

***Interactive comment on* “Impact of model resolution on Holocene climate simulations of the Northern Hemisphere” by Axel Wagner et al.**

Anonymous Referee #1

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Review of “Impact of model resolution on Holocene climate simulation of the Northern Hemisphere” by Axel Wagner, Gerrit Lohmann, Mattias Prange.

This work analyses the impact of resolution on Holocene Northern Hemisphere temperature and atmospheric circulation in ECHAM5 model. Authors found that winter temperature differences among sensitivity experiments are mainly due to changes in the orography and resolution, both affecting the pattern of stationary waves and transient eddies. On the other hand, summer temperature differences are attributable to difference in the cloud cover due to different subgrid parametrization between low and high resolution sensitivities.

General comments: The paper is overall well written and addresses very well the problem of the resolution impact on past temperature with a dedicated set of sensitivity

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Discussion paper



experiments well designed. I think however that in order to be published, further investigation is needed, especially on the dynamical influence on DJF temperatures.

Specific comments: Ln 111: why PMIP2 boundary conditions and not PMIP3?

Ln 306-311: Adding another section specifically on how stationary waves influenced temperature patterns in the past would be a valuable contribution for understanding regional discrepancies between simulation and proxy reconstructions. Furthermore, the discussion section is too long and sometimes seems just a list of previous work findings (seems an extension of the introduction): in my opinion, it can be shorten, focusing only on the discussion of the results.

Ln 314: Which differences are you talking about? You must be more precise. Adding a comparison with proxy reconstructions would be very useful. Reporting previous findings on the discrepancies itself in the discussions is not enough in order to “solve the problem” in this specific contest. You should be able to quantify those discrepancies between simulations and proxy reconstructions and being able to address to which extent, increasing the resolution would help reducing them. In fact, many other reasons can be imputable to the disagreement between simulations and reconstructions: e.g. dust concentration, vegetation cover. . . not only clouds. . .

Technical comments: Ln 113: “present-day” . . . in order to avoid ambiguities you should write “pre-industrial”. Ln 114: You should specify LR_oro before - around Ln 108 - 113. Ln 153: “. . . betwee n” . . . is the space a typo? Ln 220: Erase “The” at the beginning of the sentence.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2018-172>, 2018.