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Climate of the Past Discussions

Interactive comment on "Extreme warming, photic zone euxinia and sea level rise during the Paleocene/Eocene Thermal Maximum on the Gulf of Mexico Coastal Plain; connecting marginal marine biotic signals, nutrient cycling and ocean deoxygenation" *by* A. Sluijs et al.

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6462: please do not cite a non-published, non-refereed abstract (Thomas 2004). You could use Thomas 1998 or 2007, both of which discuss this, or just stick with Thomas & Shackleton which is already on the list. Thomas 1998, In:, Late Paleocene-early Eocene Biotic and Climatic Events in the Marine and Terrestrial Records; Thomas, 2007. GSA Spec Pap, 424: 1-24.

6467: sorry to be dumb, but why does an increase in mag sus imply an unconformity?

6468: but does this discussion of stratigraphy and unconformities finally imply that you may miss the very earliest part of the PETM or not?

6470: McCarren et al is 2008, not 2009, and we do not say that the temp rise was 5oC; at Site 1263 (too much dissolution at 1262) we see an anomalously large CIE as well as warming 9∼10oC). Lunt et al also model unusually high temperatures at intermediate depths.

6473: earlier on you referred to publications by co-author Sessa et al, indicating a paleodepth <50 m from invertebrate fossil assemblages. For what part of the section would that be valid -Paleocene or PETM or both? semiquantitaive estimate of RSLR?

6475: last paragraph – you already discussed the stratigraphy earlier (4.1) – combine this paragraph with that section to prevent confusion and repetition. Here I expect to read about sea level and environment, not stratigraphy.

6476: not clear to me (and I suspect other readers who are not experts in Gulf Coast stratigraphy). To what level in the studied core would the T4 sand correlate? Could the bones have been transported? What parts were recovered?

6477-6478: I agree with Jerry – in my opinion you must refer to seasonality here. It's what we see in all the world's dead zones today (including my playground in Long Island Sound) – after all, without stratification it's really hard to go anoxic, and depths <50 m (as in Long Island Sound) you must have vertical mixing due to storms (and hurricanes) reaching bottom and mixing the whole water column during stormy season. Option 4 looks much more probable to me than option 3 since benthic foram lining indeed oxidize easily. Thomas 1998 also compiled information on oxygenation levels at various sites, updated in the appendix to Winguth et al., 2012.

6478: I do not really like the phrase 'Ocean circulation may have stagnated', and it is not what we say in Winguth et al. I do like the comparison to the present 'dead zones',

but mainly because of the parallel of eutrophication in coastal zones (for PETM maybe due to increased hydrological cycle-weathering –nutrient input; see also Ravizza et al 2001 Paleoceanography). I agree with Lee about potentially low salinities influencing stratification, although I would say that benthic forams do not quite look like full anoxia at the bottom in Spitzbergen (Nagy et al 2013, Polar Research) – how does that work with dinos and invertebrates?

6479-6480: see also argument in Paytan et al. 2007 Geology 35 1139-1142

For your compilation: Note that at Site 1263 the d18O values in benthics indicate a much larger warming ($\sim$10oC) as said above. The lack of bioturbation and presence of lamination in Kennett & Stott are not really there (Thomas & Shackleton 1996; see core photographs; decrease or change in character in bioturbation, yes). I would now argue that we have no solid evidence for low oxygen in bottom waters at 689-690 (as reflected in that appendix of Winguth et al), but we do have evidence that there was rather widespread deoxygenation in the upper water column during the PETM (non refereed abstract, Lu, Z., Thomas, E., and Rickaby, R., 2013, I/Ca in foraminiferal shells as a paleoceanographic proxy. PP43D-02, 2013 Fall Meeting, AGU)

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