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Interactive comment on "MetUM-GOML: a near-globally coupled atmosphere–ocean-mixed-layer model" *by* L. C. Hirons et al.

E. Maisonnave

eric.maisonnave@cerfacs.fr

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As computing scientist, my comments are exclusively related to technical issues that I would like to see better detailed by the authors and not the evaluation of model results.

My main question concerns computational cost of the system, "comparable [...] to running in atmosphere-only mode". It is written that MC-KPP is "computationally inexpensive (<5% of the cost of the atmosphere ...)", and it is clear that this cost is smaller than for a full ocean model, but I would appreciate to know if the MPI communication library has been used to parallelize this mixed-layer model, to be able to evaluate its scalability at higher resolution. I also would like to know how much additional comput-

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ing cores are necessary to run MC-KPP. To summarize, and have a clear idea of this computational cost (including coupler and coupling synchronization), may I suggest to the authors to provide two simple numbers for both atmosphere-only and MC-KPP coupled runs ? The number of simulated year per day and the number of core.hours necessary to simulate a year.

My second question is related to flux correction technique (2.1.1 §). I wouldn't say that "constraining ocean temperature and salinity profiles in the coupled model produces small SST biases" "by construction" "in the resulting free-running simulation". In this free-running simulation, a correction is imposed "with no interactive relaxation": it means that the coupling could freely lead to substantially bigger anomalies than the imposed correction. It is not the case in your simulation, but it is not as obvious as "by construction" can suggest it. Could you describe with more details how this correction is calculated ? And could you precise if Figure 1b shows results of a free-running coupled simulation with correction made with a15-day relaxation run ?

Another correlative question that seems not addressed in this document is the possible drift in the free-running simulations ("K"). Mixed-layer models are particularly sensible to flux correction calculation: small differences in imposed correction values lead, sooner or later, to temperature and salinity drifts in free-running simulations. I didn't find any information about this drift, since Figure 1b only shows an average value (of 10 years ?). This value is important to determine the maximum length of the free-running simulations (before reaching biases values comparable to that of full ocean coupled simulations).

I am interested by this powerful and necessary framework and would like to know how easy it is to adapt MC-KPP to another atmosphere grid. Maybe a few sentences about how this grid is defined and how parallelization (if any) is organized would help me to evaluate the amount of work necessary for such operation.

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7, C1989–C1990, 2014