

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

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Context and recommendations

The aim of this paper is to emphasize the role of the model configuration in the computation of the atmosphere/ocean fluxes as well as their feedback on TCs. When the ocean grid is coarser than the atmospheric one, wind stresses computed on the coarser grid tend to be underestimated and cannot modulate the atmospheric winds, leading to overestimated TC strength. The authors demonstrate that fluxes should be calculated on the finest grid to allow better equilibrium between the two models.

The paper is clear and well written and the problematic is easy to understand for the reader. The experimental protocol has been well constructed to answer the question.

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Some deterministic simulations have been performed to illustrate the effect of the resolution on forecast of the real case of Leslie.

For the reasons explained in the next section, I do not think that the paper is ready for publication. Nevertheless, since the changes that I would suggest to do are not so large (addressing other characteristics of TCs in the first part and comparing deterministic simulations with observations of Leslie, deeper discussion on surface heat fluxes), I suggest that the paper may be accepted after minor revision.

General remarks

It would have been interesting to assess some other characteristics of TC activity, such as life duration, track density (are the tracks impacted by the way stress are calculated) as well as associated phenomena such as rainfall but it would result in a longer paper. Deterministic simulations of hurricane Leslie are done to illustrate what have been showed in the climate simulations. If the effect of the grid resolution on wind stresses is clear in figure 5, the realism of the simulated hurricane has not been assessed, which should be, in my sense, the objective of such simulations. For example, it is not clear in figure 5 if resulting winds are different between the different simulations and which one is the nearest to real winds observed during Leslie. I do not really understand the usefulness of such simulations if comparison with observations is not undertaken. Climate simulations may be sufficient to demonstrate the impact of the resolution on wind stresses by a statistical approach. Figure 5 d, e and f show some results on surface heat flux (SHF); I wonder whether these results and related comments are useful in the paper. Indeed, since the reader understands well in which wind stress feedback impact strength of TCs, he may not be aware on the effect of SHF differences on TC characteristics. I suggest to suppress this part or explicitly show in what way differences in SHF influence the TCs.

Minor comments

Title : You should mention explicitly “tropical cyclones” instead of “extremes” since it

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is the only phenomena assessed in the study. Page 7987 line 26 :the expression “prescribed ocean/ice model” seems to me as misleading. It would be better to mention the ocean grid instead. Indeed, what I understand is that observed SST and ice are prescribed via the coupler CLM as in a fully coupled model but no ocean/ice model is run. I suggest to reformulate the sentence.

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