

Interactive comment on “On the effect of orbital forcing on mid-Pliocene climate, vegetation and ice sheets” by M. Willeit et al.

Anonymous Referee #1

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“On the effect of orbital forcing on mid-Pliocene climate, vegetation and ice sheets” by Willeit et al. presents some results from a series of numerical model experiments related to the mid-Pliocene warm period using the Earth system model, CLIMER-2. These experiments build on from the first phase of PlioMIP (Pliocene Model Intercomparison Project), investigating the separate effects of orbital forcing, vegetation and ice sheets on the climate by running transient simulations.

Although the atmospheric and land components are of low spatial resolution, the results presented do share some commonalities with results from other modeling groups in PlioMIP. I believe these results will be of much interest to the palaeoclimate community for at least two reasons. Firstly, I am not aware of any other transient simulations run for the mid-Pliocene warm period. Secondly, one of the recommendations put

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forward for the next phase of PlioMIP is to include simulations based on a particular time-slice, as opposed to an averaged time-slab. Despite a rather long introduction, the paper was well-presented with some very interesting points and I would like to recommend it for publication. I do have a few comments and issues which are minor.

Main points:

Page 1713, line 2: When discussing the temperature and precipitation anomalies (as shown in figures 1a and 2a), I think the authors should also point out where and how these differ to the model means from PlioMIP.

Page 1713, line 29: Although discrepancy between modelled forest fraction and forest fraction derived from PRISM3D is evident in the high northern latitudes, it appears to be just as high, if not higher, in parts of the southern hemisphere, for example, central South America. This is most likely related to the discrepancies seen in the precipitation and/or temperature. It would be useful if the authors mention this and explain how the differences in the high northern latitudes come about.

Page 1716, line 6: 'Including orbital forcing improves agreement between model and data. . .' Is this simply on the basis that the blue line appears mostly within the shaded red area? By including variations in the orbital forcing, the temperature anomaly range increases, and so it is more likely that PRISM3D SST anomalies would fall in this range anyway. It would be interesting to see what the range of temperature anomalies would be if results from the warmest peaks only (as shown in fig. 3a) were used, especially in the tropics.

Figure 4: It may be worthwhile to re-plot the maximum summer insolation (black solid line from figure 3a) at the top of figure 4 as the authors mention that forest area varies closely with that particular insolation.

Other points:

For this journal, is UK English spelling preferred? If so, the authors should check for all

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occurrences of words such as 'modeled', 'modeling' and 'favored' and change them as appropriate.

Page 1705, line 9: up tp -> up to

Page 1705, line 19: little changes -> little change or few changes

Page 1709, line 1: At last -> Lastly

Page 1717, line 5: This -> These

Page 1718, line 22: sheets -> sheet's

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