

Interactive comment on “Cenomanian to Coniacian Water-mass Evolution in the Cretaceous Western Interior Seaway of North America and Equatorial Atlantic” by James S. Eldrett et al.

Anonymous Referee #2

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The study by Eldrett et al is a very nice contribution about the mid Cretaceous Western interior seaway and how WIS sediments are influenced by different water masses that are supposed to originate both from the north and from the south. The authors present a large amount of data that makes it sometimes very hard for the reader to follow the arguments because many data are only shown in the supplements but are discussed in the main text in length and are sometimes very important for the interpretation of the data. Here, it would be good to have some more information in the main figures (maybe one or two additional figures. Overall, I think that this is a nice contribution that is worth to be published in Climate of the Past. However, there are quite a few points that should be clarified by the authors to increase readability of the text and the data

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interpretation. Furthermore, available datasets from the sites studied should be taken into account by the authors to support their statements and interpretation. Therefore, I recommend moderate to major revision.

My main points are (in the order they appear in the manuscript):

- 1) Abstract: why is the abbreviation for the Cretaceous WIS written with a K instead of a C?
- 2) The first paragraph and especially the first sentence of the introduction needs much more references to be included. Same is true for lines 20-30 on page 2.
- 3) line 11 on page 3: make clear that the benthic zone is only a small part of OAE 2.
- 4) line 11 on page 4: where is the connection between figures 1 and 2 and the text?
- 5) chapter 3.2.2 needs a reference to figure 8
- 6) chapter 3.3: at least present the most important features of the palyno-dataset that are used in the following discussion so that the reader has not to go back to the supplements every time.
- 7) line 25 on page 9: eigen scores are not shown in figures 7 and 11.
- 8) lines 29-31 on page 10: would delete this statement from the text.
- 9) lines 14-15 on page 11: since there is no increase in pollen and spores, there is no support for an increased hydrological cycle
- 10) line 19 on same page: what is the indication for climate cooling? Only the PCE is cooler, under background values that are much warmer than before or after OAE2!
- 11) Chapter 4.2.2: why should the tethyan water mass be suboxic-anoxic? This is inferred by the authors at the beginning of this chapter and then used in the following interpretation but it is never shown convincingly to the reader that this is the case. What is the independent evidence for this? Same holds true for the boreal water mass. Are

there any other indications other than own data and interpretations? If yes, present them in detail. So far, the main problem with this chapter is that there is no prove that the suggested water masses existed and are characterized by the suggested data in the way they are presented here.

12) line 18 on page 12: why is this indicative for an WIS source? Explain and justify in detail. Same with the argument in lines 28-29 with the shift from agglutinated to calcareous forams. Why is this a water mass characteristic and not simply a matter of preservation or changing food availability? Technically I wonder how the foram data were produced. Are the based on the linings in the palynological samples as indicated by the figure headings? I am not aware of a single study that has shown this to work.

13) line 31 on same page: at this point in the succession, there are no benthic forams, so the statement above in lines 28-29 cannot be valid!

14) lines 32ff on page 13: there are benthic foraminiferal assemblage data available form these sites, how do they compare to the data produced by linings? This would be a good test to show if the presented foram data of this study are of any value.

15) lines 2-3 on page 14: I am not aware that there are any data e.g. Nd isotopes from these sites that support a boreal influence. Furthermore, the authors state that this water mass should only influence shallow water settings. However, a cold boreal water mass should be denser than wormer waters near the tropics and therefore influencing bottom waters and not surface waters as suggested here.

16) line 35-36 on page 14: nowadays, nobody thinks anymore that the Cretaceous had a equitable climate!

17) lines 23-24 on page 15: but the red dots are all over the place in figure 15 and quite a few from Demerara Rise even above 3. What is the r^2 for these data? Further in this chapter, Mo/TOC is used to say something about a silled basin situation at this site. Why not simply cite the papers that show that there was no sill during that time

(e.g. seismic evidence)?

18) last paragraph page 15: wouldn't be the absolute amount of refractory terrestrial organic matter (RTOM) an even more important factor than the T:M ratio alone? The ration could be high even when there is less RTOM and therefore a lower influence on Mo! Since this is not quantified, this is a weak justification and discussion.

19) first paragraph on page 16: How do these factors deplete Mo? Please explain the details.

20) lines 8-9 on same page: but isn't that what you are proposing above?

21) lines 21-23: check benthic assemblage data for these sites if available and see if there are benthic forams occurring in these intervals. If yes, these are oxygenation events, if not, it was anoxic. This would be an independent proof of the statements made here.

22) point 1 in the conclusions: are these water masses be interpreted to be surface and bottom-water masses at once? This has to be clarified in the discussion.

23) Figure 2: in part "a" it is hard to figure out the core locations.

24) Figure 3: what are the horizontal red lines?

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