



Comparison of flood regionalisation techniques in Lower Saxony.

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The index-flood method has become the standard method for peak flow regionalisation of given return periods at ungauged basins. Moreover grouping stations into regions of homogeneous flood characteristics increases the sample size and thus reduces the uncertainty of estimated peak flows even at gauged basins. At this context, this study investigates the performance of the index-flood method with regards to other regionalisation techniques and evaluates the influence of station density and data quality on the performance of the index-flood method.

For this purpose 338 runoff stations in Lower Saxony with observed monthly peak flows and record lengths of annual peak flows between 10 and 75 years are analysed. Catchment descriptors of topography, soil, vegetation and climate are derived to group them into homogeneous regions.

The regions are separated using 5 classification methods with 2 to 40 classes for selected catchment descriptors. The most suitable catchment descriptors are selected by their impact on classifying the mean annual peak flow and the variance of annual peak flows using random forest. Multiple linear regression, ordinary and external drift kriging, the standard and an extended index-flood method are compared with the at-site estimation as reference using cross-validation. Three station scenarios based on e.g. record length, known station specific experience and hydrological catchment complexity are used to evaluate the influence of station density and quality on the performance of the index-flood method.

The results show the applicability of the index-flood method in Lower Saxony and the benefit of using regional samples for more robust estimations. Combining the index-flood method and geostatistics can improve the estimation of peak flows. The performance of the index-flood method is affected by the used sample respectively the selection of stations.