

Consideration of event types in flood regionalisation by using a new POT-based statistical approach

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Flood statistics is based either on annual maxima or on peaks-over-thresholds (POT). The basic assumption of mathematical statistics “the observations are homogenous, i.e. subject of a common set of forces” (Gumbel) is often not fulfilled by series of flood peaks, which result from several event types. To consider this heterogeneity, a process-based POT- approach was developed. It considers the seasonal differences in flood generating processes and provides a mixture of several distribution functions, specified by seasons and flood types to characterise annual flood statistics. The results differ from conventional annual flood statistics, which results in an “averaging” of distribution functions of different event-types. In the proposed “seasonal mixing model of partial series” (SMPS) the risk of extreme floods, which could result from several flood types in different seasons of the year, is characterised by consideration of changing frequencies of such types over the range of observed flood peaks. The proposed extended characterisation of basin-specific flood conditions offers new options for regionalisation of flood statistics in river basins. It provides a deeper understanding of more or less relevant flood processes. By consideration of type-specific peak-volume relationships, we can assume the most probable flood characteristics in their seasonal variability to improve flood design practices. The high expenditures of data processing seems justified by these benefits of comparative flood hydrology.