

Interactive comment on “Pliocene Model Intercomparison Project (PlioMIP): experimental design and boundary conditions (Experiment 1)” by A. M. Haywood et al.

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We would like to thank the reviewer for the constructive comments. Our response is detailed below.

1) The choice of the period. Please provide a figure with some proxy timeseries that illustrates that the mid-Pliocene indeed stands out as a warm period. How should we place this period (2.97-3.29 Ma BP - very precise!!) in the course of time?

We will include a new figure which shows the location and rationale for the choice of the time period based upon stable isotopes and ability to correlate. The interval was defined more than 20 years ago by the US Geological Survey PRISM Group as an in-
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terval significantly warmer than today. A new short background section with references will be provided.

2) What do the data represent? A mean over the full 300,000 year period? How well is the dating constrained. More information here would be useful to guide model-data intercomparison and the interpretation of possible model-data discrepancies

This is documented fully in previous PRISM papers. However, we now provide a short description of warm peak averaging with references to explain the details. The dating varies from location to location and by data type- terrestrial (always poor to good) marine (usually good to occasionally poor).

3) How will the neglect of orbital variations in the experimental design influence model data comparisons? This obviously relates to point 2.

Experiment 1 uses AGCMs and fixed SSTs. Therefore the effect of orbital changes cannot be simulated as the ocean cannot respond. Since the boundary conditions provide an average warm condition for a 300,000 interval it has never been clear how, or even if it's possible, to change the orbital configuration to make it somehow consistent with what the boundary conditions represent. Therefore for simplicity we specified modern orbits.

4) The implementation of modified vegetation leaves many questions! How will changes in vegetation affect albedo's? How will inter-model differences in modern vegetation affect the MIP? It is obviously not possible to apply the anomaly approach here, or is it? The provided BIOME maps seem to lack anthropogenic classes (crops, irrigated soils) for the pre-industrial control, this will already introduce major inter-model differences in certain areas

PlioMIP is making the bold step of asking groups to change vegetation. The specification of modern vegetation in previous MIPs has been a major deficiency which hampers data/model comparison. Given the differences in land-surface schemes it is accepted

that the forcing applied in each model through the specification of Pliocene vegetation will not be the same. There is little that can be done apart from each group documenting very carefully how the vegetation was implemented. We have provided a table which outlines specific physical characteristics for each biome type to help provide some guidance but this is specific to the Hadley Centre Model. This is now discussed further in the paper. The key is document, document, document!

5) The same holds for other land surface characteristics like soils and lakes, river routing, etc Why switch to a standard/minimum solution here instead of a preferred/alternate? Why not provide the standard solution for river routes, so that groups could see how much impact the mid-Pliocene change in topography has? What do geological data tell about changes in river systems?

There are no lakes. A geological reconstruction of soils and rivers is currently not available although it will be part of the 4th iteration of the PRISM boundary condition data set when released in a few years time. In the absence of reconstructions two methods reflecting the spectrum of complexity that exists within models are suggested for both soils and rivers. We have reverted to use of the term preferred and alternate as suggested

6) Experiment II is announced as being ocean-atmosphere, but a next step of vegetation-atmosphere runs seems more warranted, given the large ambiguities in defining land surface/vegetation boundary conditions

AOV experiments can happen as a sub-project spun off from experiment 1. We would be delighted if someone would propose it following the completion of experiment 1. At the first PlioMIP workshop held in New York in May 2008 it was agreed to settle on an initial basic A and AO combination as the runs all groups should attempt to aid the participation of as many groups as possible. Not everyone has access to a DGVM.

Smaller points: 1) Title of the paper is a bit awkward

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No suggestion/details for an alternative was provided by the reviewer so the original title has been retained.

2) Please provide references or websites for the data synthesis projects mentioned on p1219, line 6

Done

3) Comment on the use of a different period (3.6-2.6MaBP) for the vegetation reconstruction

Done

4) Mention the spin-up of 20 years and analysis period of 30 years instead of the integration length of 50 years in Table 1

Done

5) There is an error in the ice-sheets boundary condition given in Table 1

There is no error

6) Model spin-up (below aerosols): why give this entry here?

An error in the table - fixed

7) Figures 3-8 are way too small in my printed copy. Why shift land-sea mask in Fig. 4 as compared to other figures

The figures will be improved in the final version

8) Indicate differences compared to unchanged modern land-sea mask in Fig. 3 left.

Done

9) To end with a positive note: figures 6+7 with the actual data points are great! Very useful information. What are the boxes in figure 7?

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They denote the geographical region where due to sample density we have specified site numbers as a range e.g. 16-19 along the west coast of North America.

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