The Status of a Diabatically Initialized Modeling System in Central Weather Bureau of Taiwan

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A local analysis and prediction system (LAPS) capable of retrieving the hydrometeors from conventional and unconentional data sources (such as the upper-air soundings, radar, and satellite data, etc.) is developed for the purpose of initializing the ensuing PSU/NCAR MM5 system. The LAPS-MM5 system is able to effectively shorten the spin-up problem of simulating severe weather systems and is used as a tool for short-range (0-12 hours) severe weather forecasts. The LAPS-MM5 applies advanced cloud and moisture analysis schemes to give a more realistic description of the hydrometeors in the atmosphere. A dynamic balance scheme is also adopted to ensure that the momentum and mass fields are consistent with the cloud-derived vertical motions. In 2004, the satellite winds, based on UW-CIMSS satellite wind retrieval algorithm, became routinely available. A series of impact studies of satellite wind on the predictions of LAPS-MM5 are ongoing. A real-time verification system is developed for the verification of precipitation, wind, and temperature fields predicted by LAPS-MM5. The performance of LAPS-Weather Research and Forecast (WRF) system is also evaluated.

Routine operations show that LAPS-MM5 is capable to predict the intensity and location of heavy precipitation system with 6-hourly rain rate greater than 35mm (higher Equitable Threat Score), yet prone to over-predict the rainfall rate when precipitating system was weaker. Many challenging tasks related to the cloud analysis, dynamic and thermodynamic balance schemes are to be overtaken in the forthcoming years.

Keywords: LAPS-MM5; LAPS-WRF; satellite wind; short-range severe weather forecast.