

## ***Interactive comment on “The biogeophysical climatic impacts of anthropogenic land use change during the Holocene” by M. C. Smith et al.***

**Anonymous Referee #2**

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The authors present a study for assessing the bio-geophysical climatic impacts of anthropogenic land use change during the Holocene. In the control experiment the changes in orbital configuration, greenhouse gases, and icesheets/sea level lead to monotonically increasing global temperatures through the Holocene. Apparently, introducing historical land use changes alters this relationship. Results show mainly due to albedo effects and teleconnections, that the vast majority of points show a show a negative temperature trend, e.g. a cooling effect.

General remarks

Although I'm not a climate modeler, a study such as this one has its merits on its own, one has to be careful in interpreting the results. One important issue is that only one historical land use change scenario used, which is correctly addressed by the authors

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(line 25, 'Whilst these are the results from only one model there are many similarities in the distribution of the temperature anomalies with those found by He et al. (2014) for 1850CE and Pongratz et al. (2010) for the 20th century although the temperature changes found in this study were greater e.g. a pre-industrial global annual mean temperature anomaly of 0.23 oC as opposed to the 0.17 oC estimated by He et al. (2014).

I completely agree with the authors that 'Running similar simulations with a greater number of models would improve the robustness of the results as the variability in the results from different models can be greater than the variability of the property that is being assessed (Pitman et al., 2009; de Noblet-Ducoudré et al., 2012; Brovkin et al., 2013).'

Page 4619, Line 20-25. The authors acknowledge that there is a lot of uncertainty in global land use reconstructions (e.g. HYDE 3.1 is much lower than KK10). Strangely, 'The decision was taken to proceed with the KK10 data due to its assumptions of a larger per capita land use earlier in the Holocene.' (page 4620, line 1-5). Why is that? Is more land use per capita better? Better than what? Would the results be different with HYDE? Please explain.

Again, I very much subscribe the need for ongoing international initiatives that aim to synthesize paleo-ecological and archaeological data leading to more robust reconstructions of Holocene ALCC in the future (e.g. PAGES LandCover6k project).

Minor remarks

Abstract, line 4. 'Various studies . . . .' needs a reference.

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