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Comments on Amoo et al

Alberto Reyes (Editor)

Editor comment on "Eocene to Oligocene vegetation and climate in the Tasmanian Gateway region were controlled by changes in ocean currents and $p\text{CO}_2$ " by Michael Amoo et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-131-EC1>, 2021

The comment below was emailed to me by Dr Ian Sluiter, who requested that I post it to the Discussion Forum. Dr Sluiter's comment is posted here nearly verbatim.

-Alberto Reyes (handling editor)

I write ... to provide a few short comments on the paper by Amoo et al. on Late Eocene to Early Oligocene vegetation of the Tasmanian Gateway Region in the hope that it may improve their paper, but also set some ground rules for future authors from the Northern Hemisphere who wish to work on pollen records from this part of the Southern Hemisphere. My name is Ian Sluiter and I am happy for you to provide the comments to the authors with my name known. I have been working on, and will publish very soon, a terrestrial pollen record from Gippsland (Victoria) which lies ~730km to the NNW of ODP1172. That is ~5.5degrees latitude north. The general thrust of a warming episode at our site mirrors the changes recorded by Amoo et al., but I am not exactly sure how this has come about.

The major criticism I have of the paper are outlined below.

Palynological [analyses]

The Methods of the paper declare that a 15 micron sieve was used to presumably clean unwanted organic and inorganic matter. To do so with Australian pollen records (Quaternary or Tertiary) is a disaster. For the Eocene to Early Oligocene vegetation and climates with which this paper is concerned, sieving excludes anywhere between 2-30% of the pollen sum; and potentially 5-70% of the Miocene pollen sum if the authors propose any work on these age sediments. This means all Cunoniaceae taxa bar larger Weinmannia, all Elaeocarpaceae, many of the small Myrtaceae including core taxa like Syzygium, along with Quintinia, Macaranga/Mallotus, Bluffopollis (*Strasbergeria*), Ulmaceae and even small Proteaceae would be washed down the sink! This is a very serious loss of data and necessarily simplifies any vegetation reconstructions. Moreover, the use of diversity indices like S-W and Evenness become redundant.

A Marine Record

This is a marine pollen record from 250km ESE of Tasmania. A Lat/Long at Line 64 would be appreciated.

The record seriously over-records the importance of Pteridophytes, at least when compared with terrestrial records from Tasmania and Gippsland. The vegetation descriptions about Tasmanian vegetation at the time lack substance. I have never seen an Australian Tertiary record without Myrtaceae! I presume they must have been washed down the sink which makes the description a whole lot easier I guess!

This is an Australian - Not New Zealand Tertiary Record

Most of the pollen ID's seem to be aligned with NZ Tertiary taxa, and not with Australian pollen taxa. It is easy to quote Ian Raine I guess, as Australia do not have a compendium like NZ has. But to do so comes with some basic flaws and oversights. It is possible the Sapotaceae palynomorph may be the smaller Sapotaceoidaepollenites cf latizonatus, but I doubt it. I would suggest it is more likely to be *S. rotundus*.

Comments on Particular Pollen Taxa

I also have some comments on the Nothofagaceae. *Nothofagidites flemingii* is a Fusca Type B (sensu Dettmann et al.) but belongs in the modern genus *Nothofagus*. I would not be combining it in with *Fuscospora*. *Fuscospora* and *Nothofagus* need to be separated in the pollen diagram.

I would not be using the NZ Brassospora pollen types *Nothofagidites mataurensis* and *N. cranwellae* in an Australian pollen diagram. They are very similar morphologically to *N. emarcidus* and this is the pollen taxon I would combine them with. UNLESS one or both of the the pollen types were the square sided *N. heterus* (Cookson) Stover and Evans 1973 which is very common at times in contemporaneous age fossils from Gippsland to the north. If *N. heterus* has not been recorded – I ask why not?

Nothofagidites lachlaniae? Another NZ pollen type which is probably best aligned in an Australian context with *N. incrassatus* (Cookson) Dettmann.

Where is *Dacrycarpus*?

A comment on *Phyllocladidites mawsonii*. This pollen taxon hits some pretty big numbers further north in Gippsland at the same time. I am seriously curious as to its relatively low representation at ODP1172, especially given the loss of the smalls down the sink. Perhaps it is due to over-representation from the spores.

What is Spinizonocolpites sp.? This genus ?*Nypa* is well gone (extinct) by the Late Eocene from southeastern Australia. No evidence is forthcoming for it at the same time in Gippsland further to the north. Can the authors be absolutely sure that this is not Early Eocene re-working? I also question what the entity/identity of *Malvacearumpollis mannanensis* might be?

Figures

Figure 1: Tasmania is a small island compared to the mainland of Australia, but not as small as the scale bar would indicate. This shows a measurement of 50km, when the actual distance is nearer to 120km!!

Figure 3: Do not quote Holdgate et al. 2017, for the Gippsland Basin spore pollen zonation. This belongs with Stover and Partridge (1973); Partridge (2006). The pollen zonation age is also wrong. Please have the authors correct the position of the Middle and Upper *N. asperus* Zone boundary to 33.9Ma as Partridge (2006) places it. I would also like to see a small stratigraphic zonation discussion of how this boundary was arrived at.

I hope these comments have been of assistance.
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