

Review of “Key ingredients in regional climate modeling for improving the representation of typhoon tracks and intensities”

By Sun et al.

Submitted to HESS Manuscript # hess-2023-222

Recommendation: Minor revision

Summary

This study investigates the influence of different combinations of model parameterization, nudging, and initial conditions on typhoon simulations using the WRF model, focusing particularly on the PRD region. Four typhoon cases within the region were simulated, and recommendations regarding the WRF model configuration in the area are provided. In comparison to the heavily cited work of Sun et al. (2019) in this manuscript, the emphasis of this study lies more on the model configuration, with less emphasis on comparing the results to observations as extensively done by Sun et al. (2019). I think this aspect could be improved if similar observation is available to the authors. However, with the substantial number of simulations conducted in this study, the results in this work appear robust. I have only minor comments for the authors to consider. It is recommended to pursue publication if the comments below can be satisfactorily addressed.

Minor comments:

L23: “Cu” should be “CU”

L40-45: the authors might want to cite another recent study below highlighting a potential positive trend in major TC landfall.

Wang, S. and Toumi, R., 2022. More tropical cyclones are striking coasts with major intensities at landfall. *Scientific reports*, 12(1), p.5236.

L79: “Sun et a.,” should be “Sun et al.”

L164: It appears the scientific question of the study can be further polished and specified. The authors tried some CU and MP schemes, but not all. Four typhoons were simulated, but, again, not all the typhoons in the region. Therefore it would be difficult to answer the question the authors put there for themselves, i.e., what is the best combination to simulation TCs in the PRD with WRF. Instead of finding the best combination, which is almost undoable with the current model setup, I wonder if it makes more sense to explore why one combination of schemes is better than the rest that were tested in the authors’ simulations. Here I’m not suggesting more

simulations, rather, I wonder if it would be helpful to rephrase certain sentences in the manuscript for better clarity.

L175: Again, I'm not asking the authors to conduct more simulations to increase the grid spacing, but it might be worth explaining why the resolution is only 5 km. Nowadays even higher grid spacing has been applied with some operational setup with ensemble simulations.

Table 1. I'm not sure "Convection-permitting (CP)" is the best way in defining the suite of simulations with no cumulus scheme. As the authors mentioned, 5 km "is within the gray zone" (L185), the 5-km grid spacing may not have convection permitted.

Figure 1. Please mark the PRD region directly with a box in the plot.

Figure 2. Please improve the resolution of the figure.

L526: please define θ_e first.