

Fabrizio Fenicia, Dmitri Kavetski, Hubert H. G. Savenije, Laurent Pfister, Gerrit Schoups, Martyn P. Clark and Jim Freer

## **A synthesis of experimental and modelling approaches to characterize catchment behaviour**

Experiments are typically performed at the plot scale and provide important insights into flow generating processes. Modelling is an instrument to infer the system behaviour at the large scale. Understanding the relationship between appropriate conceptualizations at these different levels of spatial scale is critical to address topics of crucial interest, including catchment classification and prediction in ungauged basin. In this work, we independently applied an experimental approach and a modelling approach to characterize the behaviour of 3 headwater catchments in Luxembourg. The experiments led to a set of perceptual model for the three catchments. The modelling work was carried out through the multi-model approach SUPERFLEX and provided insights into large-scale catchment behaviour. A posteriori, we analysed and synthesized the insights gained with the two approaches. We determined that a tentative correspondence between perceived “catchment structure” and appropriate “model structure” could be established. Although this is an encouraging result, more work is needed to better understand such mapping, particularly for larger catchments with more heterogeneous characteristics.