

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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Dear Dr. Ying Jun:

Thank you for your thoughtful comment. We agree that the SST and oceanic dynamics are usually considered in the air-sea coupling systems for climate response to an external forcing. The atmosphere affects the oceanic dynamics through momentum and radiative fluxes, while the ocean transfers SST, surface currents and sea-ice fraction to the air-sea interface. However, the air-sea interaction is based on the non-linear

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systems of atmospheric and oceanic dynamics in each component model, which can go beyond normal understanding of the key coupling processes within.

As we have confirmed through correlation analysis, the latent heat flux (evaporation) holds the maximum pattern correlation with SST variation. This can be explained with newtonian cooling effects. After replacing the oceanic component model, the ocean velocity differences induce the ocean temperature changes, which in turn modulates the sea surface evaporation through newtonian cooling. Due to time limitation, we haven't further probed into the topic in this regard, i.e. which part of the changes in the oceanic model accounts for the discrepancies in latent heat flux. We shall throughly discuss it in another paper.

King Regards,

Gui Shu and co-authors

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