



## Study of Changes in the Frequencies of Unusual Hydroclimatological Events

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The water cycle is an important part in the global climate system which is almost sure changed as a consequence of climate change. These changes might not only affect means, variances and extremes at single stations, but also in the spatial and temporal dynamics. Thus events (in space and time) can occur which never occurred before and others might disappear. The purpose of this study is to define unusual events in space and time and to investigate their occurrence in the different multi site and multi temporal sense. The unusual events are defined based on their geometrical position in a multivariate set of observations using the statistical concept of depth. The main idea of depth function is to measure the centrality of a point with respect to multivariate dataset. A point with low depth that located near or on the boundary of the dataset is classified as the unusual events. Long time series of daily mean temperature, precipitation, antecedent temperature index, and antecedent precipitation index for selected European stations are analyzed. The result show how the dynamical behaviors of events in spatial and temporal scale change. Typical newly occurring and disappearing patterns are identified. The statistical significance of the results is tested by a bootstrap based methodology.