

Clim. Past Discuss., referee comment RC1
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Comment on cp-2021-163

Pepijn Bakker (Referee)

Referee comment on "Calendar effects on surface air temperature and precipitation based on model-ensemble equilibrium and transient simulations from PMIP4 and PACMEDY" by Xiaoxu Shi et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-163-RC1>, 2021

The manuscript presents an analysis of PMIP4 simulations for the PI, MH and LIG and investigates the importance of the definition of the calendar. Although this has been done previously and the new results largely confirm previous ones, this new analysis is still useful as it includes an ensemble of climate model simulations and thus allows one to test the robustness of the findings over multiple models.

Major comment:

Lines 92-93: In the literature various methods are presented to adjust monthly data towards a angular calendar. In this manuscript reference is made to Rymes and Myers (2001), but how different or similar are the various methods? So for instance Bartlein and Shafer (2019) and the various other methods that they mention in their publication (Pollard and Reusch, 2002; Timm et al., 2008; Chen et al., 2011). It would be very informative for the reader to know whether the results presented in this manuscript generally hold for all those methods or if some should be avoided.

Bartlein and Shafer (2019) made their code to perform the calendar adjustment freely available and 'user friendly'. It would be great if the same could be done with the code used in this manuscript. A reference to the code could then be added in the manuscript.

Minor comments:

Line 60: Scussolini et al. 2019 do show LIG results for precipitation and temperature for both the classical calendar and the angular calendar.

Line 72: Perhaps it is good to mention that in the results section you will first briefly describe the main features of simulated MH and LIG temperatures and precipitation (describe in more detail in previous publications) and after that you will focus on the main topic of the manuscript, namely calendar-effects.

Line 110: For consistency it would be better to mention the initialization procedure of all three transient simulations, not just for IPSL.

Line 141: Perhaps good to not only focus on the comparison to earlier work on PMIP4 results, but also shortly on previous iterations of PMIP and other projects. For instance Lunt et al., 2013; Scussolini et al. 2019.

Section 3.3: this section is rather long. Consider breaking it up in several sub-sections, for instance one on temperature, precipitation and one on using monthly data to calculate angular-seasons.

Lines 240-242: The authors say that these are 'significant' differences, but the meaning of the word significant is unclear and undefined in this context. Better to replace it.

Lines 347-359: these lines are rather vague. A reference is made to major model-data mismatches that are being discussed in the literature (e.g. The Holocene temperature conundrum). So what do the results of this manuscript have to add to those discussions? Can an estimate be given on the possible magnitude of calendar effects on this model-data mismatch? Or, if not, how could this be investigated in future work? Please clarify the link between the current manuscript and the work that is mentioned in this last paragraph.

Figures 5-7: It is always a difficult choice whether to show precipitation changes in units of mm/time or as percentages. The authors choose to use mm/month and as a result the tropical regions supposedly show the most marked changes in precipitation while in terms of percentages the picture might look quite different. Consider adding figures to the supplement that show percentage precipitation changes.

Technical comments:

Line 44: replace the word 'bunch'

Lines 57-58: "hereafter referred to as fixed-length or classical calendar". Perhaps better to use only one of the two in the remainder of the manuscript to avoid confusion.

Lines 107 & 111: use subscripts for the names of the greenhouse-gasses.

Line 130: replace 'at the' by 'over' or perhaps 'in'?

Main article figures and supplementary figures: Just for clarity, mention in the figure captions when the figure shows multi-model-mean results.