



Importance of precipitation data quality for streamflow predictions

Anna Sikorska (1,2) and Jan Seibert (1,3)

(1) University of Zurich, Department of Geography, Zürich, Switzerland (as@annasikorska.eu), (2) Warsaw University of Life Sciences-SGGW, Department of Hydraulic Engineering, Warsaw, Poland, (3) Stockholm University, Department of Physical Geography and Quaternary Geology, Stockholm, Sweden

Hydrological processes are highly complex and non-linear and include many random factors which are difficult to capture. Thus, most of hydrological models cannot perfectly reproduce the process that they model and their output is uncertain. To improve its accuracy, a model is usually calibrated with (more) observational data. In this regard, precipitation data as a forcing variable has a crucial influence on the model accuracy and prediction uncertainty. Thus, the accuracy of measured precipitation data is of a high importance in hydrological community.

Unfortunately because of limited human and financial resources it is not possible to fully gauge the catchment of interest. Thus, hydrologists have to deal with the dilemma which precipitation data should be gathered in order to provide optimal predictions i.e. the most accurate and with the least uncertainty attached.

In this work, we focus therefore on input uncertainty coming from imprecise rainfall information. To this end, we carry out uncertainty analysis of streamflow predictions with different precipitation datasets and analyse how the precipitation uncertainty propagates through the hydrological model. In this regard, we first analyse four different precipitation datasets i.e. i) punctual from rain gauges, ii) punctual from rain gauges with added random error, iii) gridded precipitation from rain gauges, and iv) spatially distributed from radars and rain gauges. Next, we calibrate a hydrological model with those datasets using different lengths of observations and then we assess the impact of different imprecise rainfall information on the accuracy of the hydrological model. We test our approach in a small catchment in Switzerland. Based on our results, we provide practical recommendations for calibration strategy in ungauged catchments.

Key words:

Precipitation uncertainty, hydrological modelling, prediction uncertainty