

## **Comparative assessment of runoff hydrograph predictions in ungauged basins.**

In the last PUB decade, many hydrological investigations were focused on how to improve prediction of streamflow characteristics in ungauged catchments. The main focus of this effort was to advance the knowledge and understanding of climatic and landscape controls on hydrologic processes occurring at all scales. The main objective of this study is to compare and synthesize results of existing studies focusing on runoff hydrograph predictions in ungauged catchments. The idea is to learn from the similarities and differences between catchments in different places, and to interpret the differences in performance in terms of the underlying climate-landscape controls and regionalisation method chosen. The comparative assessment is based on 75 results found in the literature in the period 2003-2012. Their synthesis indicates that most of the studies were performed in Europe and Australia, and more studies were performed in humid than in tropical and arid climates. The analysis of runoff model performance shows that prediction of runoff hydrographs in ungauged catchments gets worse with increasing aridity and gets better with increasing catchment size. The dependence of performance on elevation differs by regions and depends on how aridity varies with elevation and air temperature. The differences between regionalisation methods did not impact markedly on model performance. The assessment of the relationship between prediction performance and the number of regionalised model parameters did not show a clear dependence even by using large datasets. The evaluation and synthesis of existing studies showed that it is indeed difficult to compare and attribute the results of different studies. Many studies combine results from different climate and physiographic settings and report only summary statistics of regionalisation performance and/or catchment characteristics. A development and implementation of a universal protocol on reporting scientific results in the hydrological literature as well as establishment of freely accessible data repositories is necessary and would be a step forward for the future.