



## Event based climatology of extreme precipitation in Europe

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An event based detection algorithm to identify extreme precipitation events in gridded data sets is introduced and applied to the observational E-OBS data set. The algorithm identifies all grid boxes in which the rainfall exceeds a threshold, which depends on the location and the aggregation period. The aggregation periods taken into account in this study range from a single time step up to 72 hours. The local 50-year return level is calculated for all aggregation periods and used as a threshold. All identified grid boxes which are located within the same continuous rain area (i.e. which are not separated by rain free grid boxes) are considered as belonging to the same event and form a cluster. The centre of mass is calculated for each cluster. The clusters are then tracked in time using a nearest neighbor approach. Thus, each detected event can consist of several grid boxes and can last for several time steps. A precipitation severity index (PSI) is assigned to the events. The severity index takes the affected area and the amount of precipitation accumulated over the duration of the event into account. It is normalized by the long-term mean annual precipitation sum expected for the grid box. The severity index can be used to compare the strength of the identified events. The detection algorithm also stores additional information for each event, such as the date, location, affected area, duration, severity and maximum precipitation.

Comparing all events detected in the E-OBS data set, which exceeded the local 50-year return levels, the highest severity index was calculated for an event affecting Spain, which took place in November 1997. It had a severity index of 49.9 and was also described in the literature. In comparison, the average PSI for the extreme precipitation events over Europe is 2.4. Overall, the most active season for extreme precipitation in Europe is summer. The longest duration of an event in the data set was 11 days. It occurred over Estonia in August 1987. The largest extend (152300km<sup>2</sup>) is associated with an event which occurred in September 1992 with its centre over Eastern Europe.

This work has been conducted within the EU project RAIN (Risk Analysis of Infrastructure Networks in response to extreme weather).