



Semi-distributed regionalisation of the HBV model parameters based on features and similarity of the elevation zones

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The study aims to test and compare the performance of a group of techniques for transposing rainfall-runoff model parameters to ungauged catchments. In particular, the study proposes the adaptation of the above-mentioned techniques to the semi-distributed structure of the HBV-based TUWien model.

The case study refers to a set of 213 Austrian catchments and the model is a semi-distributed version of the HBV model in which the modelled watershed is divided into zones of different altitude that contribute separately to the total outlet flow.

The potential of the semi-distributed structure is fully exploited: first in the model calibration, where, differently from the typical application of the model, the parameters controlling the runoff generation are allowed to vary over the different elevation zones.

Secondly, in the regionalisation procedure, the parameters of each specific altitude zone in any ungauged catchment are based on those obtained for the same altitude zones of the donors. The rationale is to implement a procedure that operates at sub-basin level, in order to have a better simulation of the different hydrological processes taking place at different altitudes.

The set of regionalisation approaches include both i) “parameters averaging”, where each parameter is obtained as a function (weighted mean or kriging) of the parameters of the donor catchments (independently from each other) and ii) “output averaging”, where the model is run over the ungauged basin using the entire set of parameters of each donor basin and the simulated outputs are then averaged.

The measure of similarity (spatial proximity or based on geo-morphologic and climatic attributes) needed for the regionalisation is of course to be applied not only to the entire catchment but also at sub-basin scale, in the proposed methodology.

Special focus is given to the study of such similarity in order to assess which attributes should be selected, testing a set of geo-morphological and climatic catchment descriptors characterising the altitude zones.

The performance of the different regionalisation approaches and similarity measures is finally assessed by jack-knife cross-validation against the observed daily runoff for all the study catchments.