



On the search for dominant processes at the catchment scale: a modeling perspective

Wouter Berghuijs (1), Murugesu Sivapalan (2), and Hubert Savenije (1)

(1) Delft University of Technology, Faculty of Civil Engineering and Geosciences, Water Resources Section, Delft, Netherlands, (2) Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, IL, USA

In this research a comparative study between several hundred catchments of the MOPEX database is conducted to explore similarities and differences in catchment run-off mechanisms by the systematic comparison of model structure performance. Catchments are analyzed using a collection of lumped conceptual models that represent different combinations of dominant hydrological processes. Processes considered are interception, snowmelt and accumulation, riparian run-off, phenology and timing. The model structures are evaluated considering both their performance (goodness of fit to objective functions) and their consistency (ability of a model to reproduce other hydrological signatures, while using the same set of parameters). By systematically evaluating the most realistic model structures for all catchments, dominant hydrologic processes of different catchments can be found.