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Climate of the Past Discussions

Interactive comment on "Mid-Holocene climate change over China: model-data discrepancy" *by* Yating Lin et al.

Anonymous Referee #2

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Data-model comparison is often problematic especially at regional scale, for which there are many reasons. This paper presents an interesting analysis to investigate the possible impact of poor representation of vegetation in climate models on the model-data discrepancy over China. The authors compare the PMIP3 results with their "reconstruction" and propose that lack of vegetation dynamics is the main reason of model-data discrepancy in seasonal climate over China. The results are clearly explained and the paper is well written. Especially, a large amount of data are presented and would be a remarkable contribution to the Holocene study. I would recommend its publication after the following comments are considered:

1. At least to my knowledge, regional diversity exists inside China regarding the timing of the mid-Holocene thermal maximum. However, the insolation of 6 ka BP is used in

the PMIP3 simulations. In which degree might the model-data discrepancy be related to the forcing used in the climate models? Have the authors compared their reconstructions to simulations of other periods like 9 ka and 12 ka or to transient simulations to see whether the data-model comparison can be improved if different forcing is considered?

2. One way to test the proposal of the authors would be prescribing the reconstructed vegetation in a climate model to see how the model results would be altered and whether the model would reproduce more realistic results when compare to other proxy data.

3. The spatial resolution of all the GCMS is very coarse when regional diversity within China is considered. The regional details of topography are not necessarily well represented. I wonder in which degree the model-data mismatch is related to rough topography used in the climate models.

4. Line 372: the authors consider the poor capacity of vegetation modelling in climate models to be the major reason for model-data discrepancy. Before the author test for other reasons like those related to topography, soil types, selected climate forcings, I am not very convinced that vegetation is the major reason.

5. Two models of 13 use dynamical vegetation model. According to your analyses, is there obvious advantage of using AOV instead of AO?

6. Line 36: do you mean " an increase in the seasonal cycle of insolation"

7. I wonder how the pollen data of PI was collected. Were they collected from the surface? Is there any influence from human activities?

8. In Figure 3: is the anomaly relative to PI? How was the grid mean value calculated?

9. Line 320: PMIP3

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