Revisiting regional flood frequency analysis in Slovakia: the region-of-influence method vs. traditional regional approaches

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During the last 10-15 years, the Slovak hydrologists and water resources managers have been devoting considerable efforts to develop statistical tools for modelling probabilities of flood occurrence in a regional context. Initially, these models followed concepts to regional flood frequency analysis that were based on fixed regions, later the Hosking and Wallis’s (HW; 1997) theory was adopted and modified. Nevertheless, it turned out to be that delineating homogeneous regions using these approaches is not a straightforward task, mostly due to the complex orography of the country.

In this poster we aim at revisiting flood frequency analyses so far accomplished for Slovakia by adopting one of the pooling approaches, i.e. the region-of-influence (ROI) approach (Burn, 1990). In the ROI approach, unique pooling groups of similar sites are defined for each site under study. The similarity of sites is defined through Euclidean distance in the space of site attributes that had also proved applicability in former cluster analyses: catchment area, afforested area, hydrogeological catchment index and the mean annual precipitation. The homogeneity of the proposed pooling groups is evaluated by the built-in homogeneity test by Lu and Stedinger (1992). Two alternatives of the ROI approach are examined: in the first one the target size of the pooling groups is adjusted to the target return period T of the estimated flood quantiles, while in the other one, the target size is fixed, regardless of the target T.

The statistical models of the ROI approach are inter-compared by the conventional regionalization approach based on the HW methodology where the parameters of flood frequency distributions were derived by means of L-moment statistics and a regional formula for the estimation of the index flood was derived by multiple regression methods using physiographic and climatic catchment characteristics. The inter-comparison of different frequency models is evaluated by means of the root mean square error of data from Monte Carlo simulations. The analysis is based on the annual peak discharges from 168 small and mid-sized catchments from Slovakia.

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