

***Interactive comment on “Plants in movement – Floristic and climatic characterization of the New Jersey hinterland during the Palaeogene–Neogene transition in relation to major glaciation events” by Sabine Prader et al.***

**Anonymous Referee #1**

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This paper shows pollen data from the late Oligocene- early Miocene part of core site M0027 (IODP expedition 313) taken from the offshore of New Jersey. This subject could have potentially been interesting as there is not much information about vegetation dynamics over that time period, including one significant glaciation Mi-1 - marking the Oligocene-Miocene transition. Nevertheless, in my opinion there are significant limitations and flaws in the study that precludes its publication in high-impact reviews such as Biogeosciences.

1. The sedimentary record is very discontinuous. There are big "jumps" in time - in

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some cases of many million years, for example with no sedimentation between 28.2-23.5 Ma or between 23-20.9 Ma - and this limits the pollen data and their interpretation in terms of vegetation/climate dynamics. The authors say at some point that the glacial (sea-level lowstand) part of the sequences are missing. However, the diagrams show a slice of the sequence that would cover one of the most important glaciations at that time - the Mi-1 glaciation at around 23 Ma - but there is barely any discussion about it. Are there any vegetation patterns that would show this significant environmental cooling?

In this respect, the pollen diagrams are very difficult to understand because they are represented continuously even though there are significant hiatuses and graphically one tries to see cycles that are obviously not there.

2. The discussion is very short, shallow and naïve. The adjective "weak" is used twice in the abstract describing the vegetation and paleoclimatic estimations but no further information is given describing the patterns, which seem to be shown in Figs 2 or 3 (i.e., peaks in conifers). I feel the authors did not squeeze the data enough to obtain conclusion. Do you really believe climate was "a straight line" between 30 and 20 Ma??? For example, the authors first say that the hiatuses "inhibits the evaluation of vegetation responses to periodic orbital changes". However, some of the sections studied are about 500,000 years, long enough to at least record orbital eccentricity changes. At the beginning of section 4.3 the authors say that the terrestrial pollen signal could be hampered in the marine environment but they do not explain how.

3. There are some pollen changes in some of the studied sections such as O3 or O6 with clear dynamics in the conifers that are barely discussed. However, some other events are discussed but are not very clear. For example, the authors in section 4.3 described a significant change, that they related with Oi2-a event at 28.3 Ma, characterized by an increase in Pinaceae. However, in Fig. 3 there seems to be a minimum in Pinaceae instead (sum-bissacates).

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4. The vegetation is mostly described as "units" and this is very confusing as one has to be going back to the figures or, even worse, the supplementary document, where the taxa are described. Why not calling these units by their names? For example, high-altitude conifer forest, instead of unit 1?

5. The lithology plot shown in Fig. 3 is very confusing and very difficult to understand. Lithology of the studied core should be shown in standard lithological patterns so one can visualize if the pollen changes are at some point related with sedimentological, transport or taphonomical changes.

6. *Eotrigonobalanus* is described in the text as an extinct genus occurring in this sedimentary record. SEM seems to be necessary to classify this pollen taxon but no discussion is found in the manuscript concerning how abundant it was or if it occurred continuously throughout the record.

7. There are some plant taxa that show affinities with subtropical climates such as *Engelhardia*, *Sapotaceae*, *Cupressaceae* with papilla (probably *Taxodioideae*) that do not occur in the area at present probably due to climate cooling but one gets the impression that the climatic inferences made here are pretty much like at present.

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