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The effect of member configuration of Ensemble Transform Kalman Filter on the performance of ensemble prediction

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Using Met Office Global and Regional Ensemble Prediction System (MOGREPS), the effect of member configuration of Ensemble Transform Kalman Filter (ETKF) on the performance of ensemble prediction is evaluated. Because Korea Meteorological Administration (KMA) is implementing Unified model (UM) and related pre/post processing imported from United Kingdom Meteorological Office (UKMO) operationally from year 2010, it is necessary to investigate the effect of ensemble size on the prediction capability of MOGREPS before operating the UM in KMA.

Currently the ensemble size of MOGREPS is 24, 1-control and 23-perturbation members. The finite ensemble size causes the sampling error of the full forecast probability distribution function (PDF), so the ensemble size is closely related to the efficiency of EPS. The prediction capability depending on the ensemble size has been evaluated by increasing the number of ensemble from 24 to 48. In addition to that, a new method of selecting 24 ensemble members that best approximate the forecast PDF from 48 ensemble members of ETKF (Reduced Ensemble Transform Kalman Filter; RETKF) is proposed to decrease computing cost by increasing ensemble size from 24 to 48, and the result of RETKF is compared with that of ETKF in terms of the statistical reliability and resolution. In the northern hemisphere, the best performance was obtained by the 48 ETKF members, followed by the 24 ETKF members. The performance of 24 RETKF members was the worst. However, in the southern hemisphere, the 24 RETKF members showed the best performance. 48 and 24 ETKF members had a little difference, but the performance of 48 members is slightly better than 24 members.