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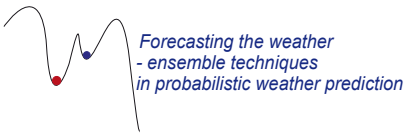

A mesoscale ensemble prediction system using singular vectors at JMA

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We have been developing a mesoscale ensemble prediction system (MEPS), using singular vector (SV) methods to provide probabilistic information and multi-scenarios in 5km-mesh operational mesoscale forecasting (MSM) at the JMA since 2007. We use the mesoscale SV (MSV) method based on the JMA non-hydrostatic model and the global SV (GSV) method based on the JMA global spectral model to construct ensemble perturbations (Ono et al. 2010). We conducted the preliminary ensemble forecasting experiments using each single SV method to generate perturbations. From these experiments, we found that the MSV has fine and localized structure, and the GSV has broad and coarse structure. Therefore, we needed to construct multi-scale perturbations for combining these advantages and compensating these disadvantages by blending the MSV and the GSV. In order to blend SVs, we adopted the variance minimum method, which rotates three types of SV (high resolution MSVs, low resolution MSVs, and GSVs) so that each initial perturbation has multi-scale structure. This method contributes to improve probability scores of MEPS.

Toward the future trial operation of MEPS at the JMA, we developed the SV-based MEPS in which the horizontal resolution and ensemble size of the ensemble forecast was 20 km and 11 members respectively and conducted its feasibility study in 2010. We are now developing another MEPS which has higher horizontal resolution and larger ensemble size (10 km and 41 members respectively).While the horizontal resolution and the ensemble size are improved, its forecast region is reduced to save computational costs. Therefore, we only use two types of MSV with different horizontal resolutions (40 km and 80 km) for generating initial and lateral boundary perturbations. Since the MEPS is aimed at predicting uncertainty of forecast at half-a-day or longer lead times, the optimization time is set to be 12 hours for the high-resolution MSV and 24 hours for the low-resolution MSV, respectively.

In the presentation, we will show the preliminary result of the feasibility study about performance of the new MEPS and differences from that of the previous MEPS.