

ASSIMILATING SUBIC RADAR DATA IN THE WRF MODEL FOR HEAVY RAINFALL PREDICTION IN METRO MANILA

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Metro Manila is the largest densely populated area in the Philippines. With problems left by rapid urbanization in the past decades, the metropolitan has become vulnerable to floods from heavy rainfall events. Some events result from the interaction between the land and southwest monsoon (Habagat) along the western coastal areas of the country from June to September.

In the Philippines, weather radars and numerical models are used to observe and predict precipitation. This study examines the capability of the Weather and Research Forecasting (WRF) model to simulate heavy rainfall events related to the Habagat over the Manila metropolitan region by assimilating radar data. Reflectivity data from the S-band Subic radar are used in numerical data assimilation (DA) experiments using the three-dimensional variational (3DVAR) system for three events over Metro Manila. The procedures for preprocessing radar data and running the WRFDA model are also discussed.

Reflectivity DA showed to have no significant impact on the WRF model's rainfall distribution compared to the conventional experiment without DA. Both experiments overestimated the rainfall over the domain. In verification statistics, the average accuracy of the model improved after DA where the over-predicted precipitation was reduced. The analysis of the rainwater mixing ratio cross-section showed that the presence of higher reflectivity observations increased the mixing ratio while weaker echoes reduced the mixing ratio in DA. However, the impact of DA was only observed up until the second day of the experiment.

The rapidly decreasing skill score indicates that the radar data failed to assimilate effectively. To serve as a manual for radar DA, this study also addressed the required data characteristics and common practices to avoid for a successful DA. The results also suggest a denser group of stations for model verification might improve the analysis of the experiments and Habagat-related rainfall might not be a suitable testing ground for radar DA.

Keywords: heavy rainfall events, radar data assimilation, Numerical Weather Prediction