**Institute of Atmospheric Physics, National Central University**

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**Assimilating radar observed and retrieved variables to improve the model convective scale rainfall forecast :**

**OSSE and real case studies**

**Abstract**

This research discusses rainfall forecast improvement using Doppler radar data. The techniques used in this study can be directly applied over terrain. Through OSSE tests the importance of vapor is first identified. As a result, a procedure for adjusting vapor is designed. By assimilating three-dimensional meteorological fields obtained from multiple-Doppler radar wind synthesis and thermodynamic retrieval as well as vapor adjustment into WRF, the impact on rainfall forecast for two real cases are investigated. The first one is the heavy precipitation of a southwest monsoon event occurring on 14 June, 2008 in southern Taiwan during SoWMEX, while the second one is an afternoon thunderstorm event occurring on 19 August, 2014 in northern Taiwan.

The forecast results of the first case show that the rainbands’ structure could maintain for a period of time and the rainfall intensity and distribution are also improved after applying the radar observed and retrieved parameters. The second case demonstrates that the vapor adjustment scheme is able to restore the fine structure of convective systems. Extreme rainfall in Taipei is well captured, but with false alarm.

The advantage of the methods developed in this research is that data from only two radar volume scans are sufficient and can be efficiently used to improve the model short-term rainfall forecast.

**Keywords:**  
Observation System Simulation Experiments (OSSE), Thermodynamic retrieval

**Reference:**

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