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Hybrid wavelet/diffusion background error covariance matrix modelling

O. Pannekoucke
(olivier.pannekoucke@meteo.fr)

In most of current NWP systems, data assimilation schemes are related on the Kalman filter formalism where a background error covariance matrix is needed. However, the huge size of this matrix implies it has to be modelled. Recent aspects of ensemble methods are now used to estimate some features of the covariance matrix. In particular, some improvements have been obtained in the representation of global heterogeneity of correlation functions. But the modelling of the local anisotropy is still under investigation. One of the feasible solutions is the use of a pseudo-diffusion. Until now, this formulation was not able to represent a key aspect of background error statistics: the non-separability between the horizontal scales and the vertical scales. An hybrid formulation is proposed to incorporate this aspect through a wavelet representation of the vertical correlations coupled with a heterogeneous horizontal diffusion.