Modelling precipitation-streamflow processes in karst basin: The case of the Jordan River sources, Israel

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Abstract

A system approach, daily precipitation-streamflow model was developed for both the base and the surface flow components, of large-scale karst basins. Long-term streamflow data were separated to baseflow and surface flow using the ''recursive digital filter'' method, which provides time series for model calibration. The HYdrological Model for Karst Environment (HYMKE) includes attributes to large-scale preferential flow that recharge the groundwater and solve the problem of uncorrelated baseflow and surface flow in a karst environment. HYMKE was applied simultaneously to the three major tributaries of the Upper Catchment of the Jordan River, which originate in the karstic region of the Hermon Mountain (Northern Israel). It was verified by comparing the calculated surface flow and baseflow with the daily time series of the baseflow separation procedure, and demonstrated good agreement of both the surface ($r2 > 0.6$) and baseflow ($r2 > 0.77$) components of each stream.