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Investigation on uncertainty in identifying the model parameters of a conceptual model due to uncertain precipitation

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Precipitation is one of the most important hydrological model inputs. Because the precipitation varies in space and time within a basin, it is usually interpolated from the available raingauge network for model computational units. Generally, uncertainty is endemic due to imperfect means of measuring, processing, and representing spatial information of precipitation.

The objective of this research is to investigate the uncertainty incurred in the model parameters of the conceptual rainfall-runoff HBV-IWS model arising from uncertain precipitation. To reproduce the spatial variation of the meteorological input at the catchment scale, the external drift kriging is applied to interpolate the precipitation from the available point measurements.

Conditionally simulated precipitation based on turning band simulation is given in input to SHETRAN, a physically based, spatially distributed modelling system, to simulate river flows. The generated discharges are then the basis for calibrating the HBV-IWS model using the interpolated precipitation. The calibration is carried out automatically by means of the combinatorial optimization algorithm simulated annealing. For this optimization, aggregated Nash-Sutcliffe coefficients at different time scales are adopted as objective function.

The hydrographs simulated with SHETRAN by means of different realizations of the conditionally simulated precipitation are presented and analyzed. Finally, different sets of calibrated parameters of the HBV-IWS model are investigated to assess the uncertainty in the model parameters due to the uncertain precipitation. The methodol-

ogy, described above is applied to a meso scale catchment located in the southwest of Germany.

The SHETRAN modelling system (version 4.0), used in the present study, is obtained from the University of Newcastle Water Resource Systems Research Laboratory.