

## ***Interactive comment on “Palaeoenvironmental response of mid-latitudinal wetlands to PETM climate change (Schöningen lignite deposits, Germany)” by Katharina Methner et al.***

### **Anonymous Referee #1**

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The manuscript by Methner et al. present new interesting datasets that represent a great contribution to the available terrestrial records from Eocene sections. The authors present new  $\delta^{13}\text{C}_{\text{TOC}}$  and TOC (%) data, as well as palynological data from the mid-latitude coastal site of Schöningen. The main conclusion is the identification of the PETM in the CIE represented by the onset of a negative excursion in  $\delta^{13}\text{C}_{\text{TOC}}$  in Seam 1 and a positive shift in Seam 2, as well as the presence of *Apectodium* in the marine interbed comprised between the two lignite seams.

The paper is well-written and properly structured and addresses interesting scientific questions which fit the scope of publications in Climate of the Past. Figures and tables

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are of good quality and relevant to the manuscript. However, I do recommend to rethink and reframe the manuscript because of the following problems.

1) The identification of the PETM. My main concern is that the evidence brought forward to define the CIE as the PETM should be discussed with care. The authors briefly acknowledge that the identification of the PETM in this interval has been suggested before by Riegel et al., (2012) but fail to discuss the possible pitfalls of this assumption: a) Ages: possible age discrepancies in the dating of the section should be discussed in the manuscript. I refer to the detailed comment by Carlos Jaramillo, who has already noted that “independent” dating by Brandes et al (2012) is relying on ages related to the dinoflagellate zones. This should be addressed in a section of the manuscript b) Thickness: a 10-m thick CIE; this requires a very high sedimentation rate (as noted in line 13) but is this reasonable? How is this changing from one lithology to the other in the transition from lignite to the marine interseam? Also, if we accept an almost linear sedimentation rate ( $\sim 0.5$  Myr/m) for the whole section, then the duration of the CIE doubles. How can you exclude that this is not the case? And how can you exclude that the CIE is not, for example, the expression of ETM2/H2 hyperthermals (which would together last about 400 kyr)? c) Hyperthermals: the acme of the *Apectodium* is the strongest evidence use to correlated this interval with the PETM. This is quite a compelling evidence, however, as noted by Jerry Dickens in his comment, *Apectodinium augustum* is the diagnostic species found in PETM section. Is there evidence for its presence?

In general, I recommend incorporating those points in the discussion, discussing more in detail all the possible pitfalls associated with a univocal identification of the PETM as well as the strong evidence in support of it. I also suggest following Carlos Jaramillo's comments on the raw palynological counts and the TOC vs  $\delta^{13}\text{C}_{\text{TOC}}$  correlation plot.

Minor comments: Page 1 Lines 6-9: The release of isotopically light carbon was most likely a feedback of the long-term warming rather than the cause. Rephrase. Line 21-23: another problem associated with the interpretation of sources and mechanisms is

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local signals in different records Page 2 line 9: A. augustum Page 5: line30 to Page 6 line 16: this part should be rewritten with more care, in the view of the main comment about the definition of this interval as the PETM Page 6 line 12: add a reference here for the PETM duration

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