Geophysical Research Abstracts, Vol. 8, 02586, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02586

A comparison of different methods for initializing ensemble prediction in a NWP model

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In the lively debate on the best strategies for specifying initial conditions for ensemble prediction, most of the comparisons have been made using simple model approach. In such a simplified context, several works have shown that "non-dynamically constrained" approaches (such as the Ensemble Transform Kalman Filter (ETKF), the Perturbed Observations method (PO) or an Ensemble Kalman Filter (EnKF)) have a sligth but significant advantage over "dynamically constrained" methods (Singular Vector (SV) or Breeding method (BM)) (see for example Hamill et al. 2000 or Anderson 1997). Comparisons between operational Ensemble Forecasting Systems (EFS) have also been made (Buizza et al. 2005) but the relative merits of the different strategies for initializing the ensemble prediction is still unclear since each EFS included its own forecasting model and assimilation technique. In this work, using the forecasting model of Météo-France, ARPEGE, and a same realistic framework, we generate analogs to current implementations of three operational techniques, the SV method (used at ECMWF), the BM method (used at NCEP) and the PO method (used at SMC). Using classical scores such as Brier skill score, rank histograms and R.O.C curves, we evaluate the different forecasts. Results are also compared with those obtained with simpler models.