Séminaire vendredi le 17 mai 2019 11:00 / Seminar Friday May 17th 2019 11:00h

Sujet/Subject: Spread-Skill Relationship in the Canadian Ensemble Prediction Systems

Langue/language : Anglais/English

Conférenciers/Lecturers: **Leo Separovic (RPN-A)**

Résumé/Abstract:

The Canadian Regional Ensemble Prediction System (REPS) is currently being upgraded to version 3.0, in which it will: (1) adopt the latest configuration of the 10-km Regional Deterministic Prediction System (RDPS) based on the version 5 of the GEM model (GEM5) and (2) take advantage of the RDPS assimilation component by introducing a recentering of the global analysis perturbations around the RDPS initial conditions. The motivation for the unification of the deterministic and probabilistic regional systems is to make the probabilistic REPS forecasts more informative on the errors and uncertainties in the corresponding deterministic forecasts obtained with the RDPS. There is also ongoing work on the unification of the global deterministic (GDPS) and probabilistic prediction systems' (GEPS) settings, based on GEM5.

In the current implementation, however, the focus has been fully placed on model improvements, whereas the forecast error representation remains the same. Here, we will diagnose several important issues related to the error sampling in the probabilistic forecasts systems that will need to be addressed in the future. First, the combined effect of the introduction of GEM5 and initial condition recentering leads to a considerable reduction of forecast error in the new REPS, especially in the lower troposphere. As a consequence, the system now tends to be over-dispersive, i.e., the spread of the ensemble members tends to overestimate the error magnitude. There are also more fundamental error-spread discrepancies that are characteristic of all versions of the REPS. For example, REPS tends to be initially under-dispersive at sub-synoptic scales below 1200 km, which is compensated by being over-dispersive at larger scales. After 24-48 hours of integration, the error-to-spread ratio becomes more uniform across the scales. Furthermore, the predictive skill of the ensemble spread in representing the time-varying model error is practically non-existent in the early stages of integration. The spread-error temporal correlation at the local scale is vanishingly small at the initial stages of the forecast; it increases somewhat during the first 24-48 hours but remains relatively low at all lead times, which is also the case in the GEPS.
These findings imply the need for (1) readjustment of the amplitudes of initial perturbations and (2) rethinking the stochastic physics perturbations in order to improve the error growth in the probabilistic forecasts.