Clim. Past Discuss., 3, S293–S296, 2007
www.clim-past-discuss.net/3/S293/2007/

Climate of the Past Discussions

Interactive comment on "The LGM surface climate and atmospheric circulation over East Asia and the North Pacific in the PMIP2 coupled model simulations" *by* W. Yanase and A. Abe-Ouchi

Anonymous Referee #1

Received and published: 8 May 2007

Review of "The LGM surface climate and atmospheric circulation over East Asia and the North Pacific in the PMIP2 coupled model simulations" by W. Yanase and A. Abe-Ouchi

General comments

This short manuscript describes the changes in precipitation and atmospheric circulation over East Asia and the North Pacific region during the last glacial maximum (LGM), as recently simulated by the models of the PMIP2 project. So far, to my knowledge, no paper has focussed on this region basing its discussion on the results of different models, and therefore presenting the model-related uncertainty of their results. This

manuscript therefore fills a gap in the description of the LGM circulation and climate. The paper is clearly written and well organised, although the English would certainly need polishing from a native English speaker. The figures got quite small on my version of the manuscript but this could be related to the editing system rather than to the initial figures sent by the authors.

In this manuscript, the authors show that the precipitation changes between the LGM and present climates are not only a matter of 'colder climate - less precipitation'. They clearly show the dependence of precipitation changes on atmospheric circulation changes, the latter being rather different in summer and in winter, in the sense that the summer circulation anomaly can be summarised as a weaker North Pacific sub-tropical high, while the winter circulation is characterised by a stronger Aleutian Low and a Pacific storm-track which is more active and shifted to the South. The summer changes in precipitation are analysed in terms of advection and precipitable water anomalies, which proves to be quite a pedagogical study. Because the atmospheric circulation is so different in summer and winter, I found it very interesting to see the separate discussion for both seasons. This should definitively be kept in the final manuscript. By showing simple mechanisms explaining climatic changes over East Asia and North Pacific, I think this work will be useful not only to modellers of climate change, but also to the community retrieving data.

I have therefore no hesitation in recommending this manuscript for publication in "Climate of the Past" with minor revisions listed below and a careful editing of the English language.

Detailed comments:

Abstract, last sentence: the authors should be more precise about which aspect of the simulations agree with the paleoclimatic records (by the way, I think it would be more appropriate to use an expression such as 'paleoclimatic reconstructions' rather than 'geological record').

CPD
3, S293–S296, 2007

EGU

Section 1, second line: reduced CO2 concentration: please insert “atmospheric” before the word “CO2”

Page 657, description of the boundary conditions: rewrite the sentence, solar insolation is not deduced from the ‘geological record’, but computed (see Berger 1978, which should be in the list of references).

Page 658: other PMIP2 references could be added from this climate of the past special issue.

Page 659: the manuscript compares the results of the 5 coupled GCMs available from the PMIP2 database. In this database, there actually is a 6th model, ECBILTCLIO, which is a model of intermediate complexity. However, it would be worth including this model in the comparison. Indeed, it is worth documenting how this type of models compares with the results of the more complex GCMs, and it can also bring insights about the mechanisms at the base of the simulated climatic changes. For instance, I would expect processes such as winter storm-tracks to be stronger in the higher resolution GCMs, and this could have an impact on the location of precipitation changes simulated by the models.

Page 660, description of Fig. 1b-g: is the global average of sea level pressure from each model removed from the anomaly simulated by the model, or is it the average over the models of this global average which is subtracted from each model results?

Page 661 and Fig. 3: if the absolute values for the LGM for the wind and precipitable water could be given in addition to what is already shown, that would be nice. Indeed, it is important to know, for instance, where the wind changes direction from North to South. The same results as those already shown for the present-climate but given in another colour could be added on the graph showing the present climate results, thus not adding another graph.

Page 662, fig 6: same as fig. 3

CPD

3, S293–S296, 2007

Page 662, top: the seasonality of precipitation changes is not very obvious from the figures over some regions, such as East Asia. It could be great to also have a hövmoller plot, giving precipitation anomalies over the discussed region as a function of the time of the year. This would show the lengths of the “summer” and “winter” behaviour, respectively.

Page 662, at the end: the temperature gradient anomalies instead of the simple temperature anomalies should be discussed in relation with changes in the winter storm-track.

Page 663, top: here the authors could also refer to the storm-track study from atmosphere-only PMIP1 GCMs by Kageyama et al (1999).

Page 663, section 4.1: the comparison with previous atmosphere-only GCM experiments could also be performed using the PMIP1 results, but this should be kept short if added to the manuscript. For instance, the authors could add a figure presenting the mean and standard deviation of the prescribed and computed SST experiments on the precipitation and sea-level pressure results.

Page 667: the North Pacific subtropical high, the Siberian low in summer, as well as the Aleoutian low in winter, are all discussed in the manuscript. But what happens to the winter Siberian high?

Fig 7b, caption: the meaning of the arrows and contours should be given.

Interactive comment on Clim. Past Discuss., 3, 655, 2007.