Climate of the Past Discussions

Clim. Past Discuss., referee comment RC2
https://doi.org/10.5194/cp-2021-84-RC2, 2021

Comment on cp-2021-84

Anonymous Referee #2

Referee comment on "Vegetation change across the Drake Passage region linked to late Eocene cooling and glacial disturbance after the Eocene–Oligocene transition" by Nick Thompson et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-84-RC2, 2021

General comment

The manuscript presents new terrestrial paleoclimatic data from high southern latitudes. A strength of the manuscript is that it presents and evaluates both palynofloral and geochemical proxies for paleoclimatic change across the EOT. The authors conclude that climate cooling began at 35.5 Ma, coinciding with the opening of the Powell Basin and importantly, prior to glacial onset at 34.1 Ma. The palynofloral evidence is well presented, but the geochemical (n-alkane and TOC) methods and results need reorganizing. One concerns is that the authors refer to high-altitude habitats in the text and in Figure 6. I would like them to clarify whether there is tectonic evidence of this or whether it is inferred from the palynofloral assemblages? Although a number of these taxa do inhabit montane areas today because that is where precipitation is highest, throughout the Cenozoic they are known to have proliferated in wet, low-lying areas throughout the southern hemisphere (eg. SE Australia, New Zealand). I suggest the authors carefully reconsider this interpretation. Notably, the wet conditions inferred at the study site might ensure that these plant taxa could have inhabited low land areas. Overall, this study is an excellent contribution to our understanding of southern hemisphere palynofloras and paleoclimates.

Specific comments

In section 2.3 (Materials and Methods) the authors comment that “The following section will focus on the interpretation of lipid biomarker (n-alkane) and stable isotope data from Site 696”. However, I encourage the authors to remove most of this section as it contains background information and therefore seems out of place. Most of the text in sections 2.3.1 and 2.3.2 should be removed and instead incorporated into the discussion or

included as background information earlier in the text, not in the materials and methods section. Please only include the equations you need for the results/discussion.

All results in sections 2.3.1 and 2.3.2 should be moved to the results section and placed under relevant subheadings. Please differentiate palynofloral results, n-alkane results and TOC results if the former two are indeed new to this study. If the n-alkane and TOC results are being reporting in Lopez-Quiros et al., in review then please do not report them here and instead refer to them in the discussion. For example, in the results you would state that TOC increased and in the discussion list the possible reasons why. This section should outline how you derived these results.

Lines 204-205. Can the authors please clarify why all of these weren't identified to species level?

Lines 215-216. Can the authors please explain why the rarefraction analysis was based on 50 specimens?

For section 3.1 I recommend separating this into two paragraphs, with each clearly distinguishing the differences between Subzone 1a and Subzone 1b. Place the MAT and MAP results at the end of each paragraph too.

Line 285. Please elaborate on any other possible palynofloral sources.

Line 288. Please outline what the significant differences are between SOM and Antarctic Peninsula palynofloras.

Line 293. Please elaborate on the precipitation requirements of the taxa too, as opposed to focussing on temperature alone.

Lines 316-322. Could the authors explain why they dismiss having more than one source area (i.e., one local and one more regional).

Please include a column for the autochthonous pollen sum on Figure 3.

Technical corrections

Numerous technical corrections have been made on the PDF attached.

Please also note the supplement to this comment:
https://cp.copernicus.org/preprints/cp-2021-84/cp-2021-84-RC2-supplement.pdf