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Regional calibration of rainfall-runoff model parameters: A Slovak-Austrian comparison

J. Parajka (1), J. Szolgay (2), R. Merz (1), S. Kohnova (2), G. Blöschl (1)

(1) Institute of Hydraulic and Water Resources Engineering, TU Wien, (2) Dept. of Land and Water Resources Management, TU Bratislava

The necessity to generate time series of runoff for planning and design purposes and environmental protection at un-gauged sites is often the case in water resources studies. As in the case of the absence of measured runoff optimisation techniques cannot be used to estimate the parameters of rainfall-runoff models, regional estimation methods are used instead. In these methods, the runoff model is usually calibrated jointly to a number of catchments by incorporating relationships between model parameters and catchment attributes. In this presentation different methods for the regional calibration of a rainfall runoff models are presented and tested in several catchments in Slovakia and Austria. Two models were considered, the semi-lumped daily rainfall runoff model (HVB type) and a monthly water balance model (Watbal). We tested three groups of regionalization approaches. The first group of methods is a modification of the usual examination of correlations between model parameters and catchment attributes. The choice of catchment attributes has been guided by a general understanding of the interactions between runoff, climate and physiography. The second group of methods we examined not to use catchment attributes, but the distance (spatial proximity) between the gauged catchments and the ungauged site of interest. We measured the spatial distance between two catchments by the distance of the respective catchment centroids. Regionalisation approaches in this group are based on different interpolation techniques: the nearest neighbour, the inverse distance weighting and the ordinary kriging methods. These two groups of regionalization methods were applied to regionally transposing parameters of a daily water balance model. The third method, which involves the regional calibration of model parameters to many gauged sites in a homogeneous region simultaneously, was applied to the monthly water balance model. Catchments were pooled together using cluster analysis of selected basin

physiographic properties. The predictive performance of applied regional calibration schemes was evaluated using jack-knife and split sample cross-validations. For the model calibration, automatic evolution based algorithms (genetic algorithm and shuffled complex evolution scheme) were employed. We evaluated the spatial and temporal decreases in model performance when moving from the calibration period to the verification period and to ungauged sites. The model performance of the proposed regional calibration methods was found satisfactory. The merits of the methods in the light of data limitations are discussed.