Temporal-spatial post processing models for probabilistic inflow forecasts combining hydrological and persistent forecasts with inflow climatology

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A methodology for constructing spatial-temporal probabilistic inflow forecasts based on output from deterministic precipitation runoff models is introduced. The post processor combines the deterministic forecast with the inflow climatology and the persistent forecast using a regression model. The methodology was tested and demonstrated in the Ulla-Førre river system, and simultaneous probabilistic forecasts for five catchments and ten lead times were constructed. The methodology has enough flexibility to model operationally important features in this case study such as heteroscedasticity, lead-time varying temporal dependency and lead-time varying inter-catchment dependency. In operational use it is strait forward to use the models to sample inflow ensembles (5 catchments and 10 lead times) that inherits the catchment and lead time dependencies. Our model was tested against deterministic inflow forecast, climatology forecast and a persistent forecast, and our approach was found to be the better forecast. This approach has a large flexibility since the regression coefficients depends on lead time. For the first lead time the hydrological forecast is given the largest weight, whereas for the longest lead time the climatology get the largest weight.