



Identifying the simultaneous extreme flood behavior in the Neckar catchment

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The study of the flood-generating mechanism is one of the most challenging topics in hydrology. The flood events caused by precipitation or snowmelt have different behavior on the neighboring catchments. Topography and other characteristics of the catchments highly influence the flood events mechanism. Investigating the combined effects of flood triggering and their dependencies are essential and can be done using multivariate statistics. In this study, we analyzed the time series of corresponding 46 discharge gauges in the Neckar catchment for 55 years with the daily resolution. First, the two highest values per year were selected which can be categorized as common and individual events. Afterward, the correlation coefficient between pair sets of peaks estimated to scrutinize relationship of the simultaneous events in different sub-catchments. Subsequently, a hierarchical classification tree was plotted to define classes of the catchments. Each separate cluster shows different behavior concerning a flood generating mechanism. Therefore, the region can be divided into the three main clusters, two of them belong to the highest elevation and part of the karstic basin. The clustering result showed a significant pattern between two parts of the upper Neckar and the rest of the catchment.