EMS Annual Meeting Abstracts
Vol. 14, EMS2017-144, 2017

Application of Blended Forecasts to High Spatial- and Temporal-Resolution Time-lagged Ensemble Forecasts

Yunsung Hwang and Dong-In Lee
Division of Earth Environmental System Sciences, Pukyong National University, Busan, Korea (hisnameys@gmail.com)

Improving short-term (up to 8 h) forecasts (nowcasts) is important for the prevention of accidents and obtaining preparation time for the impact. Moreover, predicting possible locations of convections in few hours correctly can lower the economic costs. For short-term prediction of convection for high-impact weather, frequently updating high-resolution nowcasting systems are needed. Recently, a new blending method (Saliency-based cross-dissolve, SAL) was developed as combining two different forecasts by applying different weights to extrapolation (EXT) and model forecasts (High Resolution Rapid Refresh, HRRR). SAL combined EXT and HRRR pixel by pixel by obtaining weights as a function of intensities and forecast lead time. The SAL represented improved results using 18 dBZ echo-top heights from Weather Surveillance Radar 1988 Doppler (WSR-88D) and HRRR in Continental United States (CONUS).

The time-lagged ensemble forecasts combine previous model runs reflecting latest observational data by assimilating and are suitable for short-term prediction considering computational expenses. Successful digestion of observational data represented improved skill scores in short-term forecasts and in high-resolution-short-term forecasts. In order to represent probability of severe weather in CONUS, time-lagged ensemble forecasts are suggested by combining the deterministic maps of the mosaics of column max (CMAX) from WSR-88D, extrapolated observation (EXT), HRRR, and blending of HRRR and EXT (SAL). Three ensemble forecasts of 23 and 40 dBZ (ensEXT, ensHRRR, and ensSAL) are predicted using different numbers of previous forecasts (i.e. 1 - 7 previous forecasts) and initializations (00 to 23 UTC) from the data of mid-May to mid-June 2015. The skill scores of the ensemble forecasts were evaluated as Brier Skill Scores (BSSs), reliabilities, and areas under Relative Operating Characteristics curves (AUCs). The key features of ensemble forecasts are 1) The ensEXT of 23 dBZ obtained high BSSs. 2) The ensHRRR of 40 dBZ showed best performances in BSSs, reliabilities, and resolutions later than 3 h forecasts. 3) The ensSAL of 40 dBZ showed the highest BSSs in 1 to 2 h forecasts. Reliabilities and resolutions of ensSAL of 40 dBZ indicated the best results except 15 to 19Z (ensHRRR showed the best scores). The ensSAL would be the best option for the short term forecasts (1 - 2 h) by obtaining useful information about high-impact weather (over 40 dBZ).

Acknowledgment
This work was funded by the Korea Meteorological Industry Promotion Agency under Grant KMIPA 2015-5060. This work was financially supported by the BK21 plus Project of the Graduate School of Earth Environmental Hazard System.