**Climate
of the Past
Discussions**

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Comment

Interactive comment on "How cold was Europe at the Last Glacial Maximum? A synthesis of the progress achieved since the first PMIP model-data comparison" *by* G. Ramstein et al.

Anonymous Referee #1

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General comments:

The large disagreement between model simulations and data reconstructions of the temperature in Europe at the LGM has been one of the big issues in PMIP, and the subject of this paper is therefore highly worthwhile. My main queries are:

1. What findings have already been published in Wu et al 2007? Unfortunately I could not find a published version of the paper at the time of writing this review. The main finding of the paper by Ramstein et al seems to be that the reconstructions from Wu et al are closer to the PMIP model simulations than the older reconstructions. If Wu et al make this point in their paper then I am not convinced

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that the Ramstein paper reaches substantially new conclusions.

2. Figures 1, 4 and 7 show that one of the reasons for the models now being consistent with the new reconstructions is because the error bars have increased in the Wu et al data so that the model results lie within the error bars. This should be commented on in the paper. Figure 7 also shows that the PMIP1 model results are in better agreement with the data than the PMIP2 model results. Please suggest reasons why this might be.

3. Section 5 is the most important and relevant part of the paper, and should therefore be more detailed, and/or remove the earlier sections which don't contain substantial findings. The end of section 5, starting at line 5 on page 208, overrides the findings in the previous sections and is too brief, compared to the detail in the previous sections. The discussion should be expanded. Also, if MTWA and MAT are still to be commented on in the text at line 8 then a figure needs to be added to illustrate this result.

Specific comments:

Section 2:

- The authors argue that increasing model resolution should improve the representation of a given climate because certain features, e.g. mountain glaciers, and complex coastlines and topography, are not resolved in GCMs. Is a resolution of up to 50 km sufficient to represent the glaciers, or complex coastlines and topography? I'm not sure that it is, in which case, what does section 2 tell us, apart from that 50 km might not be high enough resolution.

- Do the authors think that the simulations presented in Jost et al are long enough for the models to have adjusted to the large LGM forcing (1 year for CCSR1 and LMDZHR, 4 years for HadRM), and are averaged over a long enough period (10 years for CCSR1

and LMDZHR, 5 years for HadRM) to account for interannual and interdecadal variability? If not then some caveats should be included, or this section should be removed.

- What about using another technique for downscaling from the GCM, for example a statistical technique to produce information at the individual pollen sites, rather than a gridbox?

Section 3:

- Page 204, line 26: Figure 4 seems to show that the discrepancy for the PMIP2 simulations is actually worse, and not "unchanged" as stated in the text.

- Line 28: this statement needs clarifying. How different are the PMIP2 AOGCM SSTs from the CLIMAP SSTs in this region? A few sentences summarising the differences would be useful, and perhaps include a figure to illustrate.

Section 4:

- Page 204, line 23: are these 5 sites included in the results shown in the other figures? If not, why not choose a subset from the sites used in the rest of this paper for consistency, or include these sites in the other figures.

- I don't understand the rationale for the different experiments presented in this section. In particular, in the "third scenario" why choose a factor of 3? Is it chosen for a particular plausible reason? Similarly, in the "last experiment", why are mean T anomalies 1.25 colder, and P anomalies 3 times smaller? There needs to be some further explanation for the motivation for the design of the experiments.

Section 6, final sentence: add a few sentences to explain why these new models will lead to a better understanding of the reconstructions.

Figures 1, 2, 3, 4 and 7 show model results up to 70N, but data only up to 48N. It would be very useful to show data at higher latitudes if possible. If not, then why show the model results at these higher latitudes?

The figure legend should explain what the diamonds and squares represent in figures 1, 2, 4, 7. Also, explain what the shapes mean in Figure 6.

Interactive comment on Clim. Past Discuss., 3, 197, 2007.

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