Extremeness of weather events

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There is no unified method of defining extreme weather events and distinguishing them from 'non-extreme events'. The main reason is that the events can vary in terms of short-term intensity, duration, area, socio-economic impacts etc. Definition of suitable selection criteria is still necessary for successful research into atmospheric hazards.

We apply a dynamical approach to extremity evaluation, considering variable time periods (from 1 to 7 days) and stepwise enlarged area. We use station data converted to return period values because that suppresses spatial variability in the dataset. Furthermore, when interpolated into a regular grid, the interpolation is less sensitive to the interpolation method.

We demonstrate our method in the extremity evaluation of precipitation events in the Czech Republic. For each event, we calculate the mean return periods within stepwise enlarged area, separately for individual n-day totals. When starting from the grid box with the highest return period recorded, the mean value generally decreases as we enlarge the area. The relation between the area and the mean return periods is used for (i) spatio-temporal analysis of individual events; (ii) comparison of more events and selection of the extreme one for the given duration and area. We also show that the differences in the spatio-temporal extent of the detected events are related to large-scale circulation conditions.