On the combination of Stochastic Pertubation of Physical Tendencies and parameter perturbation for convection-permitting ensemble forecast

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A convection-permitting ensemble based on the COSMO model (COSMO-IT-EPS) has been developed for Italy. The ensemble is run at 2.8 km of horizontal resolution, with 10 members, and receive initial and boundary conditions from a coarser resolution ensemble covering the entire Mediterranean area.

A deficiency in the spread/skill relation of the ensemble in terms of near-surface weather parameter had been found in a previous study, in agreement with results reported in literature for similar limited-area ensemble systems.

In order to address this issue, the physics perturbation methodology applied to the ensemble is here studied, with the aim of combining different sources of model uncertainties.

Three configurations of the ensemble have been run for one month period in Autumn 2015: i) a control configuration, which is a pure downscaling ensemble, ii) a configuration where the model physics is perturbed by making use of the Stochastic Pertubation of Physical Tendencies (SPPT) scheme implemented in the COSMO model and iii) a configuration where the SPPT scheme is combined with perturbed physics parameters.

The aim is to assess the relative impact of SPPT and parameter perturbation and to study their complementarity, both in a statistical way and on selected events.

Objective evaluation of the forecast quality is performed for 2-meter temperature and humidity, against data from the SYNOP network, as well as for precipitation, using high density raingauge data to allow the application of spatial verification methods.