

HyARC Seminar (HyARC Seminar#168)

Date: March 24 (Monday) 10:30-

Room: The meeting space (#617) of Research Institutes Building.

Speaker: Prof. Wang Chung-Chieh (Department of Earth Sciences,
National Taiwan Normal University)

Title: Cloud-Resolving Typhoon Quantitative Precipitation Forecasts (QPFs) for Taiwan by the CReSS Model: Evaluation, Characteristics, and Future Prospect

Abstract:

The Cloud-resolving Storm Simulator (CReSS) has been used by the author to produce forecasts at real time for Taiwan, at a high-resolution of 2.5 km since 2010. As a contributing member in the Taiwan Cooperative Precipitation Ensemble Forecast Experiment (TAPEX) of the Taiwan Typhoon and Flood Research Institute (TTFRI), these forecasts are carried out four times a day (with initial time at 0000, 0600, 1200, and 1800 UTC) for 72 h (or 78 h), and once available, are posted on the author's website at <http://vortex.es.ntnu.edu.tw/>. The domain was 1080 km by 900 km in 2010-2011 and has been enlarged to 1500 km by 1200 km since 2012. This 2.5-km CReSS has the highest resolution (and also largest size of fine domain) among all models in real-time operation in Taiwan, and is in fact the only member at cloud-resolving resolution in TAPEX.

In this presentation, the quantitative precipitation forecasts (QPFs) by the 2.5-km CReSS for all 15 typhoons, for which the Central Weather Bureau (CWB) had issued warnings, during 2010-2012 are synthesized, evaluated, and analyzed.

Examples are provided to demonstrate the capability and quality of QPFs produced by such cloud-resolving models, available at real time for emergency action and hazard reduction with appreciable lead time. For example, the threat score (TS, defined as the intersection area of the observed and predicted rain area with amount reaching any given threshold over any period, divided by their union area, thus $0 < TS < 1$) of 24-h QPFs by 0000-UTC runs for the most-rainy day (0000-2400 UTC), averaged among five most-rainy typhoons (one day from each), at the heavy-rainfall thresholds of 50, 130, 200, and 350 mm are as high as 0.61, 0.51, 0.47, and 0.25 for day 1 (0-24 h forecasts starting at 0000 UTC on the most-rainy day), 0.71, 0.57, 0.43, and 0.17 for day 2 (24-48

h forecasts starting one day before), and 0.66, 0.45, 0.32, and 0.19 for day 3 (48-72 h forecasts starting two days before), respectively. These results show that such models can produce high-quality QPFs consistently, even at 2-3 days prior to the event. The characteristics of CReSS QPFs are further analyzed and the significance discussed.

(given in English)