Title of the presentation:
Dual-Scale Neighboring Ensemble Variational Assimilation of Satellite Microwave Imager Brightness Temperatures for Typhoon ETAU

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Preference: Oral

The present study developed an Ensemble-based Variational Assimilation (EnVA) scheme for a Cloud-Resolving Model (CRM) with a sampling error damping method that consisted of a dual scale separation of forecast error and a Neighboring Ensemble method (DuNE). In the EnVA, we obtained the optimal analysis increment for the ensemble mean by minimizing a three-dimensional cost function (the control variables included precipitation and the ratio of total water content to the saturation mixing ratio (RHW2) etc.). We calculated the mixing ratios of water subsistence from precipitation and RHW2 using the minimum square method. We employed Bishop’s transform matrix to calculate the analysis increments for ensemble members.

We performed experiments using the above EnVA scheme to assimilate Advanced Scanning Microwave Radiometer 2 (AMSR2) brightness temperatures (TBs) at 10, 18, 23, 36, and 89 GHz with vertical polarization for a Typhoon Etau (T1518) case (17 UTC 8th Sep. 2015). The assimilation made large-scale analysis increments for relative humidity, surface pressure, and horizontal wind speeds, and moistened a spiral band area to the south-east of typhoon. The assimilation also changed meso-scale precipitation rate and vertical updraft patterns around the typhoon. The assimilation significantly improved a CRM precipitation forecast up to 30 hours, in particular, by strengthening and stagnating a rain band over the Kanto Plain.