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Climate of the Past Discussions

Interactive comment on "Orbital forcing of terrestrial hydrology, weathering and carbon sequestration during the Palaeocene-Eocene Thermal Maximum" *by* Tom Dunkley Jones et al.

Anonymous Referee #1

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General: The cyclostratigraphy for the Zumaia global reference section has been done for almost the entire Paleocene (including across the stage boundary GSSPs), but previous authors have avoided the important PETM interval because of absence of discernible (lithological) bedding. Now Dunkley Jones et al try to do the cyclostratigraphy using Si/Fe ratios through the interval. This is in principle a beautiful idea, but I am not convinced that they actually have succeeded or that it is a realistic approach. In the nearby Ermua section the SU contains lots of thick turbidites, more or less randomly distributed through the section. If one considers that distal material from these random turbidites must have settled also at Zumaia, then the Si/Fe approach appears very simplistic. If there is climate-induced cyclostratigraphy I would have expected to

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Discussion paper

see this also in the CaCO3 profiles, but I can't see anything like that.

There is an inconsistency between the title of the paper and its content. The title says that the paper is about "orbital forcing of terrestrial hydrology, weathering and carbon sequestration during the Palaeocene-Eocene Thermal Maximum" but when reading the abstract and the introduction one gets rather the impression that the focus is on trying to explain the recovery of the PETM and its CIE using the new cyclostratigraphy.

Regarding the "Paleocene" epoch I think one should use the spelling of the official global geological timescale supported by the International Commission on Stratigraphy, i.e. not "Palaeocene", as used by the authors.

Page 4, line 10: explain acronym MAR

Page 5, lines 7-9: I note that the authors place the onset of the PETM at 0.3 m above the top of the limestone, but Schmitz et al., 2001 found the onset of the CIE at 0.0 m. The new data in this paper also show that the δ13C values begin to change in the negative direction at 0.0 i.e. over the greenish marls. The formulation here implies also that the benthic extinction event would have begun prior to the onset of the CIE. If CO2 emissions and following warming caused their extinction, why would they start to die of before the onset of the CIE?. Although there is no conclusive data, I think it makes more sense to place the onset of the PETM at the base of the greenish marls (where δ13C values begin to shift to negative values).

I think the authors would have needed to provide some independent data supporting their cyclostratigraphic approach. Iron is a very mobile element in sediments and Si/Fe ratios are obscure. If the authors convincingly could show that at least a couple of their precessional cycles also show up as grain-size cycles, and/or perhaps clay-mineral cycles then I would be in favor of publication.

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