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Statistical processing of forecasts for hydrological ensemble prediction: a comparative study of bias correction strategies

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This study investigates the use of bias correction techniques in hydrological ensemble prediction. Ensemble weather forecasts (precipitation and temperature) are used as forcing variables to a hydrologic forecasting model to produced ensemble streamflow forecasts. The impact of different bias correction strategies on the quality of the forecasts is examined. The performance of the system is evaluated when statistical processing is applied to precipitation and temperature forecasts only (pre-processing from the hydrological model point of view), to flow forecasts (post-processing) and to both. The pre-processing technique combines precipitation ensemble predictions with an analog forecasting approach, while the post-processing is based on past errors of the hydrological model when simulating streamflows. Forecasts from 11 catchments in France are evaluated during a 48-month forecasting period (2005-2008). Results show that even though correcting the meteorological uncertainties is of high importance to obtain accurate and reliable inputs to the hydrological model, efforts to also implement a post-hydrological model correction may be necessary to achieve reliable hydrological forecasts for operational needs.