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

Anonymous Referee #1

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There is little doubt that PMIP made significant contributions in assessing the role of different forcings on past climate changes. The strength of a MIP comes of course from the clear definition of boundary conditions, forcings etc. Hence, it is absolutely useful to describe these as clearly as possible in the peer-reviewed literature. Having said this, I am struggling with the purpose of this ms. Large parts read like an (unconvincing) attempt to justify PMIP4. Instead of repeating what was done in PMIP 3, the ms. would be much more convincing if the authors could outline which insights into climate processes were gained that would have been impossible without PMIP (using a few examples). In my view, there is too much description of modeled changes and matches/mismatches with proxy data but too little information on real insights into

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climate processes - especially on processes that are of relevance outside the paleoclimate community.

My understanding is that the ms. should serve as an entry point to a series of more specialized descriptions of the experimental setup for the individual time slices. While such a publication strategy seems very useful, it also means that repetition can and should be avoided. In my view this overarching ms. should have a clear focus on what is now sect. 3 as well as on common issues among the experiments. Here, I am surprised that some important aspects are only mentioned in passing:

- River routing: the recommendations are quite vague for the LIG and the Pliocene (recalling, for example, that the modern river-system draining into the Arctic developed to a large part after the LGM).

- Which plans exist to assess the results from LGM experiments using different ice-sheet configurations?

- Spin up: how is an insignificant trend defined in the framework of PMIP?

- I was surprised to read nothing about the calendar problem [Joussaume and Braconnot, 1997], that featured high in earlier cycles of PMIP.

While I am generally very much in favor of the PMIP community to publish their experimental strategy, the current ms. needs considerable re-writing to become a useful contribution. I would suggest to drastically reduce the length and to focus it on new aspects:

- Sections 1 and 2 contain almost no new information and should be largely replaced by a concise summary of dynamical insights gained from earlier PMIP phases (see above)

- Figs. 2-5 were published elsewhere and should be removed

- Focus should be on what is now sections 3 and 4.

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Finally, someone out the large group of authors should read the ms. from beginning to end to ensure that the wording/style is consistent (incl. the ref. list; “et al” vs. et al.”; paleo vs. palaeo) and that geological ages are correct and consistent among the ms. (mPWP 3.2 Ma vs. 3.3-3 Ma; incorrect start of the Quaternary at 2.5 Ma).

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