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Climate of the Past Discussions

Interactive comment on "The importance of paleoclimate modelling for improving predictions of future climate change" *by* J. C. Hargreaves and J. D. Annan

J. C. Hargreaves and J. D. Annan

jules@jamstec.go.jp

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Reply to M. Crucifix.

We would like to thank Michel for his very helpful review, which by suggesting further work analysing the correlations has, we think, lead to an improvement in our understanding of the potential improvements gained from using information from the different epochs.

The comment on the climate mechanisms is much appreciated. Some work is underway here analysing feedbacks, looking at both the LGM and increased CO2 ensemble experiments, and we fully concur with the reviewer on the difficult challenge this

presents.

We agree that the issue of statistical significance is important and we have moved the discussion of false positives from its original location late in the Discussion section, to early in the Results (Section 4.1) where the significance threshold is first introduced, in order that readers may bear this in mind when reading the paper. This significance threshold used in the paper was never intended to be more than a rough guide to aid comprehension of the results.

Given the large uncertainties arising from inter-model differences (see Andrey's review), we think it may be a risk to present too quantitative a statistical analysis. There is also the awkward problem that redesigning the statistical tests in the light of the observed results contravenes the principles on which such tests are predicated. Rather than do so we have preferred to take the approach, suggested by Andrey, of toning down the claims of the paper. Please see the response to Andrey's review for details.

Thanks to your suggestion for further calculations, we have investigated further the question of how the correlation of the different present/paleo simulations influences their joint value for future predictions. We present some simple regression analyses in the text, specifically Section 4.1 discussing global analyses.

Regarding response modes, we expect the different spatial patterns of non-uniform forcings to act primarily on a local/regional basis (ie where they are imposed, rather than through modes of the climate system), and the data also provide highly regional evidence, which motivates our style of analysis.

As for your comment on the case for the mid-Holocene, we agree that it is not very compelling and don't view the paper as an attempt to save the mid-Holocene for the paleoclimate community. We expected to find that this period would be of little value as an analogue for future climate change, so the positive results we obtained in the northern hemisphere were a little surprising to us. Moving to the monsoon regions, it may I suppose be disappointing to some that the mid-Holocene precipitation does not

provide a stronger result, but we feel that the weakly positive result must be reported in the context of the strong data evidence, and the relative weakness of both the pre-indusrial and LGM results. I do hope that the case is not over-stated in the revised manuscript, but our results have actually encouraged us, at least a little.

Interactive comment on Clim. Past Discuss., 5, 2053, 2009.