Geoscientific
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Discussions

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comment

Interactive comment on "PMIP4-CMIP6: the contribution of the Paleoclimate Modelling Intercomparison Project to CMIP6" *by* Masa Kageyama et al.

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This paper nicely lays out the plan for PMIP4, which is part of CMIP6. It describes the history and rationale for this project, then reviews the experiments which cover five periods in recent Earth history and expand on those of previous PMIPs. The protocols for these experiments are described, a few potential pitfalls are noted for modellers to beware of, and useful links to other MIPs are noted. I think the project sounds exciting and hope that plenty of modelling centres are able to participate.

This article would benefit from some very minor revisions to improve clarity, but otherwise I am happy with it and don't see any major omissions. The minor revisions to suggest are:

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[Discussion paper]

C1

6, 18-29: Please mention (as I gather later though am still not 100% sure) that all of these experiments are "time-slice" experiments, i.e., the model is run to statistical equilibrium with time-invariant forcing specified based on the quoted point in time to give a representative mean state, except for the last millennium which is transient and includes time-varying forcings such as volcanic eruptions.

8, 19: The word "observed" should be reserved for the instrumental period with real observations âĂŤ can we instead say "proxy-estimated" (or similar)?

8, 29: By "mean values" do you mean global means? Time averages? Changes in global mean relative to modern?

10,40 By "trends" do you mean differences (relative to modern)?

11, 36: please fix error message

11,34: suggest "current" rather than "modern" (which can mean many things...from a palaeo perspective preindustrial could be viewed as modern)

17, 36-37: I don't think the polarity of the forcing is the real problem, but rather, the fact that some radiative forcing agents produce larger responses per unit global-average power input than do others, and/or provoke "rapid adjustments" to the forcing that are unrelated to global-mean warming or cooling. This is due to the spatial pattern of the forcing. Given the fact that a major goal here is to test model responses to forcings, and given that past forcings are different from the dominant ones we worry about for the future (greenhouse gases), this topic may deserve a bit more discussion.

Table 2: some of the cells in the table are blank, and I am not sure what this means. Suggest every box should say something (even if it is "see text")

Figure 1. I found this figure confusing; maybe you are trying to cram too much into one panel. The caption refers to panel labels (a, b, ...) but there aren't any. It is hard to figure out what each curve as and which axis refers to what (especially when there is one on each side, or where it switches from right side to left going from one column to

another). I would prefer the axes to be individually labelled with the quantity and units, or give the quantity in the title or above the curve and the units on the axis so we know we are looking at the right one. It is not at all obvious that they grey banded stripe is meant to represent the possible range of CO_2 in the left column; nothing wrong with showing it this way but please make clearer what everything is!

Figure 2a. I presume there are black dots hiding underneath the red ones for mid-Holocene and Historical? To help avoid confusion perhaps the caption could mention this.

Figure 2b. Please give units! Also, please explain in the caption what "OAV" and "OAC" refer to.

Figure 3. Please be consistent in labelling the panels (they are given (a,b) in the figure but you say lhs and rhs in the caption). Is this for land only, or land+ocean? What is STSI and ssTSI? Does 31 points mean 31 years? (give the time width of the smoothing window rather than the number of points)

Figure 4. It doesn't appear to me that the proxy data are able to tell us anything about the seasonal cycle, given that the differences are small compared to the scatter âĂŤ so is it worth including the two right panels in a review paper on PMIP? Especially since the figure is reproduced from another source so anyone who really wants to see the seasonal results can find them. I see later you are already requesting permission to use a portion of another IPCC figure, I'd suggest making a similar request here.

Figure 7. Please spell out "preindustrial" rather than PI since PI is not one of the study time periods and you haven't used this acronym much.

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