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Input and parameter uncertainty in real time hydrological forecasts

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In general, hydrological models explain about 90 % to 95 % of the variance in the runoff pattern while the meteorological forecasts exhibit a much larger uncertainty. The objective of this poster is to analyse some sources of uncertainties for a real time forecasting system for runoff. In the presented real time forecasting system the incoming observed ground precipitation data and runoff data are continuously utilised for updating the model output.

In detail the poster looks at the uncertainties that result from precipitation input and the model parameters. Meteorological ensembles for quantitative precipitation are provided to drive a semi-distributed continuous runoff model. The parametric variability of the hydrological model parameters has been assessed for a calibration period of about four years. Both, the impact from the input and the model parameters on uncertainties in runoff forecasts are analysed by generating numerous forecasted hydrographs.

Based on a weighing procedure the expected runoff is estimated from various ensemble runs. At the beginning of a flood the ensemble runs have equal weights. Each ensemble run is compared with incoming observations of runoff and those ensemble input which results in a closer fitting of the observation receives a higher weight. Based on incoming new observations the weights are updated by an ARMA type model. The state of the hydrological system is updated by a Kalman Filter. This gives an estimation of the real state of the system. Updated states of the system provide better starting conditions für the next time step.

The calculated uncertainties are displayed in the output by providing the weighted

averaged forecast plus the range of ensemble outputs. This additional information assists in the interpretation of model outputs and should help in decision making based on the forecasts.