

Review of “Impact of environmental moisture on tropical cyclone intensification” by Wu L. et al.

Recommendation: Accept with Minor Revision

Overview

This paper investigates the influence of environmental moisture on the intensification of tropical cyclones (TCs) using the Weather Research and Forecasting (WRF) model. Guided by the results of the observational study by Wu et al. (2012), a series of simulations have been conducted with dry/moist air located in different quadrants relative to TC motion. It is shown that generally, the impact of environmental moisture on TC intensification is rather limited. Among the five simulations in this study, only the two extreme cases (i.e., relative humidity are set to the maximum value at each level) show significant impact on storm intensification. Specifically, more moisture in rear of the storm favors TC intensification while more moisture in front of the storm leads to weakening.

In summary, this paper is well written, containing new and exciting results highly relevant to the outstanding issue of TC intensification, although I have some concerns regarding the modeling framework and initialization. Therefore, I recommend that this paper be accepted after minor revision.

Major comments:

1. Section 2.1, line 17-18 (Page 16115), “Simulations are conducted with a parent grid at 9 km horizontal resolution and a vortex-following nested grid at 3 km resolution.” Since the simulation is initialized from ECMWF reanalysis (at a resolution around $1^\circ \times 1^\circ$), the coarsest WRF grid at 9 km horizontal resolution may be too small and could lead to some problems. I suggest that you add another domain at 27 km horizontal resolution and see how the results of your simulations differ.

Minor comments:

2. Section 2.2, line 20-22 (Page 16116). Do you mean the maximum RH within the parent domain? Or do you consider any specific radius within the storm center?

3. Section 4.1, line 10, change “MRI” to “MFI”

4. Fig 2b, there is a sudden change in MWSP at 30 h for MF and MR experiment, which is inconsistent with the trend in MSLP. What is the cause? Is that because of the changes in the storm size for each simulation?

5. Page 16124, line 11, change “ability” to “abilities”

6. Fig. 5 shows the differences between the MF and CRTL experiment. It will be clearer if you add another two panels showing the mean wind vector (m/s) and PWV (cm) for each of them (one for MF, one for CRTL). Same for Fig. 8.