



University of Stuttgart
Germany

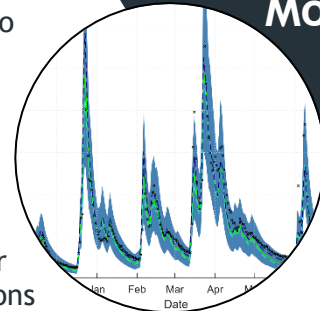
Department for Stochastic Simulation
and Safety Research for Hydrosystems (LS³)

AND/OR- Calibration Strategy to Improve Hydrological Models

M.Sc. Topic

Hydrological models are typically calibrated on timeseries of observed discharge. Different calibration strategies exist, e.g. trying to match the model's predictions with the whole timeseries, or only high-flow events, or baseflow conditions. These different strategies yield different results and hence, the calibrated models differ in how well they can predict future conditions. Even worse, all strategies typically lead to a too narrow prediction interval, such that future observations are often not covered by the predicted interval.

To overcome this problem, we propose a method that combines several versions of the same hydrological model, calibrated with different strategies, into one predictive distribution function. With an optimization routine, we equip both model versions with their respective optimal prediction variance and weight both model versions with optimal weights, such that predictive coverage of future data points is maximized. Ultimately, smart weighting schemes that react to current hydrological conditions shall be developed.



The successful applicant will implement the proposed optimization routine in MATLAB and test the method on a lumped hydrological model for the Upper Neckar catchment in Southwest Germany. There is a good possibility of writing and publishing a paper if insightful conclusions are obtained. This project is a collaboration between the Department of Stochastic Simulation and Safety Research for Hydrosystems (LS³) and the Department of Hydrology and Geohydrology (LHG) at the Institute for Modelling Hydraulic and Environmental Systems (IWS).

Prospective Tasks

- Literature review of hydrological model calibration strategies
- Implementing the method in MATLAB or PYTHON, applying it to the Upper Neckar case study
- Possibly investigating time-variant weighting schemes
- Visualization of results and discussion

Advisors

- Dr. Anneli Guthke (LS³), Dr. Jochen Seidel (LHG)

Desireable Skills

- MATLAB or PYTHON
- Hydrology, Statistics



Apply now!

anneli.guthke@iws.uni-stuttgart.de