

Clim. Past Discuss., referee comment RC1
<https://doi.org/10.5194/cp-2021-104-RC1>, 2021
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Comment on cp-2021-104

Anonymous Referee #1

Referee comment on "Clumped-isotope-derived climate trends leading up to the end-Cretaceous mass extinction in northwestern Europe" by Heidi E. O'Hora et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-104-RC1>, 2021

O'Hora et al., provide clumped isotopic data to reconstruct seawater temperatures and $\delta^{18}\text{O}$ from fossil bivalves from the Cretaceous section of the Maastrichtian. This new record helps to understand 1) the regional and global climate response to the volcanism of the Deccan traps and 2) the changes in ocean circulation with alternating southern and the Arctic Ocean waters. This dataset and article have publication potential. However, before publishing it, there are some points that need to be improved.

- Method

The method part about clumped isotopes should be detailed.

It would be good to detail how you processed your data and how you combined the two datasets (Thermo and Nu). It looks like you used ETH standards, however, with the Thermo you didn't measure ETH.

How reproducible is your data?

Are your ETH standards values $\hat{\square}\square\hat{\square}\square$ comparable to Intercarb values?

Is this the first article published with data from your Nu-perspective? If no, please cite the article that describes the procedure, if yes, please give more details on the methodology of this MS.

How did you convert the data from the D47 into an absolute repository (software, codes)?

You can also specify the number of measurement sessions and how you calculate your temperature uncertainties. It must be written in the section method, not in the caption of a figure. In the legend, the definition of your uncertainties is not clear.

Also, some citations are missing such as Brand et al., 2010 and Daeron et al., 2017 for the 17O corrections and Meckler et al., 2014 for the ETH standards.

Would it be possible to replicate some samples to reduce the uncertainties on the temperatures?

- Comparison of the D47 values from the different species and type of carbonates

You have measured different carbonates (matrix and fossil bivalves; different species). However, you are not comparing this data. For example, how do you explain the temperature difference between *Acutostrea* and *Agerostrea* at 66.5 Ma? A discussion of this comparison would improve the manuscript.

- Figures and tables

In general, I would suggest referring more often to figures and tables.

Did you put your uncertainties at 1 or 2 sigma in the figures?

You talk a lot about SEM images; however, no image is shown. Please put at least 3 with original material, traces of dissolution and secondary growth. You can include them in Figure 3.

I would suggest removing Figure 4 (as you have the same one in Figure 5) or skipping Figure S3 in the main text, which is much more detailed.

A table with the data, such as the last table in the material supplement, can be included in the main text.

In figure 5 you can label each graphic with a letter (a, b, c...) that would help to read the caption.

I would suggest adding a figure to illustrate the comparison between your data and previously published data.

- Discussion (5.1)

This section can be more detailed. You have mixed in the same paragraph the comparison of your data with today's climatic conditions and with previously published data. I would suggest adding more details, splitting the paragraph into 2 parts and also changing the name of the section.

- Citation

I am not sure you can cite an article that is in preparation.

Below are some minor comments:

Lines 79-80: Reference?

Fig 2 the legend in the square can be larger

Lines 124-125: add the reference of Huyghe et al., 2021
(<https://doi.org/10.1016/j.gca.2021.09.019>)

Lines 123-130: it seems that you mixed up methodology and material

Lines 216-218: specify which samples are not included in the discussion

Line 222: change $\sim 20^{\circ}\text{C}$ to the real values $X^{\circ}\text{C} \pm X^{\circ}\text{C}$

Lines 260-262: I would suggest to put more explanation

Section 5. Change the name to Discussion

Lines 384-385: I would suggest moving this conclusion at the end of the next paragraph

Lines 408: what is the other evidence?

Line 419: what are the other records? On the basis of which proxy?

References: Add et al., for Petersen et al., 2019, like you did for intercarb's article

Data file in EarthChem: The names of the working sample are sometime different from the Replicate ID.

Table S2: add the number of replicates