

Review for *Tracing North Atlantic volcanism and seaway connectivity across the Paleocene-Eocene Thermal Maximum (PETM)* by Jones *et al.*

General comment:

I really enjoyed reading this manuscript, it's thorough and very well-written. I believe it provides key insights into the timing and nature of NAIP activity during the PETM which may allow us to move forward in our understanding of the forcing behind this event. The proxies used complement each other well and may, hopefully, also serve as a basis for future studies into other LIP-related events. I appreciate the clear outlining of limitations and uncertainties, which make their final conclusions more robust. At this stage, my main 'issue' is that it can be a difficult paper to understand for non-specialists, due to the nature of the used proxies. I do believe it's an important paper for a wide audience and I think some small adjustments could already make it more accessible.

Specific comments:

Lithium: I am not an expert on the Li system, but I know that basalt weathering also contributes to the Li pool. Would it be possible to use Li in any way as an additional indicator for volcanism (together with Os). Does your interpretation of $\delta^7\text{Li}$ in the paper take this into account or would it change if part of the signal is affected by basalt availability/emplacement?

Seaway connectivity: Does the timing/progression of North Sea restriction such as you find it show any links to changes in North Sea oxygenation (from Schoon *et al.*, 2015)? Overall, it seems to me oxygen concentrations recover (or at least deox. becomes less severe) in the Fur Formation. Could you add a few words on this, perhaps in section 5.2 where you list previously published evidence for the restriction?

PETM C sources/sinks: I personally would like to read more specifically if these conclusions can also inform us a bit about when different types of emissions (CO_2/CH_4) may have occurred and how the balance between source/sink shifted in this time interval (e.g. evidence for volcanism also during recovery and after PETM, coincident with climate recovery). I understand this might be a bit beyond the scope of the paper, but as the introduction goes into quite a bit of detail regarding sources/sinks, a few sentences on this would definitely be of interest.

Line 752: Would your conclusions be affected by the longer estimate ($\sim 170\text{kyr}$) of Zeebe and Lourens (2019)? Is there a specific reason for choosing the shorter duration?

Technical corrections:

1. It would be helpful if the order in which proxies are described/shown is kept the same throughout the paper (e.g. first Hg, then osmium, etc.).
2. A short description of the clays you discuss, and their interpretation, is missing from section 3.4 Clay mineralogy
3. *Lines 65-68:* reference?

4. *Lines 83-85*: This sentence gives the impression that constraining volumes/fluxes is the goal of the paper, so it may need to be reformulated to avoid this.
5. *Figure 1*: the color for subaerial volcanism looks more pink in the figure, while in the legend it appears more orange. Check if it's indeed the same.
6. *Figure 1*: A bigger contrast in colors between subaerial volcanism and volcanic centers would also be welcome.
7. *Figure 3*: What does the red space in the d_{13C} panel indicate? It's also not listed in the caption.
8. *Figure 3*: As I mentioned above, the number and complexity of the proxies that have been used (esp. Hg, Li and Os) make this paper somewhat difficult to read for non-experts. I was wondering if mechanism indicators could be added to this figure? Something like an arrow with more volcanism/more weathering on either side. Otherwise, a table with the proxies and their interpretations could also work and give space for a bit more nuance than such an arrow might. If there's space within the paper, I think it would help a lot.
9. *Lines 702-703*: What does 'waning' mean in this case? Less overall explosive volcanism (and shift to more effusive) or a shift from more explosive to less explosive volcanism (e.g. because of less hydromagmatic interactions)? Could this be clarified?