High resolution climatology
- towards climate change services

Comparison of calibration techniques for a limited-area ensemble precipitation forecast using reforecasts

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The project CONSENS (CONSolidation of COSMO ENSemble), developed within the framework of COSMO (COnsortium for Small-scale MOdeling), aims at consolidating the COSMO ensemble forecasting systems for the mesoscale. One of the purposes of this project is the implementation of a calibration technique for the precipitation output.

The calibration of the precipitation forecasted at higher resolutions, as is typical of Limited Area Models, is currently a challenge for the ensemble community, especially with respect to the improvement of the forecast skill for rare events. The potential of using reforecasts to achieve this goal has been shown in several recent studies.

In this study, thirty years of reforecast of one member of COSMO-LEPS (the Limited-area Ensemble Prediction System based on the non-hydrostatic limited-area model COSMO) were used for testing the calibration strategy. Three calibration techniques were considered: cumulative distribution function based corrections, linear regression and analogues. The analog-based method was implemented in terms of the similarity of precipitation fields, as well as in terms of the similarity of synoptic patterns.

The impact of the application of these techniques to the ensemble precipitation forecasts operationally provided in the years 2003-2007 was verified over the Emilia-Romagna Region (Northern Italy), Switzerland and Germany.

The performance of the calibration methodologies were evaluated in terms of statistical scores, for different seasons, thresholds and forecast ranges. Results revealed the need of generating correction functions which are weather-regime dependent, as the model error is likely to have a systematic dependence on geography, orography and flow direction.