Operational implementation of flow-dependent background error correlations at Météo-France using a wavelet model and ensemble data assimilation

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Assimilation of observations in numerical weather prediction systems relies on modelling of forecast error spatial correlations. These correlations allow observed information to be spatially filtered and propagated during the analysis process.

A new model of these correlations is now used operationally at Météo-France, in order to take into account their flow dependence. This approach is based on a wavelet representation of geographical variations of correlations (Fisher 2003, Varella et al 2011). It relies also on the 6 members of the ensemble data assimilation system (Berre and Desroziers 2010), which are sampled in a sliding way over the last 4 current days. This provides a set of 96 perturbed forecasts, from which error correlations can be estimated in a robust way.

Figure 1 shows geographical variations of horizontal correlation length-scales, estimated for the period 24-27 February 2010. Short length-scales are observed in the vicinity of low pressure areas in the Eastern part of USA and over Northern Atlantic and Europe. This allows small scale structures that are observed in these regions to be better described.

In the context of the implementation of a new computer, it is planned in the future to increase the ensemble size. This will allow variability of error structures from one day to the other to be represented, and ensemble predictions to be better initialized.

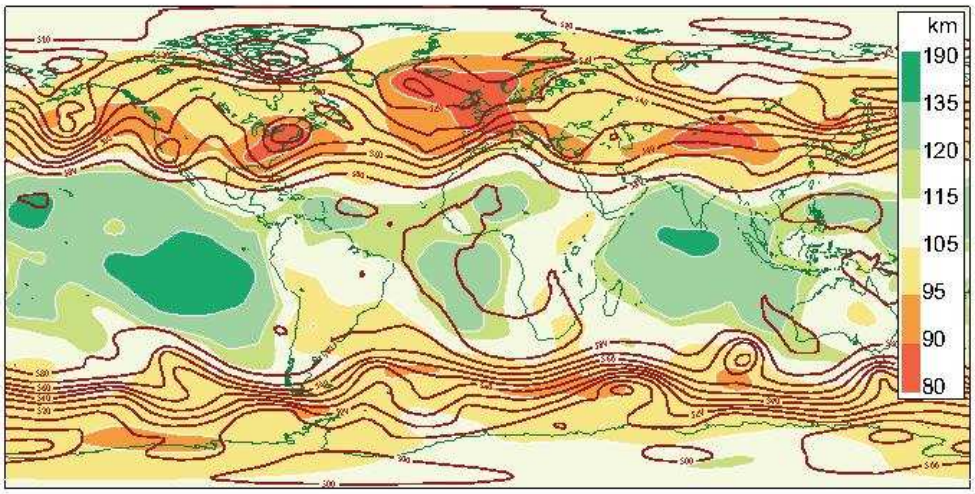

Figure 1 : Horizontal length-scales of background error correlations for wind near 500 hPa (shaded, in km), averaged over the period from 24 February 2010 00 UTC to 27 February 2010 18 UTC, and superimposed to the 500 hPa geopotential field (contours, dam) valid on 26/02/2010 00UTC. The length-scale of a local correlation function is a measure of its spatial extension.

References :

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Fisher, M., 2003: Background error covariance modeling. Proc. ECMWF Seminar on "Recent Developments in Data Assimilation for Atmosphere and Ocean", 8-12 Sept 2003, Reading, U.K., 45-63.

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