

## ***Interactive comment on “Pre-industrial and mid-Pliocene simulations with NorESM-L – AGCM simulations” by Z. Zhang and Q. Yan***

### **Anonymous Referee #1**

Received and published: 21 May 2012

“Pre-industrial and mid-Pliocene simulations with NorESM-L – AGCM simulations” by Zhang and Yan is a contributing paper to the GMD special issue “Pliocene Model Inter-comparison Project (PlioMIP): experimental design, mid-Pliocene boundary conditions and implementation” and follows on from an earlier paper (Zhang et al, 2012) detailing similar experiments with the fully coupled NorESM-L model. The paper includes a description of the set-up for experiment 1 of PlioMIP, a comparison of three sub-experiments in terms of surface air temperature and precipitation and a discussion of the potential uncertainties in choosing an appropriate set of SST in the reference experiment.

The authors make an interesting point in bringing up the issue of different SSTs in the reference experiment. The science in the paper is sound and the paper itself is well-

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structured. However, there is a long list of grammatical issues which needs to be taken care of.

I would recommend the paper for publication, providing certain modifications are made to the manuscript. There are a small number of questions. I list these and most of the modifications to the grammar or wording below.

Specific points:

Section 4.1.2 Precipitation, page 1209-1210: Although the overall pattern of the simulated precipitation is in good agreement with that of observations, perhaps the authors can also briefly point out regions where precipitation differs greatly, eg China, India and over the ocean to the west of India.

Line 8, page 1211: A reference to figure 7 does not appear anywhere in the text and needs to be inserted here.

Last sentence in 4.2.2 Precipitation, page 1211: It seems to me that the values given by the authors refer to boreal summer (ie figures 7b and 7e), and not to the annual mean (figures 7a and 7d). The decreases in the annual mean values over South Asia appear to be much smaller. The authors could also mention the equally large discrepancy in precipitation anomalies over the Indonesian archipelago.

Line 20, page 1212: Does “In Indian” mean “Over the Indian Ocean”, “Over India” or “Over the Indian sub-continent”?

Figure 4, page 1223: It would be helpful if the authors could include sub-figures for the differences between the mid-Pliocene experiments and the other two, as it is not easy to deduce the differences from (b) and (c), especially the latter.

Other points:

Line 1, page 1205: Change to “more attention is being paid to”

Line 3, page 1205: Change “2” in “CO<sub>2</sub>” to subscript

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Line 14, page 1205: Change to “was recently initiated”

Line 16, page 1205: Change to “experimental results”

Line 14, page 1206: Change to “which was developed”

Line 16, page 1206: Change to “in the horizontal” and “in the vertical”

Line 18, page 1206: Change to “special to the”

Line 19, page 1206: Change to “The minimum relative”

Line 7, page 1207: 2000s is slightly ambiguous. Change to “2000-2009” or whatever the relevant period is

Lines 9 and 16, page 1207: Change to “anomaly method”

Line 4, page 1208: Change to “anomaly method”

Line 6, page 1208: Change to “changes in topography”

Line 9, page 1208: Delete the word “condition”

Line 15, page 1208: Change to “Firstly, it is changed”

Line 21, page 1208: Change to “are the same”

Line 12, page 1209: Change to “is similar in the pre-industrial and in the control experiment”

Line 18, page 1209: Change to “occurs in the Antarctic”

Line 19, page 1209: Change to “such a pattern”

Line 23, page 1209: Change to “It is the same as”

Lines 1 and 2, page 1210: Change to “at about”

Line 12, page 1210: Change to “of both hemispheres”

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Line 13, page 1210: Change to “in the tropics of the mid-Pliocene”

Line 13, page 1210: Change to “Near the equator”

Line 14, page 1210: Change to “of the Southern Hemisphere”

Line 21, page 1210: Change to “can also be observed”

Line 24, page 1210: Change to “and by”

Line 15, page 1210: Change to “of the Antarctic”

Lines 6 and 7, page 1211: Change to “in the tropics”

Lines 6-7, page 1211: It may help the reader to add a reference to figure 4c.

Line 10, page 1211: Change to “of the Middle East”

Line 11, page 1211: Change to “Larger decreases in annual precipitation. . . appear over Southern India”

Line 12, page 1211: Change to “(on the north coast of New Guinea)” or “(on the north coast of the island of New Guinea)”

Line 13, page 1211: Change to “tropical Pacific, on the coast”

Line 17, page 1211: Change to “remarkably larger”

Line 5, page 1212: Change to “The basic pattern of mid-Pliocene warming in these simulations agree well”

Line 16, page 1212: Change to “choosing the reference experiment”

Line 23, page 1212: Change to “suggests employing local modern SST”

Line 1, page 1213: Change to “it should be noted that, compared to”

Line 6, page 1213: Change to “simulations carried out by Chan et al. (2012), but not in those by Kamae and Ueda (2012)”

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Line 11, page 1213: Change to “In accordance with the PlioMIP”

Line 22, page 1213: Change to “should be noted and assessed”

Figure 1, page 1220: Change last sentence to “Grey represents areas covered by sea-ice”

Figure 8, page 1227: Change the titles in (c) and (d) to “Anomaly difference”

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Interactive comment on Geosci. Model Dev. Discuss., 5, 1203, 2012.

**GMDD**

5, C227–C231, 2012

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