

Interactive comment on “The relevance of mid-Holocene Arctic warming to the future” by Masakazu Yoshimori and Marina Suzuki

Anonymous Referee #1

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This paper discusses the decomposition of the changes in surface temperature into local and global feedback contributions, related to the different components of the surface energy balance. This decomposition is performed both for Mid-Holocene (compared to pre-industrial) and future warming (under RCP4.5 scenario).

As a general comment I would say that I found the paper difficult to read, although I cannot figure out exactly the reason (either the topic or the language).

I also found that the discussion is not really a discussion, but rather a perspective and conclusion. After reading the manuscript, and although I acknowledge similarities in climate changes between MH and the future, I still do not understand the ‘relevance of mid-Holocene Arctic warming to the future’. This should be the major item in the discussion.

The conclusion of the paper is not very new. It has already been repeated many times that ‘improvement of the ability of the model to simulate the past will increase the confidence in their ability to simulate the future’. I would suggest to identify a ‘crispier’ conclusion.

The manuscript is missing a data availability section. Moreover, data citations are also missing (in addition to the references that are indeed given). This is the case, at least for the data of Bartlein et al (2011) and Sundqvist et al (2010). Moreover, the code used to extract the values displayed in figure 5 should be made publicly available as well (with a reference in the data availability section).

Specific comments.

P1-I29 : is it solar forcing?

P2-I1 : I assume that the ‘scenario’ refers to RCP scenarios. This should be made clear.

P4-I16 and P7-I13 : there is a reference to Sect. 3a, which does not exist (at least as such).

P6-I33 : According to my reading of the figure, the simulated warming only occurs in the northern North Atlantic and Arctic oceans, where there is no data. It is therefore very difficult to say if it is under- or over-estimated. Or do the authors call ‘warming’ the negative values in the figure?

P7-I16 : ‘plays an important role’. According to my reading, this is only true in JJA.

P7-I32 : ‘exhibits a large contribution’. This does not really seem to be the case for MH.

P8-I9 : could the authors make the label coherent (Dtas in the text, Dta in the figure).

P10-I11 : PMIP3 instead of PMIM3

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P10-I22 : The authors should make their conclusion readable by itself. It should be said that the Arctic warming is for the future (under RCP4.5).

P10-I33 : 'seeking possible analogues between physical processes in the past and future climate'. Do the authors mean that the climate processes are time dependent? I thought that they were based on basic physical principles valid through time. Moreover, as we do not know the future climate it is hard to look for analogues there and then.

P15 : A reference is missing here.

P 21 : The figure is misleading because the Y-axis (scale) is not the same for MH and RCP4.5.

P23-I4 : I do not see two (black and blue dashed) lines. Are they exactly superimposed? In that case, this should be mentioned in the caption.

P24-26 : Figures 6-8 are not using the same number of models. (1) the name of the models used should be mentioned. (2) Not using all the models (and not always the same models) may introduce a bias in the interpretation. Would the conclusion be the same if only the models (and their outputs) available for all the figures were used?

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