

Review #2 of „Future diversity and lifespan of metazoans under global warming and oxygen depletion” by Kunio Kaiho

Evaluation of the revised manuscript

In the revised manuscript, the author has addressed all of my comments and all the issues that I pointed out in my first review. The introduction now provides a better overview over previous research efforts in the field, putting the current study into a broader context. In addition, the Discussion now has a much clearer structure, clearly pointing out the advances/differences of the current study compared to previous research and discussing the uncertainties of the projections made. The structure and readability of the Methods section has greatly improved as well, making the workflow much more understandable and easier to follow. All in all, the overall readability and narrative of the manuscript have improved significantly due to the revisions implemented by the author. However, a few minor issues and technical corrections remain that should be addressed before final acceptance of the manuscript.

Specific Comments

- L. 58-63: This paragraph was rewritten down below but forgotten to delete.
- Section 2.3: Some aspects are mentioned multiple times in this section; maybe it was forgotten to delete rewritten sentences.
- L. 78-79: I don't see how Fig. 2 verifies this statement.
- L. 80-84: This paragraph seems to contradict itself; in the first sentence, you state that short-term events are independent of long-term climate changes, while shortly after, you say that the long-term decline in mantle potential temperature affects these short-term events. Can you please explain that again?
- L. 144-145: Isn't temperature only highlighted in red?
- L. 161-186: Old and rewritten paragraphs seem to have gotten mixed up here.
- L. 248: This sentence is misunderstandable. Maybe you could write: “was set to be 20 °C and 14 °C, which is 3°C larger”
- Sect. 2.4.4: Why do you use 45° as reference latitude here and not 37° like in the other cases?
- L. 295-296: Don't you only need one survival rate per metazoan group for event 0?
- L. 299: Do you mean survival rate?
- L. 376: Where is PER used in the model?
- L. 436: Do you mean events 0-4?
- L. 496-499: I cannot follow the argumentation here. You state that in simulations without abrupt warming, diversity decline is not delayed. As far as I understand, this implies that the results are quite independent of the presence or absence of abrupt warming. Still, you conclude from these results that abrupt warming is the key driver of final extinction. Can you please explain that further?
- L. 532: I would not use the word “accurate” here. Maybe “robust”?
- Figure 5: I think the color scheme is a bit difficult to understand. As far as I understand, the color scheme is as follows:
 - Dark color: Conservative Model
 - Light color: New Evolutional Model

- Red curves: Worst Anthropocene Model
- Black curves: Continuous Worst Anthropocene Model

However, there are two red curves in each plot, so what does the second red curve show?

- Tables 2a-2c: What is NC? I could neither find a definition in the text nor in Table 3.

Technical corrections

- L. 136-137: diversity remaining at ~1.0_; by the end-Silurian
- L. 270: the year_; the difference
- L. 272: limits_; for subterranean animal
- L. 303: global average surface temperature equivalent?
- L. 314: CO₂_; and the
- L. 334: ~~L~~atitude
- L. 346-347: Recovery Rates in the Conservative Model (Table 2a; Recovery Rates in the New Evolutional Model and the Continuous Worst Anthropocene Model are shown in Tables 2b and 2c, respectively):
- L. 396-397: Consequently, Equation 15 is used ~~for~~to calculate the recovery rate (RR) ~~for~~of marine metazoans_; because the GAT exceeds the highest GAT at the end-Permian ~~highest~~ GAT of 36°C