

## ***Interactive comment on “Mid-Pliocene climate modelled using the UK Hadley Centre Model: PlioMIP Experiments 1 and 2” by F. J. Bragg et al.***

### **Anonymous Referee #2**

Received and published: 15 June 2012

General Comments: The manuscript “Mid-Pliocene climate modelled using the UK Hadley Centre Model: PlioMIP Experiments 1 and 2” is one of a series of papers documenting the Mid-Pliocene model experiments conducted for the Pliocene Model Intercomparison Project (PlioMIP). The paper describes the UK Hadley Centre Model and the boundary and initial conditions used to run the mid-Pliocene simulations. The authors also briefly describe their results.

The authors are very thorough and careful; they do an excellent job of fully describing and documenting their simulations. The figures are clear, informative and in good agreement with the discussion. Figure captions are complete. The paper is clearly written and well laid-out.

I recommend that this manuscript be published with minor revisions.

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## Specific Comments:

1. Section 4.3: I found this section comparing latitudinal gradients to be confusing. Both experiments 1 and 2 have polar amplification and a reduced latitudinal gradient relative to the control. The comparison between the two experiments highlights their relative magnitudes. However, the discussion leaves the impression that Exp 2 polar temperatures actually cooled relative to the control. By clarifying that you are comparing relative magnitudes of warming, rather than referring to an “increased latitudinal temperature gradient” for Exp 2 you will help the reader understand what you are comparing.

2. Section 4.3: Can you make meaningful comparisons of TS over the oceans since SSTs are fixed for Exp 1?

3. Section 5.1: Are the proxy data shown from PRISM3\_MASST\_anomaly.nc? Just checking since you refer to the PRISM3 dataset, yet you have derived independent anomalies?

4. Section 5.3: I got lost here. The text could be improved by consistently referring to the experiments and corresponding vegetation datasets according to the definitions in Table 1.

5. Section 5.3: Do you know how sensitive the model is to vegetation? How do you separate the vegetation signal from the climate signal?

6. Conclusions: (p. 853): (same as point 5) I wasn't clear whether you also had a control with the potential natural vegetation. Perhaps I missed this. Otherwise it would be difficult to separate the effects of veg from the Pliocene forcings.

## Technical corrections:

Pg 838: line 17: Reorganize to say “We present sensitivity studies . . . .”

Pg. 838 line 19: “. . . simulations are presented, which . . .” to “simulations indicating

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the ...”

Pg. 839 line12 “... period which ...” to “... period that ...”

Pg. 839 lines 21-25: break into 2 sentences. E.g., “... 2011). We also provide ...”

Pg. 840 line12: “... model uses specifies 12 ...” to “... model specifies 12 ...”

Pg 840 line 14: “... due to Gregory” to “developed by Gregory...”

Pg. 841 line 5: “... versions, ...”

Pg 841 line 22: “single-cell”

Pg 842 line 20: “due to” to “from”

Pg 843 line 8: “additional fully coupled Pliocene simulation. ...”

Pg 843 lines 14-17: Sentence structure could be rewritten to be more clear.

Pg 847 line 6: was this run for a total of 500 yrs? i.e., how long was the original experiment?

Pg. 847 line 21-22: Specify the panel you are referring to so it becomes more clear for the reader: e.g., Figure 4a.

Pg. 848 line2. “Polar amplification of XXX degrees ...”

Pg 849 line 23: “.. over the oceans with a rise on the order ...”

Pg 849 line 26: “... and is reduced in ...”

Pg 850: line 11: “... Kuroshio Current off the East coast of Japan ...”

Pg 850: line 9: “.. warmth that are not ...”

Pg 850 line 20: “... Previous simulations have been ...”

Pg 850 line 22: “... 200 years. Figure 13 ...”

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Pg 851 line 16: Reference and/or define “WHS”. Which experiments used it?

Pg 852: Conclusions:

Lines 10-13: Ambiguous sentence: “ resulting in a higher mean latitudinal gradient similar to that in the control simulation ...”

Line 18: “.. PRISM3 data that ...”

Line 20: “ ... significantly. There is no evidence ...”

Line 22: “ ... The model shows evidence of a distinct .....model. The data also show a signfica..”

Figure Comments:

Overall, the figures may be more effective if the panels showing absolute T/PPT are removed and only anomalies are shown. Little additional information is gained from the absolute T and PPT, and the resulting difference figures may be larger and easier to read. (e.g., Figure 6a,b,d,e,g,h)

Fig 3: lower 2 panel legends show 3 colors/labels but only 2 lines.

Fig 4: Extend vertical scale to include polar amplification in panel 4.e

Fig 10. Break into two figures, using panels c and f, and g-j.

Fig 12. Change “Contours show ...” to “background color contours show ...”

Fig 12. I am confused by the data shown. How do these proxy records relate to PRISM3\_MASST\_anomaly.nc from the PRISM3D database?

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Interactive comment on Geosci. Model Dev. Discuss., 5, 837, 2012.

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