



Assessing the impact of nested catchments on the performance of parameter regionalisation techniques

Mattia Neri (1), Elena Toth (1), Juraj Parajka (2), and Alberto Viglione (2)

(1) DICAM, University of Bologna, Bologna, Italy (mattia.neri5@unibo.it), (2) Institute for Hydraulic and Water Resources Engineering, Vienna University of Technology, Austria

When regionalising the parameters of rainfall-runoff models, the presence of several nested catchments may have a strong influence on the assessment of the overall performance: when transferring model parameters to an ungauged watershed, the availability of parameters obtained from upstream or downstream gauged river sections on the same watercourse could strongly distort the general accuracy of the proposed method. In particular, the significance of the results may be not transferable to a case study where the set of donors may not include nested basins.

The aim of the study is to assess the impact of nested catchments on the performance of parameter regionalisation techniques for a rainfall-runoff model (semi-distributed version of the HBV model, TUWien model) for simulating daily streamflows.

The case study refers to a set of 213 Austrian catchments, many of which are nested basins.

A few consolidated parameter regionalisation methods are applied, and their predictive accuracies are assessed by jack-knife cross-validation against the observed daily runoff for all the study catchments. Three regionalisation methods are implemented. The first technique is a kriging approach where model parameters are regionalised independently from each other, based on their spatial correlation. The second method is a nearest neighbour method where the complete set of model parameters is taken from the nearest donor catchment. The last technique is a similarity approach where the complete set of model parameters is transposed from the donor catchment that is most similar in terms of geo-morphological and climatic descriptors. In the last two approaches the correlation among parameters is maintained.

Each regionalisation technique is first implemented in the jack-knife cross-validation using all the basins in the dataset as donor catchments and afterwards by excluding the basins which are considered to be nested in relation to the ungauged section. In order to exclude the nested basins, two different criteria are followed: i) excluding the immediate downstream and upstream gauged sections, ii) excluding all the catchments which share a certain percentage of drainage area with the ungauged one. Finally, the performances obtained over the nested/not nested catchments are analysed.