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Geoscientific Model Development Discussions

Interactive comment on "Impact of ocean coupling strategy on extremes in high-resolution atmospheric simulations" *by* C. M. Zarzycki et al.

Anonymous Referee #2

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This paper is a short study that points out some spurious effects when the surface fluxes in an atmospheric GCM are computed on a coarser grid. In particular, this leads to wind stress vectors that are not always aligned with the surface wind, leading to a mis-representation of extreme events. The problem is demonstrated here with an atmosphere-only GCM, but it should remain present in coupled mode.

This problem may not occur very frequently in practice : not all atmospheric models compute surface fluxes on the ocean grid, and it is probably relatively rare to have a coarser ocean resolution, especially now that surface datasets at 0.25° exist. Still, it is something to be aware of when designing the interface of a GCM (along with the converse issues for the ocean with a coarse atmospheric grid). The problem pointed out may not be immediately apparent as the mean state is not impacted, and the paper

shows it in a clear and pedagogic way. It should therefore be a valuable addition to the literature on model development.

Minor comments:

1. Title could be more specific (fluxes on coarse surface grid... rather than "coupling strategy" when imposed SSTs are used here).

2. Maybe a comment could be made in the intro or model section on why the fluxes are computed on the surface model grid in the first place ? (History of higher-resolution surface grid presumably). This would fit with the conclusion that fluxes should always be computed on the finest grid.

3. Conclusion, first line : "atmospheric extreme climatology" is a bit awkward: distribution of extremes in atmospheric circulation ? Or just "strength of tropical cyclones" ?

4. Figure 5 : Legend does not explain panels (c,f) type of simulation. Note that there are few differences between the (e,f) panels only because the SST used has no small-scale structure; there would presumably be more impacts in the presence of oceanic front or eddies.

Interactive comment on Geosci. Model Dev. Discuss., 8, 7983, 2015.