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**Geoscientific
Model Development
Discussions**

Interactive comment on "The atmosphere-ocean general circulation model EMAC-MPIOM" *by* A. Pozzer et al.

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We thank referee #3 for her/his comments.

We partly understand the concerns raised by the referee regarding the necessity to have an evaluation of the climate model in this paper. The referee mentioned that "we know how they [ECHAM5 and MPIOM] behave and can assume that the MESSy coupler doesn't change this". In our evaluation simulations performed, we confirm this, rather than assuming it, in particular since MESSy is not a "coupler" comparable to OASIS. The analysis showed that the changes required in the MPIOM code (e.g., using another "master" to call the subroutines) do not alter the model results. For this reason we think it is important to keep this section as a proof, yet keeping it as short

as possible.

We agree with the referee that the resolution used in our simulations is not a standard resolution used for the CMIP5 simulations. It must be stressed, however, that our next steps are to include processes of atmospheric chemistry and biogeochemical processes in the ocean. This will increase the demands on computational power drastically, therefore we need a reduced resolution, which still gives reasonable results. We will add this motivation to the revised manuscript.

As mentioned in our replies to S. Valcke and referee #2, we argue that the overall model performance cannot be easily predicted, since it strongly depends on the resolution, the number of available tasks, the mode setup, etc. Hence, our performance analysis does not provide general conclusions and any other additional simulation will suffer from the same uncertainties. We are hence reluctant to perform additional simulations, because these would also be not conclusive.

The inclusion of atmospheric chemistry (and ocean biogeochemistry) is the natural next step, but clearly beyond the scope of our present study. Here, the focus was on the alternative coupling method, its role for the overall run-time performance, and the analysis that our modifications do not deteriorate the results. Therefore, we prefer to keep this study as first documented milestone on the way towards a new, dynamically **and** chemically coupled atmosphere-ocean model system. If the chemistry is fully operational, new scaling tests are clearly required.