Review template for the four brief documents of the second World Ocean Assessment (WOA II)

A. Brief on WOA II and climate change on the ocean

Section [number]: [title]	Comment	Response from the Experts
Canada		
Section III: Marine ecosystems		
10, 32	This paragraph mentions that species distributions have extended polewards. Is this referring to plankton species or other species in the food web?	It refers also to other species.
11, 47 (new paragraph 48)	Is it possible to describe the geographic variability?	Suggestion included
Section IV: Coastal communities		
11, 48 (new paragraph 52)	Could be useful to also highlight the impacts on coastal infrastructure here.	The impacts of climate change on coastal infrastructure are described in a dedicated section below (Coastal infrastructure, paragraphs 56 to 60) under the same general topic (IV Coastal communities). A cross reference has been included.
12, 57-60 (new paragraphs 61-64)	Consider mentioning impacts of climate change on food and water scarcity in Chapter 8 on Human society	Mentioned now in paragraph 80 (Human society).
China		
Section [V]: [Knowledge gaps and capacity development needs]		

[Page 14], [paragraph 73] (new paragraph 78)	The challenge of optimizing existing data (GIS, disaster lose and damage, economic, etc.) need to be addressed as well.	New sentence included in paragraph 78 as suggested. The following footnote has been added "The text provides additional information to the content of WOA2 suggested by the States that reflects general scientific consensus."
[Page 14], [paragraph 74 (new paragraph 79)	The accurate climate extremes/disasters early warnings also need to be disseminated to the coastal communities especially for the most vulnerable groups timely.	New sentence included in paragraph 79 (old 74) as suggested. The following footnote has been added "The text provides additional information to the content of WOA2 suggested by the States that reflects general scientific consensus."
Section [Final remarks: interaction with other United Nations processes]:		
[Page 15], [paragraph 85]	Within the framework of the Paris Agreement, to advance the climate change achievement not only requires collaboration between States, but also the domestic consideration of each State. Thus, we made the following modification: Present and future collaboration pathways will advance the interaction of the Regular Process with other ocean-related United Nations intergovernmental processes and will make it possible to strengthen decision-making at all levels in a coordinated manner and in accordance with respective mandates with respect to ocean climate change.	The suggestion was included. Please note however that the Secretariat has replaced the section by a new one that is common to all the Briefs.
Colombia		
General comments		
Education in marine sciences and Social Appropriation of	Although the content of the document is oriented to the diagnosis of the influence of climate change in	Suggestion included in the section Human society, new paragraph 83. The following

Knowledge. Proposal to incorporate two new sections in chapter V (Page 13 to 14)	different approaches, and the need to eliminate (reduce) gaps in technical and scientific knowledge, it is essential to include the component of education in marine sciences and social appropriation of knowledge. The first, focused on generating academic, technical, and scientific capacities in the community that contribute to the traceability and repowering of technological advances, considering education in marine sciences as a basis in each of the stages of academic training (at different ages, children, youth, and adults). The second (social appropriation of knowledge), visualized as a tool that guarantee the exchange of knowledge with the communities, articulating scientific knowledge with local knowledge, which strengthen the design and implementation of mitigation and adaptation strategies in the face of climate change. It is suggested that these two components be included in the section V. Knowledge gaps and capacity development needs	footnote has been added "The text provides additional information to the content of WOA2 suggested by the States that reflects general scientific consensus."
Section Purpose and process of preparation of the briefs		
[Page 1], [paragraph 3]	Considering that this evaluation is focused on two fundamental global issues; climate change and marine biodiversity, as indicated in the document, it is suggested to expand the references, including the association of this activity with the contribution to the Sustainable Development Goals (SDG), mainly those related to climate action (SDG13), underwater life (SDG14) affordable and clean energy (SDG7), and alliances to achieve the goals (SDG17).	SDGs were included as suggested. Please note however that the Secretariat has later changed this section by a new one common to all the Briefs
Section II: Extreme events		

[Page 9], [paragraph 26]	"… observational period (1982–1983, 1997–1998 and 2015– 1916) …". There is an error in the year, this must be 2015- 2016. The impacts associated with the warm events of El Niño, are presented in a very general way, assuming increases in rainfall for the entire geographic domain, when the influence of ENSO events on this atmospheric variable is more heterogeneous and Page 5 of 20 depends on the confluence with other climatic oscillations of different periodicity acting simultaneously. This, based for example on studies carried out in the Southeast Pacific (Colombia and Peru), where the anomalies registered in precipitation respond to the geographical characteristics of the study area, and to the configuration of the anomalies of the surface temperature of the sea in the Pacific Ocean, which allow cataloging whether they obey a distribution consistent with a Modoki El Niño or a Canonical El Niño. This in what is generally known as the "Flavors of ENSO". Although the objective of this section is to identify how the climate change signal can influence the increase in the intensity or frequency of ENSO events, it is necessary in this paragraph to expand the possible impacts of ENSO on other ocean-atmospheric variables, such as sea temperature, positive anomalies in the Southeast Pacific, which undoubtedly have great consequences on fishing, mainly affecting the economy of countries like Peru.	Suggestions included in paragraph 26. The following footnote has been added "The text provides additional information to the content of WOA2 suggested by the States that reflects general scientific consensus."
Section [III]: [Marine ecosystems, Fish biodiversity and distribution]		

[Page 11], [Paragraph 44] New paragraph 45	Overexploitation together with climate change are not the only cause of the degradation of the marine ecosystem, likewise, there are no quantitative data that assess the impact of each pollutant and therefore, the generalized cause must be established as one of many causes	Suggestions included in paragraph 45. Novel threats, for instance microplastic pollution, are also attracting increased research interest, even though considerable uncertainty remains about the population-level effect.
[Page 11], [Paragraph 45] New paragraph 46	It should be emphasized that the high density of the fishery resource in these areas should not affect the sustainability of the resource	Suggestion included in paragraph 46.
Section [IV]: [Coastal communities]		
[Page 11] , [Paragraph 48, new 52]	The possibility of carrying out coastal protection works, based on nature, should be considered, for example: Planting mangrove forests. This prevents all protective works from being of hard engineering structures.	This is already considered in the following paragraph 53.
[Page11], [Paragraph 49] New paragraph 53	It is important to promote the protection of coastal ecosystems, as well as the mitigation of impacts generated by the development of activities, however, the contribution to livelihoods and food security must be safeguarded along with resource sustainability Page 6 of 20 It is suggested to consider that in some geographical areas it is necessary to implement mixed works, which incorporate hard and soft works, because of the high energy of the waves and marine currents, the geomorphological characteristics of the area, and the landscape environment. Emphasize the importance of deepening the knowledge of local conditions, based on the collection of data recorded in the coastal zone, climate projection (using local scalability) and expertise in the line of coastal works.	Suggestions included in paragraph 53

[Page 12] , [Paragraph 51] New paragraph 54	It's not just climate change that causes erosion. We can mention that, despite the efforts on marine and coastal affairs, it is evident that the unregulated construction of coastal protection works "Trap sediments" accelerate the erosion and retreat of the coastline, this due to the accretion of sediments in the parts where these works are built, preventing the natural fluid of sediments.	Suggestion included in paragraph 54
[Page 12] , [Paragraph 53] New paragraph 56	Erosion is a natural process caused by high coastal dynamics, where marine currents, winds, extreme events, among other causes, interact. The appropriate thing is to adapt to this dynamic in a natural way, which allows the rulers to have the financial resources for the creation and execution of contingency plans.	We do not understand this comment "The appropriate thing is to adapt to this dynamic in a natural way, which allows the rulers to have the financial resources for the creation and execution of contingency plans". Please provide further explanation and we will reflect it in the text.
[Page 12], [Paragraph 58] New paragraph 62	Considering the manifest vulnerability of rural coastal communities, it is suggested to include the status of the implementation of warning systems for natural hazards, the same ones that are articulated to the institutions (or organizations) linked to disaster risk management, attenuate the level of threat and contribution to the generation of other mitigation strategies against extreme events associated with the climate change signal.	The suggestion is included in the paragraph 79 in the section "V. Knowledge gaps and capacity development needs" under the subheading "Human society". "74.With regard to human society and especially for communities of indigenous peoples, better information is needed on their state, the climate change threats that they face and their economic and social situation. Accurate climate extremes/disasters early warnings need to be disseminated timely to the coastal communities especially for the most vulnerable groups."
Section [V]: [Knowledge gaps and capacity development needs]]		

[Page 13], [Paragraph 61] New paragraph 70	Considering the spatial and temporal limitations inherent to the in-situ records available worldwide for the development of climate studies, it is necessary to deepen the incorporation of emerging and acquired techniques associated with numerical modeling processes, especially in relation to the implementation of the validation-calibration-validation chain, thus optimizing the use of observations and measurements of ocean-atmospheric variables. Page 7 of 20 In this sense, in terms of diagnosis, it is necessary to propose numerical modeling as a complementary solution, and at the same time present a real panorama of numerical simulations, showing possible current strengths and weaknesses.	Suggestion included as new paragraph 70. The following footnote has been added "The text provides additional information to the content of WOA2 suggested by the States that reflects general scientific consensus."
[Page 13], [Paragraph 62] New paragraph 66	In addition to what has been diagnosed in this point regarding the lack of tide gauges in the coastal zone to study the influence of the climate change signal on sea level, and the limitations of altimetric observations in the coastal zone, it is also necessary to consider in the diagnosis the importance of relating geological aspects to the coastline, given that, for example, in countries such as Colombia and Ecuador, there are subsidence and liquefaction processes, among others, that can alter the reference level with respect to land, and have a quantitative and qualitative impact on the identification of possible long-term changes in sea level at a local scale.	Suggestion included in paragraph 66.
[Page 13], [Paragraph 67] New paragraph 72	It is essential to have more information on the dynamics of coastal processes (as argued in the paragraph), aimed at a deep understanding of wave conditions (sea and swell) and marine currents at a	Suggestions included in paragraph 72. The following footnote has been added "The text provides additional information to the content of WOA2

	local scale, considering their importance in the sediment transport. In this sense, there are investigations carried out in some countries, where the importance of studying the impact of the climate change signal on variables such as waves is underestimated, not knowing that this variable is influenced by ENSO events, the same ones that intensify in response to global warming as argued in section II (External Events, El Niño Southern Oscillation (chapter 9).	suggested by the States that reflects general scientific consensus."
[Page14], [Paragraph 74] New paragraph 79	There are limitations in the knowledge about phenomenon of climate variability and risks caused by them, which is a great limitation for decision-making at national and regional levels.	Suggestion included in paragraph 79.
[Page14], [Paragraph 76] New paragraph 80	Although there are important advances in information, there are still gaps in terms of real impacts caused in the territory; this makes it difficult to focus on investments and efforts to give effective responses in the reduction of risks. It is important to optimize resources that are directed to an integral management and adaptation to variability and climate change.	Suggestion included in paragraph 80.
Mexico		
Physical and chemical impacts of climate change Sea surface temperature and ocean heat content (chapter 5)	Paragraphs 4, 5 and 6 mention the changes observed in terms of temperature increase, however, only at the end of paragraph 6 are impacts mentioned in a general way, in terms of changes in the distribution of species. It is suggested to reinforce the impact messages and include specific examples for key species, for example, the implications of this increase in temperature on corals and further detail the impact of the distribution of species or even their	More information included in paragraph 6. Marine heatwaves and their impact are analysed in paragraph 24

	possible loss impact of the distribution of species or even their possible loss. Some impacts are addressed in Chapter 9 on Marine Heat Waves. It is suggested to make the link.	
Sea level rise (Chapters 5 and 9)	Although it is a technical document, it is suggested to dimension in paragraph 7, the speed of sea level rise and the implications that this would bring. In the same way in paragraph 8, it is mentioned that there is regional variability in exchange rates, it would be useful to detail the implications. For paragraph 9 it will be important to address the population and infrastructure that would be affected by the loss of coastal territory. For paragraph 10, which mentions that sea level rise will continue for centuries, even if mitigation measures are applied, it is suggested to clarify that it refers to measures to mitigate impacts, or mitigation of Gases Greenhouse.	The rate of sea level rise is already dimensioned in paragraph 7: "By 2010, the global average sea level was 52.4 mm above the 1993 level and, by 2018, it had increased to 89.9 mm above the 1993 level." The implications of sea level rise are presented in other sections (Extreme events, Coastal communities) but have been expanded here following the suggestion. The projected number of people affected by sea-level rise ranges greatly and the estimates differ on account of the different types of data used. The paragraph of regional variability has also further detailed. Clarified mitigation of Greenhouse Gases
Tropical and extratropical cyclones (chapter 9) 29.	29. It is suggested to make a reference that it also has to do with the increase in ocean temperature. Although reference is made to global temperature. And indicate whether ocean heat waves also have an implication in increasing the intensity of tropical cyclones. Which would make sense but is not mentioned.	Reference is made in the Brief to global temperature and tropical cyclones in the following way "An increase in the average intensity of tropical cyclones and the associated average precipitation rates is projected for a global temperature rise of 2°C, although there is low confidence in future frequency changes at the global scale.

		Projections suggest that the proportion of tropical cyclones that reach the strongest levels (category 4 and 5) will increase. We are not aware of the suggested link between the marine heatwaves and tropical cyclones mentioned in the WOA or IPCC reports.
Sea level rise and cities (chapter 9) 49 (new 53)	It is suggested to mention in greater detail the benefits of Nature-based Solutions or Ecosystem-based Adaptation *vs* "hard" adaptation measures	Benefits mentioned in greater detail in paragraph 49
Korea, Republic of		
General comments	I think that "Brief on the second World Ocean Assessment and climate change in the ocean" is very well summarized the impacts and projections of the ocean due to climate change in briefly. It is considered that this report will be very useful and helpful for policymakers and the general public as it includes social impacts as well as natural impacts. The many contents are similar to the SROCC(2019) and AR6 WG-I report(2021) by IPCC, but some of the contents and values that are slightly different are considered to need to be revised. In addition, some sentences and paragraphs will need to be revised for readability.	Thanks. Noted and revised. Please note that the text has been examined by a UN copy editor.
Section 1: physical and chemical impacts of climate change		
[7], [4]	In the sentence of "the 10 warmest years on record have~", it should be added to the start and end	Suggestion included in paragraph 4

	years about record. I hope to revised like "record(0000~0000)" in this sentence.	
[7], [4]	It is needed to add the rate of warming trend of long-term trend though it is just described about warming trend rate during recent decade in this sentence.	Suggestion included in paragraph 4
[7], [5]	In SROCC approved by IPCC(2019), they reported that ocean temperature increase corresponds to an uptake of over 90% of the excess heat accumulated in the Earth system. I think that it is slightly differed with first sentence of this paragraph. Therefore, I think that it is needed to reconsider the description of this sentence.	Suggestion included in paragraph 5
[7], [5]	The unit of ocean warming in this sentence was described by W m^{-2}. This unit means the ocean warming as average fluxes. I think that it is better to use the unit as ZJ yr^{-1}.	For consistency with WOA2 we will keep the same units.
[7], [6]	I hope that this sentence should be more described in detail. As SROCC, IPCC(2019), they reported that the observed rate of range shifts since 1950s are estimated to be 51.5±33.3 km per decade and 29.0±15.5 km per decade for organisms in the epipelagic and seafloor ecosystems, respectively. Like the SROCC, it is more detailed values in this sentence.	Shifts are reported in paragraph 32.
[7], [7]	In SROCC, GMSL from tide gauges and altimetry observations increased 3.2 mm yr^{-1} over the period 1993~2015. It is slightly differed with the described value of GMSL in this sentence. Please check about this GMSL value with the GMSL value in SROCC.	Both observations are coherent (± 0.3 mm $year^{-1}$). Cazenave et al. (2019) using the most recent time series (January 1993–February 2019) gives a mean rate of sea level rise of 3.15 ± 0.3 mm $year^{-1}$, with an acceleration of 0.10 ± 0.04 mm $year^{2}$. This acceleration

		value agrees well with Nerem et al. (2018)'s estimate.
[7], [12]	It is better to change the wording from "the atmospheric water cycle" to "the Earth's hydrologic cycle".	Suggestion included in paragraph 12
[8], [13]	In this paragraph, I think that it is necessary to describe the uncertainty caused by a relatively short direct observation periods.	The text commented has been deleted.
[8], [15]	It is necessary to describe the trend of deoxygenation by dividing it into the over all depths and the upper layer like 0~700m. I think that this is a better way to express that more serious deoxygenation is occurring near the surfaced layer with physical change like strong stratification.	Suggestion included in paragraph 15
[8], [19]	It is better to change the wording from "since the Industrial Revolution" to "since preindustrial times".	Suggestion included in paragraph 19
[8], [19]	In AR6 WG-I by IPCC(2021), the period of long-term trend of pH as reconstructed using boron isotope was the last 65 million years. In this paragraph, however, it was described as the past 66 million years. Please, check about the gap of periods between AR6 and this report.	The following footnote has been added "In AR6 WG-I by IPCC (2021), the period of long-term trend of pH as reconstructed using boron isotope is the last 65 million years."
[8], [22]	It is better to change the wording from "the areal extent of Arctic sea ice" to "the extent of Arctic sea ice area".	Suggestion included in paragraph 22
Section 2: Extreme evets		
[9], [24]	According to SROCC by IPCC(2019), marine heatwaves have had a negative impact to fisheries like mass mortality on aquafarm, migration change and habit damage. Therefore, it is needed to change	Suggestion included in paragraph 24

	the sentence like these; "~negative impact on marine organism, ecosystem and fisheries in ~".	
[9], [24]	It is better to change the wording from "by increases in mean ocean temperature" to "by ocean warming".	Suggestion included in paragraph 25
[9], [26]	Typing error : 2015-1916 → 2015-2016	Corrected
[9], [29]	It is better to change the sentence from "the proportion of category 4 and 5 tropical cyclones will increase." to "the proportion of tropical cyclones will reach the strongest levels(category 4 and 5)."	Suggestion included in paragraph 29
[10], [31]	It is needed to change the wording from "near coasts and islands" to "in most low-lying coastal areas".	Suggestion included in paragraph 31
Section 3: Marine ecosystem		
[10], [32]	According to SROCC by IPCC(2019), warming has contributed to observed changes in phenology of many marine organism. Therefore, it is needed to change from "seasonal spring maximums in plankton biomass have advanced by 4.4 days per decade~" to "timing of spring phenology of marine organisms is shifting to earlier in the year at an average rate of 4.4 days per decade~".	Suggestion included in paragraph 32
[10], [35]	It is better to change the wording from "In the Antarctic region, krill~" to "Antarctic krill~"	Sentence deleted
[10], [38] new 39	I hope that the following sentence will be included at the beginning of the paragraph; Mangroves, saltmarshes and seagrasses are known as the coastal blue carbon ecosystems. Coastal blue carbon ecosystems provide climate regulatory services through their carbon removal and storage.	Suggestions included as a footnote of the subsection title

[11], [44] new 45	For readability, I hope to change from “overexploitation” to “overfishing”.	Suggestion included in paragraph 45
Section 4: Coastal communities		
[12], [55]	It is better to change the wording from “rising sea level” to “sea level rise”.	Suggestion included in paragraph 55
Section 5: Knowledge gaps and capacity development needs		
[13], [64] new 68	I also hope that the following sentence will be included at the beginning of the paragraph; Marine ecosystem model is very useful and helpful to understand the biochemical impact due to climate change.	Suggestion included in paragraph 68
[13], [65] new 69	I hope that the following sentence will be included at the end of the paragraph; The recently extreme change of Antarctic ice sheets should be clearly influenced to global mean sea level, but the impacts to GMSL by Antarctic ice loss have very low confidence by rare observations.	Suggestion included in paragraph 69
Spain		
Section [IV]: [Coastal Communities]		

[12], [53] new 57	We would like to suggest the use of the term nature based solutions alongside ecosystem-based measures. This concept has already been used in the resolution on Implementation of the Convention on Biological Diversity and its contribution to sustainable development approved last year in the GA. Additionally, a resolution on Nature-based Solutions for Supporting Sustainable Development was approved in the UNEA https://www.unep.org/news-and-stories/press-release/un-environment-assembly-concludes-14-resolutions-curb-pollution.	Suggestion included in paragraph 57 The following footnote has been added: The concept "nature-based solutions" has been used in the resolution on Implementation of the Convention on Biological Diversity and its contribution to sustainable development approved in 2021 in the GA. Additionally, a resolution on Nature-based Solutions for Supporting Sustainable Development was approved in the UNEA https://www.unep.org/news-and-stories/press-release/un-environment-assembly-concludes-14-resolutions-curb-pollution.."
Thailand		
Section III: Marine Ecosystem		
Page 10 – 11	This brief document would presumably address climate change's short- and long-term impacts on the marine ecosystem and its link to the SDG14. Moreover, it should suggest the possibility of regional and national implementation plans.	Please note that page 5 (paragraph 3) makes reference to "decision-making at all levels."
US (by Breitburg)		

Page 6, Figure: Visual summary of global change indicators	A panel showing change (decline) in global ocean oxygen content should be added to this figure. Ocean deoxygenation is a major consequence and indicator of climate change and is included in the report and brief. It's omission in this figure incorrectly de-emphasizes the importance of this problem. Members of the IOC-UNESCO Global Ocean Oxygen Network can assist in identifying an appropriate figure if help is desired.	We agree in the need of a figure of global dissolved oxygen. CMEMS does not produce it so far as aglobal ocean indicator and that is the reason for the absence in Figure 1. A new figure 2 has been added to the brief presenting (a) the extent of the oxygen minimum zones, (b) the decreasing trends over five decades (1960-2010), (c) the vertical distribution of deoxygenating and (d) the percentage of deoxygenating due to warming of the water column.
Page 13, paragraphs 61-65 (especially paragraph 64) New paragraphs 65-70	Much of the discussion on research and scientific observation needs for acidification and deoxygenation is actually contained in Chapter 9, Section 3 of the WOA II report, not Chapter 5. The primary conclusions of that section should be reflected in the brief – especially in paragraph 64. In Chapter 9, Section 3, there is a clear call for expanded observations and increased understanding of effects of BOTH acidification and deoxygenation. In addition, the need for a multi-stressor framework is emphasized and should be included in the brief.	Both suggestions included in the heading and paragraph 68.
US (by Jewett)		
Page 6, Figure	The units should be on the y axis label, not the top of the graph	We follow CMEMS (Copernicus Marine Service) that sourced the individual figures.
Page 6, paragraph 13	Change the first sentence to "Independent proxies indicate the Atlantic Meridional Overturning Circulation is at its weakest…" The sentence is unclear as it stands. This will allow the sentence to read better although another comment is that the data supporting this statement is equivocal.	Changes made.

[Page 14, header	"Human society (chapter 8)" follows chapter 14. This header may be out of place?	"Human society" follows "Marine infrastructure".
US (by Levin)		
General comments IV.	There is a section on coastal communities, but a parallel section on open ocean and deep-sea communities does not exist. Climate change is covered extensively in WOA2 Chapter 7, with many mentions in each section including those overing the open ocean (7N – 14 mentions; 7Q – 10 mentions) and the deep sea (7L – 3 mentions; 7J – 17 mentions; 7M- 14 mentions; 7O- 6 mentions; 7P-5 mentions). Information about climate changes, ecosystem consequences and societal effects should be summarized in one or two additional sections covering the Open Ocean and Deep Sea. The IPCC SROCC also devotes considerable attention to these.	Please note that the section "Coastal communities" refers to coastal human communities and not to communities in an ecosystem sense. This section (Coastal communities) covers societal impacts and adaptation in both areas, continental and open ocean (deep-sea) regions. Similarly the previous section "Marine ecosystems" (probably you wanted to refer to this) includes also the ocean regions from the coast to the deep ocean (see for example references to cold water corals). We have included a new additional new subsection on "Deep-sea ecosystems" to give an special emphasis to this region as suggested.
7,	While a focus on essential climate variables is useful, a major omission is oxygen, whose loss in the ocean under climate change is well documented and a major stressor on marine ecosystems. Since IPCC reports are a part of this synthesis, please consider the comprehensive Figure 1 of the SROCC Summary for Policy Makers (Figure titled *Past and Future Changes in the Ocean and Cryosphere*) which includes oxygen alongside surface ocean pH, sea level rise, ocean heat content etc. The World Ocean Assessment covers oxygen	Please note that dissolved oxygen is already included in the main text and in the index (see page 1). We agree in the need of a figure of global dissolved oxygen, that CMEMS does not produce so far as a global ocean indicator (that is the reason for its absence in Figure 1). A new figure 2 has been added to the brief presenting (a) the extent of the oxygen minimum zones, (b) the decreasing trends

	loss and its consequences in several chapters. At a minimum you can add a parallel oxygen figure into the figure *Visual summary of global ocean climate change indicators*	over five decades (1960-2010), (c) the vertical distribution of deoxygenating and (d) the percentage of deoxygenating due to warming of the water column. The SROC figure presents modelling projections to 2100, and we find more convincing for policy-makers to highlight the trends of real observations and specially those of the recent decades (1993 to 2019/2020). The SROCC figure includes trends of land glaciers and continental permafrost that are beyond the scope of WOA.
7, 5	Point 5 – This text implies that the ocean below 2000 m is not warming, when it is. The 2000 m limit is a by product of Argo depths but other deep sustained observing systems (GoSHIP and OceanSITES) document this warming. This deep warming is referred to in the WOAII Ch. 7 abyssal section as well as IPCC SROCC and elsewhere and needs to be acknowledged.	The text has no implications but we have included your comment as a footnote.
8, 17	This paragraph is correct to indicate that anthropogenic nutrients are the primary cause of oxygen loss in coastal waters but it is critical to point out that ocean warming is acting to increase the number of coastal areas that become hypoxic, and causing earlier onset, longer duration and more intense oxygen loss in seasonally hypoxic coastal settings.	Suggestion included in paragraph 17

8,17	Please also summarize the biodiversity loss, habitat compression and other ecosystem consequences of oxygen loss in deep (bathyal) depths discussed in WOA II Ch 7J (Continental Slopes and Canyons).	Suggestion included in paragraph 18 and in a new subsection on Deep-Sea ecosystems (paragraphs 49 to 51)
UNEP		
General comments		
This is a general comment, but may be incorporated in paras. 48 et seq. (in Section V, Chapter 8)	There is a need to address the issue of climate change impact on *statehood.* Three main elements constitute the State: population, territory and a government organization. With sea level rise, as a result of climate change, the territory of certain States may change considerably, and this puts into question not only the notion of statehood, but also impacts on the available resources for the population of a given state, and may further lead to conflict.	The secretariat of the Regular Process had advised the Group of Experts (GOE) that the issue of sea-level rise impact on statehood goes beyond the scope of the World Ocean Assessment (WOA), and on that basis, the GOE decided not to include the paragraph proposed by UNEP in the brief.
Section V: Knowledge gaps and capacity development needs		
Page 14, paragraph 78 (new paragraph 82)	To note that in June 2021, the Committee of the Rights of the Child (CRC) decided to draft a **General Comment on children's rights and the environment with a special focus on climate change** (Draft General Comment No. 26), which will make recommendations to State parties to the Convention on the Rights of the Child relating to the issue. Its main objective is to provide authoritative guidance on a child-rights approach to environmental issues. Within this context, the CRC will convene a series of online and offline consultations with State parties, experts from relevant fields, children, and youth to inform and	Suggestion included as foot note in paragraph 82

	shape the draft general comment. UNEP is supporting the CRC through the Expert Advisory Board which oversees and provides guidance to the development of the General Comment. (see https://www.ohchr.org/en/documents/general-comments-and-recommendations/draft-general-comment-no-26-childrens-rights-and)	