



Regionalization of model parameters based on large sample hydrology

Jan Seibert (1,2), Sandra Pool (3), Marc Vis (1), and Daniel Viviroli (1)

(1) University of Zurich, Department of Geography, Zürich, Switzerland (jan.seibert@geo.uzh.ch), (2) Swedish University of Agricultural Sciences, Department of Aquatic Sciences and Assessment, Uppsala, Sweden, (3) Eawag, Department Systems Analysis, Integrated Assessment and Modelling, Switzerland

The parameterization of hydrological models in ungauged catchments remains challenging. However, the increased availability of large data sets in recent years provides new opportunities for regionalization. In this study, we use the CAMELS dataset and the HBV model to simulate runoff in nearly 600 catchment areas in the United States. The HBV model was calibrated for all areas, and the calibrated parameter values were related to catchment characteristics. To account for parameter uncertainty, 100 independent calibrations were performed, and then median values and percentile ranges were used for the further analyses. For the simulation of runoff in ungauged catchments, we evaluated the use of regression equations compared to the transfer of complete parameter sets based on similarities between catchments leads to better model simulations. Additionally, we tested the added value of single discharge observations, which we pretended to be available. The regionalization approaches were furthermore benchmarked by runoff predictions using random parameter sets.

First results indicated that the use of an ensemble with parameter sets calibrated in one of the other catchments leads to clearly better simulations than the use of randomly selected parameter values. Surprisingly, however, a hydrologically based selection of catchments – and the transfer of the corresponding parameter values – did not lead to better simulations than using the ensemble with parameter sets from all 600 catchments. Overall, this study indicates possibilities and limitations of regionalization with the help of large data sets.