

Interactive comment on “Simulation Improvements of ECHAM5-NEMO3.6 and ECHAM6-NEMO3.6 Coupled Models Compared to MPI-ESM and the Corresponding Physical Mechanisms” by Shu Gui et al.

Shu Gui et al.

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Reply to minor comments:

1. Fig. 8: Unit of color contours missing.

Reply:

We are sorry for the mistake. The figure units have been added.

2. Fig. 8: Why does the MOC plot stop at 1600m depth?

C1

Reply:

According to previous studies (Liu et al., 2011; Buckley and Marshall, 2016), the MOC in upper levels plays an important role in heat transport that affects the air-sea interaction. The NPMOC at deep ocean levels has not been discussed in Liu et al. (2003). Without comparison with other studies, we are not sure how to correctly interpret the model biases.

3. Page 8, Line 6: Details for the reference Huang et al. (2014) are missing.

Reply:

Thank you for reminding us about the problem. We have added the reference in the bibliography.

4. Page 5, Line 29: It is not clear whether the control experiments for the ECHAM5/NEMO3.6st and ECHAM6/NEMO3.6st setup use present day or piControl external forcing. Please clarify.

Reply:

We use the present day climatology, which is also written in section 2.4.

5. Page 11, line 5: The Wang et al., 2014 paper cited focuses on the Atlantic MOC and not on the Pacific MOC, hence the citation in this context is not appropriate.

Reply:

Thank you for pointing out the problem. In the revised manuscript, section 5.1 contains inter-model comparison of both NPMOC and AMOC. Therefore, this reference is unremoved.

6. Page 11, line 15: The Ge et al., 2017 reference is not appropriate in the context, as Ge et al., 2017 focus on the impact vertical resolution on the SST bias in a ocean model (MOM5) driven by reanalysis data and not the impact of coupling frequency.

C2

Reply:

Thank you for pointing out the problem. We have removed the citation.

7. Page 11, line 31 and Figure 9: Please provide the coordinates you use to determine the SEC region. Figure 9 does not show zonal averages (longitudes on the x axis) as indicated in the text. Please correct.

Reply:

Thank you for pointing out the problem. The statement has been corrected. The coordinates used to calculate the vertical circulation are marked within the box on subplot(d) (Fig. 11 in the revised manuscript).

8. Page 12, line 28: LH flux and evaporation describe the same physical process, so there is no need to discuss the two separately.

Reply:

Thank you for your suggestion. We have deleted the relevant content.

So far, we have addressed all the questions in the SC5 and have modified the manuscript according to your comments. Thank you for giving us so many suggestions.

Although the answer to some questions may not be satisfying for you, that is the best level we can achieve at the current stage. we will do better in future.

The final version of manuscript is attached in this post, with yellow highlights on the major modifications.

Please also note the supplement to this comment:

<https://www.geosci-model-dev-discuss.net/gmd-2018-130/gmd-2018-130-AC10-supplement.pdf>

C3

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2018-130>, 2018.

C4