [Hernan Sala, Argentina]	Accepted: citation formating corrected
15482	1	62	56	62	57	Check if this reference is properly written. The link "http://www.ipcc-wg2.gov/meetings/CGCs/index.html#U" is broken. [Hernan Sala, Argentina]	Accepted: citation formating corrected
5326	1	63	13	63	14	Full reference is Meinen, C. S. et al. Meridional Overturning Circulation Transport Variability at 34.5°S During 2009–2017: Baroclinic and Barotropic Flows and the Dueling Influence of the Boundaries. Geophysical Research Letters 45, doi:10.1029/2018GL077408 (2018) [Meric Srokosz, UK]	Accepted: reference has been corrected
21344	1	63	22	63	23	Red Flag: where is the Merrey et al. publication in press? Currently not traceable. [Philippus Wester, Nepal]	Taken in to account: in press literature was submitted to TSU
22330	1	64	47	64	48	Citation Parveen et al. 2015: It should read: Erdkunde 69 (1), 69-85, doi: 10.3112/erdkunde.2015.01.05 [Marcus Nüsser, Germany]	Accepted - the reference has been updated.
16180	1	67	46	67	46	Missing the complete Talley et al. reference. Here is the reference in my own format: Talley et al., 2016. Changes in ocean heat, carbon content, and ventilation: Review of the first decade of global repeat hydrography (GO-SHIP). Ann. Rev. Mar. Science 2016, 8, 185-215. DOI: 10.1146/annurev-marine-052915-100829. [Lynne Talley, USA]	Accepted - the reference has been updated.
17246	1	68	9	68	9	Please replace the reference to L.9 (session document) to the report of COP 21 (FCCC/CP/2015/10/Add.1) [Iulian Florin Vladu, Germany]	Accepted: the reference has been updated
620	1	70	0			This list excludes some key ocean and climate restoration methods including: ice thickening, ocean brightening, enhancing convective cooling, precipitation control, enhancing the carbon pumps, and enhancing environmental methane and smog conversion. [William Clarke, Australia]	Taken in to account: this table has been deleted in the SOD
15484	1	70	4	70	4	In the Appendix 1.A, Table 1, the last column has the header: "Cross-Chapter Box LLIC", but the acronym "LLIC" is not defined in this chapter. Consider to include its definition. [Hernan Sala, Argentina]	Taken in to account: this table has been deleted in the SOD
834	1	71	0	71		in the 2nd column ; 3rd line: "Extension of coral reefs poleward" in which "mangroves" be added [Kathiresan Kandasamy, India]	Taken in to account: this table has been deleted in the SOD
12348	1	71	0			I don't understand this table. The LH column lists ocean warming and cryosphere loss but the second column is almost exclusively about the former unless you take an extremely narrow vview (at odds with the definition of natural systems given earlier) of the impacts. Is this supposed to be only biological impacts (it seems not as coastal erosion is mentioned). Anyway it seems odd. [Eric Wolff, UK]	Taken in to account: this table has been deleted in the SOD
15414	1	71	1	72	1	This Table seems to be contributing to an assessment document, although Chapter 1 is not meant to be an assessment. Anyhow, the material included here should be discussed with other chapter teams. [Samuel Morin, France]	Taken in to account: this table has been deleted in the SOD
17684	1	71	1			This table is just a selection of impacts, but does not reflect all fields covered in SROCC. Are the confidence statements in line with the assessment results of the later SROCC chapters? [Andreas Kääb, Norway]	Taken in to account: this table has been deleted in the SOD

SROCC First Order Draft Expert Review Comments - Chapter 1							
Comment id	Chapter	From page	From line	To page	To line	Comment	Chapter Team Response
6002	1	72	4	72	4	"...decade 2017-2016.." should read "2007-2016" [Jens Zinke, Germany]	Rejected: unclear what was being referred to, and search of document doesn't find this mention.
13154	1	72	5	72	36	the existence of this supplementary information should be announced in the caption of Fig. 1.4 . It would also be nice to give the individual panels letters, so it is easier to identify which explanation belongs to which portion of the figure. In my mind the lower panel would be the data coverage (% domain) at the very bottom of the figure. [Baerbel Hoenisch, USA]	Accepted: Annex 1.A pointed to in caption, and additional labelling added to figure.