



Evaluation of probabilistic precipitation forecasts with a probabilistic reference in Swiss catchments

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The information content, i.e. the predictive capability, of a probabilistic forecast system has to be quantified. Here, precipitation forecasts of the limited-area ensemble prediction system COSMO-LEPS shall be evaluated for Switzerland (41 300 km²) and Swiss catchments (~ 1500 km²). The observational reference is derived from spatially interpolated rain gauge data.

The evaluation is often quantified by skill scores like the Ranked Brier Skill Score, BSS, and the new Ranked Mutual Information Skill scores, RMIS_{O/Y}. Commonly, these scores are used to compare probabilistic forecasts of events with a binary reference (yes the event occurred on no it did not). This neglects the observational uncertainty in areal events. Therefore, we apply observational references generated through (a) analysis of rain gauge data by ordinary Kriging and (b) realization of an ensemble of interpolated rain gauge data by stochastic simulation. This permits the consideration of either a deterministic reference (the event is observed or not with 100% certainty) or a probabilistic reference that makes allowance for uncertainties in spatial averaging. We show (a) how the probabilistic reference can be applied in estimating confidence intervals for the skill scores, (b) how relevant the reference uncertainty is for evaluation uncertainty, and (c) how the skill scores are to be interpreted in a fully probabilistic evaluation (with probabilistic forecast, probabilistic reference, and skill scores which compare probabilities).