Séminaire Vendredi 30 Janvier 11h00 / Seminar Friday January 30, 11:00 AM

Conférencier / Lecturer: Mark Buehner

Sujet / Subject: Intercomparison of Variational and Ensemble Kalman Filter Data Assimilation Approaches in the Context of Deterministic NWP

Présentation/Presentation: Anglais / English

Lieu/Room: Grande salle du premier étage CMC

Résumé / Abstract:

An intercomparison of the Environment Canada variational (3D-Var and 4D-Var) and ensemble Kalman filter (EnKF) data assimilation systems is being conducted in the context of producing global deterministic numerical weather forecasts. All experiments assimilate exactly the same observations and use the same configuration of the forecast model to produce medium-range forecasts (very similar to the currently operational configuration). Both 3D-Var and 4D-Var experiments were conducted, each using either 1) background error covariances similar to those used operationally, which are nearly static with horizontally homogeneous and isotropic correlations, or 2) flow-dependent covariances based on the EnKF background ensembles. An EnKF experiment, run with the same horizontal resolution as the 4D-Var inner loop, uses the mean of each 96-member analysis ensemble to initialize the higher resolution deterministic forecasts. Overall, results obtained for the study period of February 2007 show that use of the EnKF flow-dependent error covariances in the variational systems (3D-Var and 4D-Var) leads to significantly improved medium-range forecasts in the southern hemisphere as compared with using the nearly static and horizontally homogeneous and isotropic covariances.

Over all regions, use of the 4D-Var analysis, with the background error covariances similar to those used operationally, or the EnKF ensemble mean

results in forecasts of comparable quality. In addition, an ensemble-4D-Var experiment is being performed. This approach uses 4D flow-dependent background error covariances estimated from the EnKF ensembles to produce a 4D analysis with the variational data assimilation system, but without the need of tangent-linear or adjoint versions of the forecast model.