

The Taiwan WRF Ensemble Prediction System: Scientific description, model-error representation and performance results

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Abstract

A Weather Research and Forecast model (WRF) based ensemble prediction system (WEPS) covered East Asia area was developed for well handle the forecast uncertainty and provide the reliable probabilistic forecasts. In this study, a series of numerical prediction experiments were designed to assess the performance of the WEPS among the suite of the multi-physics, the SKEB (Stochastic-Kinetic Energy Backscatter), and the SPPT (Stochastic Perturbation of Physics Tendencies) schemes.

The results show that none of the stochastic schemes deteriorates the RMS error, but adding stochastic perturbations improve the spread/error ratio and consequently probabilistic forecast skill. Combining SKEB and SPPT with multiple physics suite leads to the best performance skill for 500 hPa-geopotential and 850 hPa-temperature fields. Moreover, the results also showed that the single physics with SPPT scheme generates the larger error of ensemble mean forecast. It indicates multi-physics approaches in mesoscale ensemble prediction system plays important role to reduce the accuracy of the ensemble forecast.