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SREPS: A multimodel approach to ensemble forecast in operational environment

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Unpredictability of atmospheric motion is strongly related to the nonlinear and chaotic behavior of its dynamics and then there is a theoretical limit of predictability. Medium range forecast is near this limit, and chaotic behavior is then observed. Several techniques has been developed to improve forecast skill. Some of them are based on setting an ensemble of perturbations with maximum growing rates in the short range. In an ensemble system several integrations are made adding the perturbations to the analysis and then probabilistic forecasts products are obtained daily. Effort is done to construct the best ensemble of perturbations to represent the statistical uncertainty in the analysis.

The model is also a source of error or uncertainties in the forecast. In the short range it is necessary to sample uncertainties due to errors in the model evolution to have enough spread. Multimodel ensemble approach consist in different regional models with different boundary conditions. The different dynamics and physics of each model provide differents atmospheric evolutions, not only in the synoptic flow but in mesoscale aspects. SREPS will run four mesoscale models, MM5, HIRLAM, HRM (former DWD limited-area model) and UM (UKMO limited-area model), with four boundaries supplied by AVN, ECMWF, GME and UKMO, it will have on the whole 16 members. HIRLAM is a limited area, hydrostatic, hybrid coordinate, semi-lagrangian time integration scheme model. HIRLAM has been developed in cooperation of 8 meteorological institutes in Europe. HRM is a limited-area, hybrid coordinate model developed by Deutscher Wetterdienst. MM5 model is a limited area, nonhydrostatic, terrain following sigma coordinate model developed at Penn State and NCAR as

a community model with contributions from users worldwide. UM model is a limited area, nonhydrostatic model, developed by Meteorological Office in the UK.

The system will work at the INM in a high performance supercomputer CRAYX1. At this time the project is in the development stage, and we are obtaining ensemble forecasts, not for operational use yet.