EGU2020-7147
https://doi.org/10.5194/egusphere-egu2020-7147
EGU General Assembly 2020

The additional value of using proxy data besides runoff for calibrating a conceptual hydrological model in a small agricultural catchment

Borbála Széles[1], Juraj Parajka[1], Patrick Hogan[1], Rasmiaditya Silasari[1], Lovrenc Pavlin[1], Peter Strauss[2], and Günter Blöschl[1]

[1]Vienna University of Technology, Institute of Hydraulic Engineering and Water Resources Management , Vienna, Austria (szeles@waterresources.at)

[2]Federal Agency of Water Management, Institute for Land and Water Management Research, Petzenkirchen, Austria

The aim of this study was to explore the additional value of using proxy data besides runoff for calibrating a conceptual hydrological model. The study area was the Hydrological Open Air Laboratory (HOAL), a 66 ha large experimental catchment in Austria. A conceptual, HBV type, spatially lumped hydrological model was calibrated following two approaches. First, the model was calibrated in one step using only runoff data. Second, we proposed a step-by-step approach, where the modules of the model (snow, soil moisture and runoff generation) were calibrated using proxy data besides runoff, such as snow, actual evapotranspiration, soil moisture, overland flow and groundwater level. The two approaches were evaluated on annual, seasonal and daily time scales. Using the proposed step-by-step approach, the runoff volume errors in the calibration and validation periods were 0% and -1%, the monthly Pearson correlation coefficients were 0.92 and 0.82, and the daily logarithmic Nash Sutcliffe efficiencies were 0.59 and 0.18, respectively. The additional benefit of using proxy data besides runoff was the improved overall process consistency compared to the approach when only runoff was used for model calibration. Soil moisture and evapotranspiration observations had the largest influence on simulated runoff, while the calibration of the snow and runoff generation modules had a smaller influence.