

Reply to Reviewer 3 (S. Gallagher) by Bijl et al.

This is an excellent description and interpretation of organic microfossils from the Oligo-Miocene strata off Wilkes Land Margin and their palaeoceanographic significance. I have made extensive comments and suggestions in the attached annotated pdf text to this paper.

I would like to add the following to the discussion:

I appreciate the utility of using isotopes to interpret Antarctic Ice Sheet variability as summarised by Liebrand et al 2017 (www.pnas.org/cgi/doi/10.1073/pnas.1615440114) and this approach is used extensively when discussing the Cenozoic greenhouse icehouse transition. However, there are other sections that have been interpreted using backstripping and stratigraphic data in the Gippsland (Oligocene) and New Jersey (Oligo-Miocene) margins that reflect glacio-eustasy in the Oligocene and relative ice volume (Gallagher et al., 2013), it would be useful to consider the significance of these near field and far field sections in any section reviewing ice volume variability. Gallagher, S. J., G. Villa, R. N. Drysdale, B. S. Wade, H. Scher, Q. Li, M. W. Wallace, and G. R. Holdgate (2013), A near-field sea level record of East Antarctic Ice Sheet instability from 32 to 27 Myr, *Paleoceanography*, 28, doi: 10.1029/2012PA002326.

This is a good suggestion, we will add this to the revised manuscript.

More specific comments are below:

Lines 116-117 please clarify these lines they are bit vague. **-done**

Line 132: I don't think the word is speculate here, perhaps hypothesize? **-done**

Section 3 Methods: Bijl et al in press, I presume this means the paper published in *Jl Micropal* so please correct as it is not even in the reference list. **indeed. Done**

Line 217: what does empirical data mean here? **Now better explained**

Paragraph starting at line 332: I found this section quite confusing, I have attempted to edit this in the annotated text.

5. Discussion section needs a few lines of a preamble. **Agreed. Done**

Page 22 line 507 onward, as mentioned above there are other records that point to ice sheet instability in the time period being considered, please include in discourse.

Lines 518-527 are too speculative and should be left out or moderated.

In conclusion, once the text has been clarified and the suggestions considered this will be useful addition to the relatively sparsely documented Antarctic (palaeo)climate and oceanographic records.

Please also note the supplement to this comment:

<https://www.clim-past-discuss.net/cp-2017-148/cp-2017-148-RC3-supplement.pdf> – **We will carefully incorporate the comments that were annotated into a new version of the ms.**