



Interactive comment on “Climate forcing reconstructions for use in PMIP simulations of the Last Millennium (v1.1)” by G. A. Schmidt et al.

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Anonymous Referee 1

1/ From my reading, it seems that the authors consider, on the basis of current knowledge, that the solar forcing reconstruction of Shapiro et al. (2011) is likely less reliable than the other ones. It may be an overinterpretation from my side but a clearer statement regarding this point would be useful. I understand that the authors do not want to impose a particular reconstruction but do they recommend to select this time series as a sensitivity study when a simulation with a particular model has already been performed using another solar forcing or do they simply let the choice among all the proposed series?

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We would suggest using this as a sensitivity study and have added this explicitly to the text.

2/ Page 2454, line 20. A reference for the pre-Columbian population estimates would be useful.

These are now explicitly stated, and the sources given (Pongratz et al, 2008; Krumhardt, 2010).

3/ Figure 4. Add in the caption the meaning of the acronyms for an easier reference.

Done.

4/ Figure 4. It is difficult to see the difference between PEA and CEA.

Colors were changed.

Anonymous Referee 2

1) the discussion of land use change is somewhat confusing. The writing doesn't clearly bring out the differences between Kaplan and Pongratz. Does Pongratz assume that land use per person is largely unchanged over time, or does the land use change (the writing mentions that the uncertainty estimates consider changed practices over time). The difference between both could be worked out clearer, to get the reader to better understand where the relatively large difference in land use change comes from. It would also be interesting to hear if the regional changes are similar in both (basically close to scaling) or if they are different.

This has been rewritten to increase clarity and detail.

2) I am unconvinced that the albedo change is the only relevant aspect for radiative forcing by land use change - does that stand up to using other GCMs? How important are changes in the hydrological cycle caused by deforestation which would change cloudiness?

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We agree with the reviewer that biophysical aspects of land use/land cover change other than albedo are relevant. We have discussed this issue in more detail in v1.0 of this paper:

“This land cover change has a direct impact on the albedo of the surface, but also indirect impacts on water cycling, surface roughness and soil characteristics. There is also an implied impact for CO₂ emissions and CO₂ uptake capacity of the terrestrial biosphere, but which are not considered here since they are implicit in the greenhouse gas concentration changes” and “We include an estimate for the radiative forcing associated with land use/land cover for surface albedo changes (Pongratz et al., 2009). This may be model dependent (Pitman et al., 2009) and does not include the implied changes in CO₂ (which are implicit in the greenhouse gas records), or the effects of evapotranspiration changes (Davin et al., 2007; Pongratz et al., 2010).”

We refer the reader to this previous discussion in Section 4 of the present manuscript:

“As previously described in v1.0, these forcings are model dependent and do not include the impact of consequent carbon emissions, or the impact of changes in evapotranspiration.”

Effects on hydrology and cloudiness have been simulated in a multitude of previous studies, and consensus as well as disagreement across models been discussed (see e.g. Brovkin et al., *ClimDyn*, 2006; Pitman et al., *GRL*, 2009, Pongratz et al., *GRL* 2010). We restrict depiction of land use impacts in our Figure to albedo effects, because albedo changes are the only biophysical effect that can be expressed in terms of tropopause radiative forcing. Further, albedo changes are likely also the dominating biophysical effects on the global scale (Betts, *Atmos Sci Lett*, 2001).

3) Fig 3 caption could spell out SSI, Fig 2 caption could spell out the land use data and figure 4 needs to spell out what the acronyms for the forcings mean (makes no sense to the noninitiated like this...)

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Done.

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