

Clim. Past Discuss., referee comment RC2
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Comment on cp-2021-25

Anonymous Referee #2

Referee comment on "Enhanced terrestrial runoff during Oceanic Anoxic Event 2 on the North Carolina Coastal Plain, USA" by Christopher M. Lowery et al., *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2021-25-RC2>, 2021

This study presents two new sedimentary records of the Atlantic Coastal Plain of North Carolina, USA, covering Oceanic Anoxic Event 2 (OAE2), one of the largest carbon cycle perturbations of the Mesozoic. The stratigraphic framework is based on calcareous nanofossils and (bulk) organic carbon stratigraphy. Sedimentary TOC is used to assess inner shelf organic carbon burial and C/N ratios are used to reconstruct terrestrial input, indirectly linking to the local/regional hydrological cycle. TOC content is relatively low and C/N ratios are relatively high for the OAE2-interval pointing to low inner shelf carbon burial and increased terrestrial input linked to an enhanced hydrological cycle, in accordance with previous studies.

The paper is well written and the methods used are robust. While the findings of this study are not leading to major new insights the introduction of two new mid-Cretaceous sedimentary records of the Atlantic Coastal Plain of North Carolina is valuable and warrants publication in this journal. I do have some comments and suggestions that the authors might want to use for improvement of their manuscript.

Comments:

Calcareous nanofossils are successfully used as a biostratigraphic tool in this study, but I was wondering whether their assemblages are also providing insight in the paleoenvironmental conditions on the Atlantic Coastal Plain during OAE2? If this is the case, it might be worth to add a brief section on this.

It would be helpful for potential follow-up work to present these new records in a more global stratigraphic framework. Perhaps an overview figure (potentially as a supplemental figure) including some key $\delta^{13}\text{C}$ curves (e.g. Eastbourne, Pueblo), the proximate Bass River core and the new $\delta^{13}\text{C}$ curves could be included? Such figure could also help to

directly compare these new records with the other two already existing records (Bass River and Sun Spinks) brought forward in the discussion.

Minor comments

Line 14: I would rephrase "North Atlantic basin" to "proto-North Atlantic basin". Idem for lines 376 and 386.

Line 37: I would add the approximate age for the event, i.e. ~94 Ma.

Line 51: In the van Helmond et al. (2014) study the interval with the highest terrestrial input correlates with the cold event during OAE2. I think the inference by van Helmond et al. of an enhanced hydrological cycle is mainly based on relatively high abundances of a group of dinoflagellate cysts associated with low sea-surface salinities during the warmest phases. This actually brings me back to my comment above, do the calcareous nannofossil assemblages provide any information on for example salinity?

Line 61: "therefore" seems to be unnecessary in this sentence.

Line 67: Important to mention that these are "molar ratios". Unfortunately I have seen that sometimes weight percentages are used instead.

Line 145: Was this core also drilled as a stratigraphic test for Atlantic Coastal Plain aquifers?

Line 170: I would first mention the elemental composition and then the isotopes, that is the sequence you use in the remainder of the manuscript.

Line 172: Please correct " There is was no..."

Line 178: Are these absolute or relative uncertainties? Were duplo's and or triplo's ran? What was the average analytical uncertainty of those?

Line 180: Idem as for Line 178.

Lines 188-192: Is it possible to estimate the paleo-water depth?

Line 200: What do the authors mean with "cleaner sand"?

Line 239: "Core" should be "core"

Line 253: What environmental conditions?

Line 283: Could (seasonally) low oxygen conditions be an alternative explanation for the almost absence of benthic foraminifera? Can the authors give a rough estimate of the bottom water redox conditions at both sites based on their study?

Lines 286-287: I wonder whether the TOC content in Smith Elementary School and Hope Plantation is related to the absence of foraminifera. TOC in the Bass River core is higher, yet that core does contain plenty of foraminifera (Sugarman et al. 1999; *Journal of Foraminiferal Research*).

Section 4.3.3: Maybe the authors can include a table with average, minimum and maximum TOC and C/N prior to OAE2, during OAE2 and post OAE2 to make the differences more prominently visible. Based on Fig. 6 alone a reader might not be convinced of the shifts that the authors describe.

Line 346: Please see my comment on Line 51.

Line 377: How does this compare to modern values for these settings?

Line 398: "2.4 g/cm²" should be "2.4 g/cm³"

Figures:

Figure 1: Is there any evidence for major rivers flowing out on the Atlantic Coastal Plain? If so, it would be helpful to indicate their position.

Figures 2 and 3: What is the position of the C/T boundary (dashed line) based on? Perhaps a diagonal line would be more justified? I.e. marking a range rather than a specific depth. Depths in the photographs are hard to read, a larger font would help. "Core" in the caption of Fig.2 should be with a lower case letter.

Figures 4 and 5: X-axis for the lithology is unreadable.

Figure 6: I would add "(molar)" below "C/N" and move the site names to below the lowest datapoints.