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Correlated extreme events in runoff data from Southern Germany

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We investigate a data set of 160 river runoff time series at daily resolution from catchments in Southern Germany . Our aim is to seek spatial patterns for best parametrization of extreme value distributions to these data sets on one hand, and to analyze temporal instationarities of parameter estimates and extreme value attributes on the other. Conventional extreme value statistics and the calculation of return periods implicitly assume that the most extreme events are statistically independent. We demonstrate that this assumption is invalid, and that correlations, temporal as well as spatial, of arbitrary extent prevail instead. An important consequence is that the concept of return periods is obsolete. In order to find explanatory variables for the observed patterns, features of the waiting time distribution at a given relative threshold are correlated to catchment properties, such as size, mean runoff volume, elevation, and others. Finally, the effect of varying temporal resolution on the duration periods is exhibited.