

Interactive comment on “Partially coupled spin-up of the MPI-ESM: implementation and first results” by M. Thoma et al.

Anonymous Referee #2

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Review of “Partially coupled spin-up of the MPI-ESM: implementation and first results” by M. Thoma et al.

Overall comments:

This is one of most interesting papers I have ever reviewed for years. I applaud the effort of trying out the partial coupling approach to constrain of the wind-driven ocean state so as to constrain the climate and provide a possible way for initializing climate forecast. What I find interesting about the paper are that by prescribing the the anomalous component of the reanalysis wind stress for the ocean, the Modini-MPI-ESM can yield considerable skills in emulating the historical fluctuations of the climate modes of variability, regional climate records, and even the interannual variations in polar ice extent and volume. In particular, the Modini approach can also replicate the hiatus of

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the global surface temperature during the past 1.5 decades. I have a few relatively minor comments, otherwise the paper is already in good shape and almost acceptable for publication.

1. Other effort along similar line may be compared or at least mentioned. For example, the correlation map (Figure 1) may be compared with those from the interactive ensemble experiments with NCAR CCSM (Chen et al. 2013 JCL; <http://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-12-00292.1>).

2. Comment on Figure 1e why the Modini ensemble produces larger fluctuation of the Nino-3 index than the single realization of the observation. Could it be that the ENSO variability in the freely coupled MPI-ESM is too strong?

3. The sentence in the middle of page 5557 may be taken out of the parenthesis, since the message is quite important. Also, the authors might want to comment that the skills arising from the prescribed wind forcing may not be fully realizable in the actual prediction, since wind itself is the result of the air-sea coupling. According to the insights gained from the interactive ensemble approach, the low-frequency variability over the Atlantic is primarily forced by weather noise (ftp://cola.gmu.edu/pub/ctr/CTR307_ms.pdf). If that is the case, the wind used to drive the ocean is largely the result of the noise forcing and thus doesn't provide much real predictability.

4. In several places, it is said that "the serial correlation does not play a role". What is the basis for these claims? Using PDO as an example, the existence of the decadal scales decreases the effective degrees of the freedom of the PDO index, and this should impact on the significance of the correlation.

5. "vulcanic should be "volcanic".

6. Figure 6: you may want to add labels for the regions to improve the readability of the figure.

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7. 1st paragraph in page 5560: The skill in SAM in the Modini simulations might come not only from ENSO, but also the local wind stress in the Southern oceans, given that the wind-stress feedback in the SAM is positive (Lu and Zhao, 2012).

8. Line 22, page 5562: consider changing “no” to “marginal”.

9. Line 6, page 5563: delete “rather”.

Interactive comment on Geosci. Model Dev. Discuss., 7, 5547, 2014.

GMDD

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