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A multi-boundary model-perturbed limited-area ensemble system for the short-range.

C. Marsigli, A. Montani, T. Paccagnella

ARPA-SIM, HydroMeteorological Service of Emilia-Romagna, Bologna, Italy

A high-resolution ensemble system for the short-range (up to three days) is here presented. The system, called COSMO-SREPS, consists of 16 integrations of the non-hydrostatic limited-area model COSMO, at about 10 km of horizontal resolution and with 40 levels in the vertical. The ensemble is generated by taking into account different sources of forecast errors, in order to describe the uncertainty affecting the scales of interest in the high-resolution weather forecast at the considered time range. Initial and boundary conditions perturbations are provided by some members of the Multi-Analysis Multi-Boundary SREPS system of INM: the 10-km COSMO runs are driven by four lower resolution COSMO runs, nested on four different global models (IFS, GME, NCEP, UM) which use independent analyses. A representation of the smaller scale uncertainty is accomplished by applying also limited-area model perturbations: the values of a number of parameters included in the schemes for the parameterisation of the sub-grid processes are randomly changed (within their range of variability) in the ensemble members. Results are presented for a 1-month test period in Autumn 2006. The relationship between the ensemble spread and skill is analysed. Furthermore, the role played by the different perturbations in the determination of the spread is assessed, investigating the relative impact of driving-model perturbation and limited-area-model perturbations. Results show that the inclusion of the limited-area model error, although based on a simple technique, allow to increase the spread of the ensemble to values closer to the error, in terms of surface variables. The impact of the limited-area model perturbations, though less evident globally, can become important at a local scale. Finally, the degree to which members with similar perturbations tend to clusterise and the different behaviour of a model perturbations when applied to members having different initial and boundary conditions are also shown.