Editorial Decision for Chapter 3, Global Oceans

I am now in receipt of all reviews of your manuscript entitled “BAMS State of the Climate in 2019. Chapter 3, Global Oceans”. On the basis of these reviews and my own evaluation, I find the manuscript acceptable for publication after minor revision.

The reviewers offer a variety of recommendations to improve the manuscript, which they find to be well-written and informative. Reviewer 1 elected to make a smattering of comments in a marked version of the manuscript. In responding to these, please transcribe the reviewer’s comments as best you can, along with your responses, in your usual response document, despite the extra work involved in doing so. Reviewer 2 makes a worthwhile point about the sometimes confusing use of “tendency” in the text (see also my comment #69 below). Reviewer 2 and especially Reviewer 3 have carefully examined your figures and offer numerous suggestions about them, and, in some instances, question their interpretation. Reviewer 4 focused on the biogeochemical sections of the manuscript and makes valuable points, such as the worthiness of the aging MODIS sensor for climate studies.

In addition to responding to all the reviewers’ comments, I offer below my own comments for your attention (some of which are also noted by the reviewers).

1. Line 129: Unlike last year’s *Overview*, this year’s version is less compelling and coherent. I understand, however, that circumstances this year are very different. Even so, two important omissions from the *Overview* should be corrected: ocean carbon (section j) and the Atlantic Meridional Overturning Circulation (section h), the latter reappearing after last year’s absence. Please include some 2019 highlights from these two sections in the *Overview* (for example, lines 1272-1275 provide material about ocean carbon).
2. Line 131: Insert “on” before “the longer-term”.

*Inserted as suggested.*

1. Line 135: Change “For the eighth consecutive year, 2019 global mean sea level reached a new record” to “The year 2019 marks the eighth consecutive year that global mean sea level increased relative to the previous year, reaching a new record”

*Changed as suggested.*

1. Line 139: Change “300 dbar” to “300 m”, if this is correct. Because the next sentence uses meters for depth, it would be good to be consistent.

*Changed as suggested.*

1. Line 150: Delete the comma before “and were much”.

*Deleted as suggested.*

1. Line 152: Delete the comma before “and drove increased”.

*Deleted as suggested.*

1. Lines 158-160: The sentence beginning “Averaged over 2019” does not follow sensibly from the preceding sentence about ENSO, except for referencing the same location in the tropical Pacific. Please find another approach to including mention of the chlorophyll reduction in the *Overview*. Also, rather than reporting on chlorophyll in the *Overview*, please instead find something notable to report about global ocean phytoplankton in 2019, which, after all, is the primary feature of interest to readers.
2. Line 171: It would be good to define “Global”. Does it include all oceans (including the Southern Ocean, which is treated in a separate chapter) and seas like the Red Sea? What else? What is not included?
3. Lines 172-181: Can this description of the data used be shortened by referring readers to earlier *State of the Climate* reports, as is done, for example, in section g, lines 784-785? If so, then the text here can note only updates to these data sets.
4. Line 196: Delete the comma before “and slightly”.

*Deleted as suggested.*

1. Line 211: Insert “the” before “Pacific Decadal”.

*Inserted as suggested.*

1. Lines 216-217: Include a reference to section 4h in The Tropics chapter about the IOD, and a reference to section 7h about the impact of the strong IOD on the Maritime Continent and Australia.

*Thank you. These have both been referenced now.*

1. Line 223: Change “its areas stretched” to “these anomalies stretched”.

*Changed as suggested.*

1. Line 226: Delete the comma before “but were closer”

*Deleted as suggested.*

1. Line 237: Change “IOD index for at least the past 70 years” to “IOD index since 1994”, which is how it is now described in section 4h.

*This has been changed to reflect the statement in Chapter 4.*

1. Line 250: Please include a reference to “Atlantic Nino”, which is not a familiar concept to many.

*Reference added.*

1. Lines 253-254: I don’t see the trend since the 1880s noted anywhere. While it’s good to know that it “remained significant”, it would be good to also report its value.
2. Line 258: Insert the values of the trends in the Indian Ocean and North Pacific before the two instances of “C decade -1”
3. Line 288: Insert “the” before “larger heat”.

*Inserted as suggested.*

1. Line 305: Change “moderate El Nino” to “weak El Nino”, which is how it is described in chapter 4, The Tropics.

*Changed as suggested.*

1. Line 309: Delete the comma after “previous years”.

*Deleted as suggested.*

1. Line 317: Delete the comma before “and ending at”.

*Deleted as suggested.*

1. Lines 323 and 325: Change “consonant” to “consistent”.

*Changed as suggested.*

1. Line 329: Change “subtropics as well as in the Subpolar” to “subtropics, as well as in the subpolar”

*Changed as suggested.*

1. Line 338: Delete “the” before “average”.

*Deleted as suggested.*

1. Line 350: Delete “from” before “the surface” and insert “layer” after “dbar”.

*Deleted as suggested.*

1. Line 351: Change “from 100-400 dbar is cooler” to “the 100-400 dbar layer is cooler”.

*Changed as suggested.*

1. Line 360: Delete the comma before “and slightly”.

*Deleted as suggested.*

1. Line 364: Insert “full” before “measured depth”.

*Inserted as suggested.*

1. Line 365: Delete “, and deeper,” because Fig. 3.5 and accompanying text already consider behavior down to 2000 dbar. The results from the historical ship date described in this paragraph go down to the same 2000 m.

*Deleted as suggested.*

1. Line 370: Insert a comma after “record high”.

*Inserted as suggested.*

1. Line 386: Insert “for the period from approximately X to Y” after “heat gain rate”, where X and Y are the start month/year and end month/year of the nominal period being reported. Because this sentence nicely summarizes the results of this section, it is worth being as clear as possible about the time frame involved, even while acknowledging the “slightly different time periods”.
2. Line 405: Delete the comma before “used to diagnose”.

*Deleted as suggested.*

1. Line 444: Change “twice from 2015 to 2019” to “twice between 2015 and 2019”.

*Changed as suggested.*

1. Line 448: Delete the comma before “and perhaps”

*Deleted as suggested.*

1. Line 459: Change “warms, and therefore can carry” to “warms and, therefore, can carry”

*Changed as suggested.*

1. Line 462: Delete the comma before “and fresher”.

*Deleted as suggested.*

1. Line 468: Delete “(NH)”

*Deleted as suggested.*

1. Line 498: Change “is evident” to “are evident”.

*Changed as suggested.*

1. Line 512: Insert a comma before “as well as”.

*Inserted as suggested.*

1. Line 553: Change “is made possible” to “are made possible”

*Changed as suggested.*

1. Lines 569-570: Again, include a reference to section 4h.

*This has been included.*

1. Line 594: In what sense was the warm blob “weak”? Does this refer to the spatial extent of the 2019 blob or to its warmth? Please clarify.
2. Line 596: Change “appear to be” to “appears to be”.

*Changed as suggested.*

1. Lines 613, 620, and 623: It seems odd to refer to a piece of the ocean as being “dry” or “drying”. While this may be a term of art, some readers will find this image strange, so please consider rephrasing.

*Changed to “evaporative”.*

1. Line 617: Please explain what the source of the inconsistency is. Which tendency is to be believed: P-E, or SW+LW?
2. Line 632: Please spell out the acronym “ACC”.

*It has been spelled out.*

1. Line 633: Change “Northwest Pacific” to “northwest Pacific”.

*Changed as suggested.*

1. Line 640: Delete the comma before “at the base of”.

*Deleted as suggested.*

1. Lines 655-656: If the Qnet wind stress anomalies are relative to “2001-15”, isn’t it possible to use this as the base period for the P-E and wind stress anomalies instead of “1998-2015”?
2. Lines 684-686: In addition to reporting the “estimated climate-change-driven acceleration in GMSL”, please also report the estimated climate-change-driven increase in GMSL, so I don’t have to multiply the acceleration by the length of the record.

*Increase in GMSL now included.*

1. Line 714: Change “Southwest Pacific” to “southwest Pacific”.

*Changed as suggested.*

1. Line 725: Delete “the global”.

*Deleted as suggested.*

1. Line 757: Change “Atlantic ocean” to “Atlantic Ocean”.

*Changed as suggested.*

1. Line 767: Change “Southeast U.S.” to “southeast U.S.”

*Changed as suggested.*

1. Line 792: Change “indicated that the” to “indicate that the”.

*Changed as suggested.*

1. Lines 799 and 827: Insert “2019” after “February”.

*Thank you. We have inserted 2018/19 to reflect the overlap in years.*

1. Line 810: Change “Kurioshio” to “Kuroshio”

*Changed as suggested.*

1. Line 839: Delete the comma before “and in each”.

*Deleted as suggested.*

1. Line 840: Insert “in the” before “location of”

*Inserted as suggested.*

1. Lines 886-889: The reader should be informed that measurements of the FC capture the upper limb of the AMOC, whereas those of the DWBC are intended to capture the lower limb of the AMOC.

*Now noted in text.*

1. Line 894: Delete “to” before “the subpolar”.

*Deleted as suggested.*

1. Line 902: Change “used, and therefore” to “used and, therefore,”

*Changed as suggested.*

1. Line 921: Insert “low” after “previous record”

*Inserted as suggested.*

1. Lines 949-950: Is 1.2 PW a large value? Please place this value in the context of other transport values, like the MHT of the atmosphere at this latitude.
2. Line 951: Insert “to X and Y” after “0.2 PW”, where X and Y are the MOC and MHT values for 2008-12, because we haven’t been told what the 2004-08 values were.
3. Line 964: Change “In order to monitor” to “To monitor”.

*Changed as suggested.*

1. Line 968: Insert “at 34.5 S” after “20 moorings”.

*Inserted as suggested.*

1. Line 986: I don’t understand how the difference between values in two years of data can be called a “trend”, but more importantly, how the statistical significance of such a trend (difference) can be determined. Please fix this discussion.
2. Line 991: Delete the comma before “and thus provide”.

*Deleted as suggested.*

1. Lines 995-999: Please indicate the latitude range of these arrays.
2. Line 1056: Please state somewhere in this section how the phytoplankton biomass changed in 2019. I confess to having lost track of this fundamental result within the text. Lines 1152-1154 note that Cphy provides this information, but I’ve missed where the value of Cphy for 2019 is reported and its relationship to previous annual values.
3. Line 1060: Change “and diversity is” to “and diversity are”.

*Changed as suggested.*

1. Line 1075: Delete the comma after “same period”.

*Deleted as suggested.*

1. Line 1101: Delete the comma before “but contrasting”.

*Deleted as suggested.*

1. Line 1112: Change “anomaly), and northeastern” to “anomaly) and the northeastern”

*Changed as suggested.*

1. Line 1150: Delete the comma before “from the”

*Deleted as suggested.*

1. Line 1151: Delete the comma before “that can”

*Deleted as suggested.*

1. Line 1202: Delete “the” before “neural network”.

*Deleted as suggested.*

1. Line 1250: Delete “to” after “2019 from”.

*Deleted as suggested.*

1. Lines 1251 and 1256: Change “Northwest Pacific” to “northwest Pacific”.

*Changed as suggested.*

1. Line 1270: Do you mean “slower than that for inert gases”? As currently written, the sentence doesn’t make sense. Please fix. And why is this comparison with inert gases relevant or important?
2. Lines 1305-1317: Are there results for 2019 from the GO-SHIP surveys? If so, please report those here.
3. Line 1307: By “Since 1750”, do you mean through 2019? Please clarify.
4. Line 1315: Delete the comma before “will be directly”.

*Deleted as suggested.*

1. Line 1316: Insert “the” before “changing buffer”.

*Inserted as suggested.*

1. Line 1335: Insert a comma before “and an implementation”

*Inserted as suggested.*

1. Line 1361: Please provide a brief example or two of the “unprecedented ecosystem response”.
2. Line 1377: Change “This early data” to “These early data”.

*Changed as suggested.*

1. Line 1382: Change “that is” to “i.e.”

*Changed as suggested.*

1. Line 1384: Delete the comma after the parenthetical reference.

*Deleted as suggested.*

1. Line 1469: Change “earth prediction” to “Earth prediction”

*Changed as suggested.*

1. Line 1484: Insert a comma after “to users”.

*Inserted as suggested.*