Geoscientific
Model Development
Discussions

Interactive comment on "Simulating the mid-Holocene, Last Interglacial and mid-Pliocene climate with EC-Earth3-LR" *by* Qiong Zhang et al.

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Thanks for your comments, follow your suggestions we have provided more information and revised the manuscript, below is our response to your comments.

1. Indeed, we should provide more information on the model since the reference paper is still in preparing. In the revised version we have added more information on different model component.

2. We have now introduced the model resolution used in the other EC-Earth3 CMIP6. The standard CMIP6 model version with atmosphere resolution T255L91 (horizontal $\sim$ 80 km) and ocean resolution ORCA1L75 (horizontal 1x1) is used in most of the MIPs (e.g., CMIP, DCPP, LS3MIP, PAMIP, RFMIP, ScenarioMIP, VolMIP,

CORDEX, DynVarMIP, SIMIP). The high-resolution model version with atmosphere resolution T511L91 (horizontal $\sim$ 25km) and ocean resolution ORCA025L75 (horizontal 0.25x0.25), is used in the decadal prediction DCPP and HighResMIP. These are included in the revised version.

3. Fig S1 is to show the spinning up process and we prefer to keep that in the supplement. We agree that an evaluation for simulated PI climate is necessary. Beside showing the comparison of the simulated PI temperature with reanalysis, we now added a new figure on comparison of the simulated PI precipitation with ERA20C. The comparisons show that the EC-Earth3 model does have the cold and dry biases in northern Hemisphere and warm and wet biases in southern Hemisphere in PI control.

4. The imblance between net TOA and net surface radiative fluxes is different with different resolution. In the EC-Earth3 standard resolution T255L91, the difference is in the order of 0.25 W/m2 (Döscher et al., 2020) and for the high resolution T511L91 the imbalance is 0.9 W/m2 (personal communication). We have revised the text to provide the citable information for T255L91.

We now improved the section 3.4 as suggested. The spin-up of EC-Earth3-LR PI control is run for approximately 1000 years during the course of development and tunning process. The 200 years spin-up run shown in FigS1 is continued from the previous long spin-up by applying the implemented physics described in section 2. In the revision we have added more information on the PI run, as well as the comparison to PI runs with other model versions.