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Anatomy of Floods – Flood Event Analyses and their Utilization

Svenja Fischer (1) and Andreas Schumann (2)

(1) Ruhr-University Bochum, Institute of Hydrology, Civil-Engeneering, Bochum, Germany (svenja.fischer@hydrology.ruhr-uni-bochum.de), (2) Ruhr-University Bochum, Institute of Hydrology, Civil-Engeneering, Bochum, Germany (andreas.schumann@ruhr-uni-bochum.de)

The knowledge of the flood regime is crucial to obtain an overview of flood conditions and differentiate between flood generating processes. A first step to differ between these processes is the typology of floods. The simplest case is the differentiation between rainfall and snow induced floods. However, often a closer look on flood events in a river basin is needed to determine flood types. Here, a detailed step-by-step procedure to determine the flood type as well as the runoff generating processes is presented based on very general, easily available time series like daily discharge, precipitation and temperature. Different types of rainfall and snowmelt induced floods, corresponding e.g. to heavy rain or rain-on-snow, are detected and the preconditions of floods are investigated by analyzing the relation between hydrograph and event rainfall. With this, certain runoff generating processes can be linked directly to flood types. Temporal as well as spatial correlations between events and event types become visible, mainly depending on the climatic conditions. These results are used to differ between extreme and moderate floods and to characterize the generating mechanisms of extreme floods.
In a second step, the detected relationships between rainfall, peak and volume of an event are used to simulate flood events. The results show a very high potential in typological based statistical simulating of flood events with only small differences in statistics of peak and volumes and can lead to improvements in regionalization.