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Structure and impact of ensemble perturbations provided by convective-scale ensemble data assimilation

F. Harnisch (1) and C. Keil (2)

(1) Hans-Ertel-Centre for Weather Research, Data Assimilation Branch, LMU München, Germany (florian.harnisch@lmu.de), (2) Meteorologisches Institut, LMU München, Germany

Initial ensemble perturbations for convective-scale ensemble prediction systems (EPS) are commonly generated by downscaling information of coarser resolved driving models. This approach is attractive due to its simplicity and has been shown to give good results. However, by using coarser resolved model information, it is not possible to represent the full spectrum of uncertainty in the initial state of the convective-scale EPS.

Deutscher Wetterdienst (DWD) is running a convective-scale EPS based on the COSMO-DE model operational since May 2012. Initial condition uncertainty is accounted for by downscaling perturbations from four different global models. Currently, a kilometer scale ensemble data assimilation (KENDA) system for COSMO is under development at DWD, which provides a full ensemble of analysis states. Within the KENDA system the intermediate step to generate initial perturbations can be skipped and ensemble forecasts can be directly initialized from the convective-scale ensemble analysis.

In this presentation we are showing first insights of the KENDA ensemble analysis. We focus especially on the structure of the KENDA initial perturbations which have the advantage to exhibit substantial perturbation energies down to the smallest scales. Further, ensemble forecasts initialized from the KENDA ensemble analysis are addressed in case studies.