15th December 2017   
  
\*Please ensure you delete the link to your author homepage in this e-mail if you wish to forward it to your co-authors.  
  
Dear Dr Bruno,   
  
Your manuscript entitled "Climate Change Threatens the Biodiversity of the World’s Marine Protected Areas" has now been seen by 2 referees, whose comments are attached. The referees acknowledge the potential interest of your work, but between them, they also raise a number of concerns, which must prevent us from offering to publish the paper in its present form. If you would like to pursue publication in Nature Climate Change, we will therefore need to see your responses to the criticisms raised and to some editorial concerns, along with a revised manuscript, before we can reach a decision regarding publication.    
  
The referees’ reports seem to be quite clear. Naturally, we will need you to address all of the points raised.   
  
You will also need to make some editorial changes so that it complies with our Guide to Authors at [www.nature.com/nclimate/authors/gta/submit/index.html](http://www.nature.com/nclimate/authors/gta/submit/index.html)  
  
In particular I would like to draw your attention to the way we are publishing methods. We offer an online-only methods section of up to 3,000 words. References in this section do not count towards the total in the main paper, and will be fully indexed. Methods will not appear in print but will be fully copy-edited and appear online in the full-text HTML and PDF versions.   
  
The Methods section should be appended to the end of the manuscript Word document (or .tex file, after the acknowledgements, author contributions, etc). If there are additional references their numbering should continue from the last reference in the main paper, BUT the list should follow the Methods section. This on-line Methods section should provide all methodological information and technical details that would allow other researchers to replicate and interpret the results (we define "Methods" quite broadly, so this is not limited to details of experimental protocols - supplementary discussion and analysis can also be included, however NO figures or tables are permitted so these will need to be provided as supplementary information if required). For more mathematically complex methods, or methods that require many figures or tables, the entire Methods section can instead be included within Supplementary Information (submitted as a separate file).   
  
We require a paragraph in the Methods section entitled "Data availability", where any available information on data resources used in the paper is provided. For data sets with a doi, we additionally encourage full citation of the data in the reference list of the Methods section.  
The minimum compliance statements take one of the following forms:   
\* "The authors declare that [the/all other] data supporting the findings of this study are available within the article [and its supplementary information files]"  
\* "The data that support the findings of this study are available from the corresponding author upon request"  
But we strongly encourage all authors to provide as much information on data sources as possible.  
For more information and for examples on how to compose the statement, please see here: <http://www.nature.com/authors/policies/data/data-availability-statements-data-citations.pdf>   
  
The paper as it stands lies within our normal length limit for a letter to Nature Climate Change with three-to-five small display items (figures or tables) of 2,000 words. We have some flexibility, and can allow a revised manuscript at a length of 2,200 words, but please consider this a firm upper limit. There is a trade-off of ~250 words per display item, so if you need more space, you could move a Figure or Table to Supplementary Information.   
  
Nature Climate Change titles should give a sense of the main new findings of a manuscript, and should not contain punctuation. Please keep in mind that we strongly discourage active verbs in titles, and that they should ideally fit within 90 characters each (including spaces).   
  
To improve the accessibility of your paper to readers from other research areas, please pay particular attention to the wording of the paper’s opening bold paragraph, which serves both as an introduction and as a brief, non-technical summary in up to 200 words. The opening paragraph should cite references numbered appropriately, and its contents should not be repeated elsewhere in the paper. Because scientists from other sub-disciplines will be interested in your results and their implications, it is important to explain essential but specialised terms concisely. We suggest you show your summary paragraph to colleagues in other fields to uncover any problematic concepts.   
  
We encourage you to archive the data reported in your manuscript in an accessible, persistent repository. If your data are archived prior to the acceptance of your manuscript, please provide us with the full citation as soon as you receive it so that a link to the data can be included in the publication. For further information regarding the benefits of data deposition, see <http://www.nature.com/nclimate/journal/v1/n1/full/nclimate1057.html>   
  
  
When revising your paper:    
  
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\* ensure it complies with our format requirements for Letters as set out in our guide to authors at [www.nature.com/nclimate/authors/index.html](http://www.nature.com/nclimate/authors/index.html)  
  
\* state in a cover note the length of the text, methods and legends; the number of references; number and estimated final size of figures and tables  
  
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Nature Climate Change is committed to improving transparency in authorship. As part of our efforts in this direction, we are now requesting that all authors identified as ‘corresponding author’ on published papers create and link their Open Researcher and Contributor Identifier (ORCID) with their account on the Manuscript Tracking System (MTS), prior to acceptance. This applies to primary research papers only. ORCID helps the scientific community achieve unambiguous attribution of all scholarly contributions. You can create and link your ORCID from the home page of the MTS by clicking on ‘Modify my Springer Nature account’. For more information please visit please visit [www.springernature.com/orcid](http://www.springernature.com/orcid).  
  
We hope to receive your revised paper within three weeks. If you cannot send it within this time, please let us know.   
  
We look forward to hearing from you soon.    
  
Yours sincerely,    
  
Dr Bronwyn Wake  
Chief Editor  
Nature Climate Change    
  
  
Reviewers comments:    
  
Reviewer #1 (Remarks to the Author):  
  
This manuscript summarises projected changes in sea-surface temperatures and oxygen concentrations in the global network of MPAs, with a specific focus on the year of "emergence" of trends beyond background noise.  
  
At its heart, this is a simply, yet useful paper that would likely be well cited. I do have a three fundamental concerns. All can be reasonably easily addressed, I think.  
  
First, the utility of the entire manuscript is contingent on the premise that environmental change will have detrimental consequences for biodiversity. Whist I agree with this idea in principle, ecological impact is not modelled here in any way. Instead, environmental change is modelled, with impacts assumed. In many cases, this assumption is hidden behind some very "certain" language (concrete assertions). I think this needs attention. Where the authors refer to assumptions/projections, they should not imply certainty, but should rather use language that reflects at least some uncertainty.  
  
Second, although two RCPs are analysed, results and discussion focus heavily on RCP 8.5. It would be useful to provide regular contrasts with projections from RCP 4.5 to indicate what might be achieved in the event that global action is taken to mitigate climate change. This is particularly important, given the final conclusions of the manuscript.  
  
Third, the origin and novelty of the data and trends are unclear in the main text (and in some cases, also in the Methods). Specifically, it seems to me that year of emergence was not computed for this analysis, but rather extracted from a recent paper; similarly CTSM was extracted from a separate paper. Even the SST and [O2] projections were extracted from non-native grids whose origins remain unclear to me. I have no problems with use of data extracted from various sources, but the origins should be more clear in the main text, and should be explicitly stated in the Methods.  
  
Beyond this, there are several minor issues that that Authors should consider addressing. They are listed below by line number.  
  
Title: The title implies threats to biodiversity, but the link between the projected warming and threats to biodiversity are not strongly developed in the manuscript, which focuses instead on trends in environmental change.  
15-16: I’m not convinced that the analysis shows that there will be species or habitat loss.  
18: When MEAN SST & O2 exceed these ranges?  
19: “Natural variability” has no real context here. When was the variability natural?  
20 (and elsewhere): I’m not sure that “factor” is the right word here and elsewhere. Would “Stressor” not be better? Or just “environmental variable”?  
24: CTSM is an undefined abbreviation, albeit that its definition is vaguely implied.  
25-26: Yes, but this will often be the case. The real question is whether one stressor is more influential than another.  
29: How many such species really “depend” on marine reserves?  
\*\*\*Point them the HOP’s paper on the OCLTT?  
39: Insert comma: “…perturbations, including…”   
43-45: An assertion often made, but see Llovel et al. (2014) Deep-ocean contribution to sea level and energy budget not detectable over the past decade. Nature Clim. Change 4 (11), 1031-1035.  
47-49: This needs a citation. Maybe Pörtner H-O, Bock C, Mark FC (2017) Oxygen- and capacity-limited thermal tolerance: bridging ecology and physiology. Journal of Experimental Biology 220:2685–2696?  
52: Possible issue with citation: “(ref. 2)”?  
54-55: Are the no-take reserves in addition to the 8236 MPAs, or a subset. Minor point, but not clear from the writing.  
Figure 1: No explanation of panels in the figure caption, and there is an inconsistency between panel identifiers (lower case letters) and in-text citation (capital letters)  
57-59: Either “/“ or “per”, but not both...  
Table 1: There is a case of analysing minimum temperatures, also, since these often control leading range-edge expansions. Ranges expanding into MPAs with vulnerable (small?) populations might introduce new competitors, for example.  
71: Projected responses, not responses…and they are driven by the assumption that species will track their projected thermal niches. Perhaps this language is too concrete.  
77-78: Again “will” is too concrete…these are projections, so certainty should not be implied.  
80-81: Insert comma: “…processes, including…”  
83: Since the authors are writing about temperature changes, perhaps a word other than “degree” would be more appropriate here?  
87-88: It is not explicit whether this emergence refers to any one of these three stressors, a combination of two, or only to the case where all three exceed natural variability. Adjust wording to clarify.  
88-91: This is a strong statement that requires a citation. If there is no support in the literature, this is a bit jump to make, and should probably be expressed more tentatively as an expectation?  
Figure 2: “a” & “b” on figures, but “A” & “B” in legend.  
Fig 2: I don’t understand what is meant here. Blue dots have already exceeded ranges, but “emerge” well after 2017? How?  
Fig. 2A/B: Why would you expect these relationships to be linear? Visual inspection suggests that they are not, with a trough (A)/peak (B) at the equator.  
95: This statement in parentheses could be moved earlier and given more prominence...it is an interesting point  
106-107: This is a strong statement of theory that needs support from the literature. Alternatively, phrase in a less concrete manner.  
114: Insert comma: “…(Table S1), but…”  
247: What is a “mean maximum”? Could this wording be clearer?  
255: By “sample size”, do you mean number of grid squares?  
Table 2 and associated analysis: did you adjust for changing area of grid squares (i.e., use weighted mean, etc.)?  
Figure 3: This is an interesting colour palette, with red indicating essentially the best possible outcome. The authors might want to think about the intuitive interpretation. Also, the panels are not identified by letter.  
120: 3.5% by number or area? Please clarify.  
131-134: Most analyses focus on RCP 8.5, so the data presented do not necessarily support the contention made here. A more thorough treatment of results from RCP 4.5 would allay this concern.  
274/428: The M in GAM is model, so “model” is unnecessary.  
296-300: Where are these 1 x 1 degree data archived (CMIP5 ocean realm data are generally not on a 1 x 1 º grid). Ensembles of which models and why? How were GCM estimates from varying geographic projections combined? More detail is needed.  
Methods: Throughout this section, the authors mix and match “degree” and “º”. Consistency would be better.  
311: Insert comma: “…hemisphere, while…”  
312: Missing degrees.  
333-335: Readers will be familiar with the concept of anomalies. Use this terminology to rewrite the figure caption, thereby making it more intelligible. The final sentence is unnecessary and should be deleted.  
382-383: Hyphenate “community-weighted”  
  
  
  
Reviewer #2 (Remarks to the Author):  
  
The authors raise an interesting argument – that the protections already provided to MPAs might not be sufficient to protect them from changes driven by a changing global climate. The authors focus on the patterns of concomitant warming and deoxygenation using a modeling approach. The core observation here is that they provide predictions of the emergence of biologically-significant high temperature combined with low dissolved oxygen as they appear where MPAs are found. For this modeling effort, the authors use a “business as usual” scenario RCP 8.5, and a mitigation strategy, RCP 4.5, where emissions stabilize around 525ppm in 2100. Although this might be a minor point, it might interesting to defend this choice in the manuscript. In addition, to add the value of the study, have the authors considered including an ocean acidification component in the study. For many coastal marine ecosystems, that include many MPAs, the emergence of future OA is quite drastic.   
  
  
  
  
  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*END\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*   
  
  
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