



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

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The calibration of the precipitation forecasted at high resolution is currently a challenge for the ensemble community working with Limited Area Models, 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.

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 in this study for testing the calibration strategy. Three calibration techniques were tested: cumulative distribution function based corrections, linear regression and analogs. The analog-based method was implemented in terms of the similarity of the precipitation field, as well as in terms of the similarity of upper air fields representing the synoptic pattern.

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

An additional verification of the calibration task was performed by the coupling of the ensemble precipitation forecasts with an hydrologic model. This test was carried out for a medium-sized catchment located in the Emilia-Romagna Region.