



Improving flood frequency analysis by integration of empirical and probabilistic regional envelope curves

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For flood design, discharges for large recurrence intervals need to be estimated. Due to limited data these estimates are highly uncertain. Therefore, the use of additional information is recommended, and for the estimation of extreme floods, especially additional information for the extrapolation area is needed. We propose to use empirical and probabilistic regional envelope curves as additional information and show how they can be integrated into flood frequency analysis. For this study, 89 gauging stations from Saxony/ Germany are used.

Envelope curves are derived to estimate upper bound discharges. Further, the method of probabilistic regional envelope curves (PREC) is applied for pooling groups of sites. In this method, a recurrence interval is assigned to a regional envelope curve. A PREC flood quantile – a pair of a discharge and the corresponding recurrence interval – is calculated for each site of the pooling group. An empirical envelope curve is used as second additional regional information together with the PREC flood quantiles in a mixed bounded distribution function. In this way, two types of additional information which are related to different parts of the upper tail of a distribution function are included in the flood frequency analysis and improved the estimation of discharges with recurrence intervals of 1000 years.