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Postprocessing of ensemble precipitation forecasts over India using weather types

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Accurate predictions of heavy precipitation in India are vital for impact-orientated forecasting, and an essential requirement for mitigating the impact of damaging flood events. Operational forecasts from non-convection-permitting models can have large biases in the intensities of heavy precipitation, and while convection-permitting models can perform better, their operational use over large areas is not yet feasible. Statistical postprocessing can reduce these biases for relatively little computational cost, but few studies have focused on postprocessing forecasts of monsoonal rainfall.

We present a postprocessing method for operational precipitation forecasts based on local precipitation distributions for 30 Indian weather types. It is applied to ensemble forecasts for daily precipitation with 12km spatial resolution and lead times of up to 10 days from the Indian National Centre for Medium Range Weather Forecasting (NCMRWF) Ensemble Prediction System (NEPS). The method yields local probabilistic forecasts that are the weighted mean of the observed local precipitation distributions for each weather type, with weights given by the relative frequency of the weather types in the forecast ensemble.

The general forecast skill is determined through the Continuous Ranked Probability Skill Score (CRPSS) and the skill for predicting the exceedance of the local 90th percentile is quantified through the Brier Skill Score (BSS). The CRPSS shows moderate improvement over most of India for forecasts with one day lead time, and substantial improvements almost everywhere for longer lead times. The BSS for one day forecasts indicates a spatially complex pattern of higher and lower performance, while for longer lead times the forecasts for heavy precipitation are improved almost everywhere. The improvements with respect to both measures are particularly high over mountainous or wet regions. We will also present reliability diagrams for the raw and postprocessed forecasts of threshold exceedances.