

Study project/master's thesis @HFM:  
**How using infilled time series for spatial interpolation affect the discharge behavior of a rainfall-runoff model?**

## **Problem description**

Performance of any model is highly dependent on the data used to drive it. In most practical cases input time series such as precipitation and temperature have gaps due to various reasons. Time series infilling (or imputation) algorithms exist that help with the missing values. While preparing gridded inputs using point time series for models, at any given time step the spatial interpolation algorithm uses neighboring observed values to estimate values at all grid points. Consequently, if the number of observed values or their quality changes, the quality of the interpolation changes which directly affects the output of the model it is used to drive. There are other issues as well. Using an infilling algorithm, the number of these “observed values” may be increased. It is normally not known if it really helps the quality of the model output. It could also be that during calibration, model parameters somehow compensate for the lack of quality. This is what needs to be investigated for a rainfall-runoff model.

## **Steps**

The general idea and setup would be as follows: The study area are some Bavarian catchments (Naab, upper Main and Regen etc.). Point precipitation and temperature data are available from GKD and DWD at a daily resolution. Using Kriging and nearest neighbors, gridded inputs are prepared. These are fed to the model and a calibration and validation is performed. Next, all the missing gaps in the point precipitation and temperature are filled using the Normal Copula infilling algorithm and the same steps as before are followed. Finally, comparisons are made between the change in various performance measures of the output and model parameters. Finally, conclusions are drawn based on the results.

## **Requirements**

The student is expected to have some background in rainfall-runoff modeling, statistics, geostatistics and programming in python as everything mentioned above is coded in it. The required background could be acquired before and/or during the study.

## **Contact**

Interested students may write to me ([faizan.anwar@tum.de](mailto:faizan.anwar@tum.de)) for further discussion. The work load can be adjusted depending on the student if they want to pursue a study project or a master's thesis.