

Interactive comment on “Greenland Ice Sheet sensitivity and sea level contribution in the mid-Pliocene warm period – Pliocene Ice Sheet Model Intercomparison Project PLISMIP” by S. J. Koenig et al.

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RESPONSE TO REVIEWER H. Dowsett (Referee)

My co-authors and I wish to thank the referees for their careful reviews. We believe we have addressed most (if not all) of the points raised. Point-by point explanations and responses to the individual points raised are given below.

Koenig et al. have evaluated the ensemble of PlioMIP ISM's using several different
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versions of forcing. They question whether model dependence or boundary condition forcing are more important. Their analysis suggests boundary condition forcing is more significant. While possibly not rocket science, the work needed to be done to document this. Understanding the Pliocene climate is a major area of research and reducing uncertainty in ice sheet configuration is critical to our understanding of Arctic climate, sea ice and polar amplification. Their work is also important for the next phase of the PlioMIP initiative.

Overall this is a good paper and should be an important contribution to the Pliocene literature. Since my expertise is not with modeling, my comments are confined to the stratigraphy or are general in nature.

> We thank rev3 for judging the manuscript to be an “important contribution of the Pliocene literature”.

In the abstract the “mid-Pliocene Warm Period” is defined as the interval between 2.97 and 3.29 Ma. Since later in the text Dowsett et al. (2010) is cited for this interval, the dates should be 3.264 to 3.025 Ma and it is convention to define an interval from oldest to youngest. Page 2825, line 1, states that the mid-Pliocene will hence be referred to as simply Pliocene. That’s fine but throughout the text Pliocene and mid-Pliocene are used many times including the title of section 3.3. What was once the mid-Pliocene (an informal designation but roughly the mid-Piacenzian) is no more since the timescale was revised and the Quaternary extended down to 2.6Ma. Thus the term mid-Pliocene no longer makes sense. Mid-Piacenzian does, but so few in the climate sciences know what the Piacenzian refers to that it is apparently confusing. My point is that early on in the manuscript you require a sentence to establish what interval of time you are talking about (mid-Pliocene, Mid Pliocene Warm Period [both of which are no longer accurate), Pliocene Warm Period, mid-Piacenzian, PRISM interval) and stick with that throughout the text.

> We follow rev3’s advice and define the time period of concern as to the “mid-

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Piacenzian” or “Pliocene warm period” with an age of 3.264 and 3.025 Ma. “Pliocene” is now consistently used throughout the manuscript as the abbreviated form.

I note that another reviewer has corrected you on the age of units you use for verification data. I’m not that concerned that something that was Pliocene is now Pleistocene (these ages have changed in the past and presumably will in the future), the point is there are few Arctic data points, none have good age control, and the marine localities, ODP or terrestrial, are where suitable material exists. While it might not be what you need, I think you can make use of the fact that regardless of when, there were warm intervals that suggest. . . at a particular latitude. No it’s not going to be verification of your result, but it provides some framework for the possibilities.

> We share rev3’s notion on the past and potential future changes of definitions of geological time periods and the consequences for the dated analyses and reconstructions.

See answer to rev1 above.

There are a number of places where you have an extra word or have dropped a word. Proof the text carefully.

> Done.

As mentioned by the other reviewers, check your references- some are not accurate.

> Done.

The first sentence of page 2830 makes no sense to me. What is a “modern Pliocene temperature?”

> Corrected. It now reads “. . . show temperature anomalies with respect to modern . . .”.

2836, line 26 change ‘same the’ to ‘the same’

> Done.

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2837, last line of main text; I think “verification’ is a better choice than ‘validation’

> Done.

All figures are necessary and of high quality.

> Thank you.

Interactive comment on Clim. Past Discuss., 10, 2821, 2014.

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