



Comparison between singular vectors and breeding vectors as initial perturbations for the ECMWF ensemble prediction system

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We have compared singular vectors and breeding vectors as initial perturbation strategies for ensemble prediction. Earlier comparisons between the strategies (e.g Buizza et al. 2005) have used different forecast systems for each perturbation method. We have used the ECMWF IFS-model to compare the operational perturbation strategy at ECMWF, using singular vectors, with breeding vector perturbations. Both a simple breeding system (simple BV-EPS) as well as one with regional rescaling dependent on an estimate of the analysis errors variance (masked BV-EPS) has been used. 10-day forecasts have been made for 46 forecast cases during 20051201-20060115 with resolution T255L40.

We have evaluated the characteristics of the different ensembles both in terms of spectral and physical space properties. Results show that the ensembles have different properties initially but converge during the first 48 hours (optimisation time for singular vectors). We have also investigated the performance in the medium range (3-10 days) of the ensembles using several verification scores (RMSE, ROC area, Ranked Probability Skill Score and Ignorance Skill Score). The overall results show that SV-EPS has a somewhat better performance for the northern hemisphere compared to BV-EPS. For the southern hemisphere masked BV-EPS and SV-EPS yield almost equal results. In general, the two ensemble techniques give very similar results when applied to the same weather forecasting system.

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