

Biogeosciences Discuss., author comment AC2
<https://doi.org/10.5194/bg-2021-179-AC2>, 2021
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Reply on RC2

Ádám T. Kocsis et al.

Author comment on "Not all biodiversity rich spots are climate refugia" by Ádám T. Kocsis et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-179-AC2>, 2021

Referee: In their manuscript entitled "Not all biodiversity richspots are climate refugia", Kocsis et al. explore the vulnerability of marine, terrestrial and freshwater biodiversity richspots (regions that currently have exceptionally high endemism and/or number of species) to anthropogenic climate change. They specifically test whether these regions are likely to provide refugia under future climate change. The results bring valuable evidence for the need to protect a representative network of biodiversity-rich areas that also considers species' vulnerability to climate change.

The paper is well written, and I enjoyed reading it. The analyses are straightforward and use sound methodology. In fact, I have virtually no concern with seeing the paper published in its current form. I will only make a few suggestions to improve the manuscript, which the authors can choose to consider.

Answer: We are thankful for the kind feedback and are happy to implement the suggestions.

Referee: It is somewhat confusing that "climate velocity" is interchangeably used in the manuscript to refer to long-term climate change since the last glacial maximum and recent/future anthropogenic climate change velocity over a few decades. I understand that both concepts refer to similar mechanisms and are called like this in the literature (e.g. Sandel et al. 2011, Loerie et al. 2009), but as mentioned in L.194, the consequences are very different, owing to the different time scale considered (evolutionary origin of richspots and driver of endemism in the first case, and drivers or range shifts and vulnerability to anthropogenic climate change in the second case). Maybe it could be clarified early in the text that this analysis focus on the latter, also avoiding the use of the term interchangeably?

Answer: Indeed, the term "climate velocity" has been used by us and by the community in a way that can refer to both long-term and short-term changes. We do not consider this to be bad practice, as these references reflect the same physical dimension, albeit on different scales. However, it would indeed be preferable make these references more explicit. We will try to clarify whether climate velocity in a context refers to long-term or short-term changes.

Referee: At the end of the introduction, the authors mention that these “findings are of importance for policies to address biodiversity loss and climate change”. However, the discussion does not further mention the relevance for policy and biodiversity management, except calling for climate change mitigation and mitigation of other threats in the conclusion. Maybe the authors could further develop the implications of their findings for the identification of conservation priority areas and management of biodiversity richspots. How are these currently used in decision making and how are these findings relevant to better prioritize biodiversity conservation in a changing world?

Answer: We will elaborate the implications of our results on conservation management. For example, we can explain how the absence of the analysis presented in this paper, leaves the issue of whether all or some biodiversity richspots will be to any extent natural refugia from climate change unanswered. As these areas represent most of the world’s biodiversity it may thus be speculated that biodiversity may not be as badly affected by climate change as studies reporting results on taxa in regions subject to rapid warming.

Referee: Huntley & al (2021) recently explored (terrestrial) biome consistency in the past and under projected anthropogenic climate change. This study was not published at the time of submission, but it seems that it could now be incorporated to discuss how these two approaches support each other in their findings and conclusions.

Huntley, B. et al. 2021. Projected climatic changes lead to biome changes in areas of previously constant biome. - J Biogeogr: DOI: 10.1111/jbi.14213

Answer: We are thankful for the suggestion and will incorporate the paper by Huntley et al. in our study.

Referee: Minor comments:

20-21: This sentence could be simplified to “It has been suggested that some geographic areas (...) because they have had (...)”

77-78: There is no mention of invasive species anywhere else in the paper, which makes this sentence quite out of topic. Could be deleted?

56: Missing dot in “distance.time-1”

Answer: The suggested corrections will be incorporated into the manuscript. Again, we are very grateful for the feedback.