Assimilation of Dropwindsonde Data in Tropical Cyclone Prediction: Impact of Microphysical Processes

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Dropwindsonde is an observing system that provides information on vertical atmospheric structure after being deployed at upper air; thus extremely useful to obtain data inside tropical cyclones especially over the ocean. In this study, experiments are performed to investigate the impact of dropwindsonde assimilation in forecasting track and intensity of tropical cyclone using a mesoscale model (PSU/NCAR MM5), with various choices of cumulus parameterizations and explicit microphysics. A tropical cyclone case was chosen for the assimilation and impact study, which produced unprecedented rainfalls over eastern coast of the Korean Peninsula - Typhoon Rusa (2002). A strategy called the observing-systems simulation experiments (OSSEs) is employed.

Generally, track forecasts were improved with increased number of dropwindsondes around the storm center (e.g., [1]). However, the forecasted tropical cyclone was sensitive, in both track and intensity, to the choice of microphysical processes in the numerical model. Our results demonstrate possible improvements in tropical cyclone forecasts in both track and intensity through assimilation of dropwindsonde data obtained in the vicinity of tropical cyclone centers.

References

[1] S. K. Park, E. Jo, and D.-L. Zhang, Impact of Dropwindsonde Assimilation on Tropical Cyclone Track Forecasts: Implications for the Asian THORPEX. 4th Int. Conf. on MCSs and Heavy Rainfall in East Asia, Beijing, China (2004).