

Calibration of a semi-distributed hydrological model using discharge and remote sensing data

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Abstract The objective of this study is to present an approach to calibrate a semi-distributed hydrological model using observed streamflow data and actual evapotranspiration time series estimates based on remote sensing data. First, daily actual evapotranspiration is estimated using available MODIS satellite data, routinely collected meteorological data, and applying the SEBS algorithm. Second, the semi-distributed hydrological model HBV is calibrated and validated using the estimated evapotranspiration and observed discharge. This is done for multiple sub-basins of the Karkheh River basin in Iran. The Nash-Sutcliffe coefficient (NS) is calculated for each sub-basin. Maximum and minimum NS values for the calibration using observed discharge are 0.81 and 0.23, respectively, and using estimated evapotranspiration 0.61 and 0.46, respectively. The comparison of model simulations with multiple observed variables increases the probability of selecting a parameter set that represents the actual hydrological situation of the basin. The new calibration approach can be useful for further applications, especially in data-sparse river basins.

Key words hydrological modelling; SEBS; remote sensing; MODIS; HBV model; actual evapotranspiration; Monte Carlo simulation; Karkheh River basin, Iran