

## **Value of morpho-statistical analyses for the delineation of hydrologically homogenous regions in Saxony**

U. Büttner, C. Görner, F. Kerl, A. Philipp, S. Thieme, E. Wolf

The German Free State of Saxony exhibits various landscapes and its area can be divided into 23 physical regions (macrochores), ranging from lowland regions in the north to low mountain ranges in the south. Therefore, runoff is essentially transported in north(west)ward directions and its information is transferred from the mountainous areas to lowland regions. Regardless of this quite straightforward transfer of runoff information, a preceding state-wide peak-flow regionalization study suggested only four hydrologically homogenous regions with respect to the estimated flood regime. The delineation of homogenous regions was based on the results of cluster and regression tree analyses, which incorporated both morphological and hydrological characteristics.

In the light of the given landscape variability, these results may suggest that available morphological and hydrological data are insufficient for the description of regional flood regimes. Incorporating the above-mentioned analyses, the question arises, which morphological characteristics are statistically independent and exhibit certain explanatory power (in a statistical sense), aiming at the delineation of hydrologically homogeneous regions under the constraint of lacking hydrological data.

Against this background, this contribution presents a comprehensive correlation analysis, aiming at revealing the spatio-statistical interdependencies of 22 flood-regime related characteristics. They were selected in order to represent all runoff-influencing compartments and they are derived for 1511 river catchments with an area of at least 10 km<sup>2</sup>. As a result, it can be shown that parameter dependencies are strongly diverse and only a small subset of characteristics is uncorrelated with another one.

The main conclusion from this study is that the self-organization of the landscapes hampers the options to identify watershed characteristics which are to a greater or lesser extent relevant for flood conditions. The interactions of hydrological processes and the spatial dependencies among watershed characteristics result in complex interrelationships which cannot be explained by mathematical statistics only. To select the runoff characterizing parameters for further statistical analyses (e.g., maximum entropy method), an argumentative interpretation of the dependencies is necessary.