

Interactive
Comment

Interactive comment on “Mesoscale processes for super heavy rainfall of Typhoon Morakot (2009) over Southern Taiwan” by C.-Y. Lin et al.

Anonymous Referee #2

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General Comments

This paper is to analyze the mesoscale processes (moisture fluxes) associated with a heavy rainfall associated with Typhoon Morakot (2009). Results from global analyses (0.1 degree from a combination of model and observational data) and regional scale numerical model (10 km grid spacing) are used. The results indicated that there are two processes, convergence of the southwest monsoonal flow and typhoon induced circulation, and westerly with highly moist air against the Taiwan Central Mountain Range, are responsible for the heavy rainfall.

The paper has rich (observed) information (images) related to Typhoon Morakot (damage). However, I would suggest that the authors delete the modeling section (1 page). The model's resolution is too coarse (10 km) and the moist physics is not good for

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this resolution (note that model could only resolve the cloud processes over 20 -40 km range). Also there is no detailed comparison between model simulated and large-scale analyzed moisture fields.

Specific comments

Fig 2 is discussed before Figs. 1a, 1b and 1c.

P13498, Line 10: Do you imply that 10 km grid spacing model simulation is better than 3 km grid spacing model simulation? Note that 10 km grid spacing can only resolve the cloud systems over 40 km (4 dx wave). Not sure the model “explicit” moist processes are good for this resolution.

P13499, Line 20: What data (T, Qv, U, V and W) were assimilated? How was the 4D data assimilation used (whole domain, or just a few layers near lateral boundaries)?

Fig. 1c: It is nice. What is the temporal resolution (ground based observed rainfall)?

Figs. 1d and 1d: How different between modeled and observed rainfall? (In addition to maximum rainfall accumulation)

Figs. 4d and 4e are good pictures. Not sure what we can learn from these (quantatively).

P13504, Line 20: Please conduct a simulation with 27 vertical layers to validate the maximum rainfall issue.

Fig. 5: The differences between model and NCEP GFS are significant. Why (even with utilization of the 4D data assimilation scheme)? P13505, Line 10: The 10 km grid spacing could not resolve the terrain well. The lifting may be underestimated. Therefore, the model results should underestimate the rainfall.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 13495, 2010.

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