



## Assessment of the extremity of heavy precipitation

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Considering all natural disasters occurring on the Czech territory, heavy precipitation and associated flooding pose the greatest direct risk. To explain the causes and development of flood events, it is important to analyze the occurrence of intense precipitation in the past. A frequently used method of evaluation of heavy precipitation which is based only on rainfall intensity, total rainfall depth or duration of the events does not enable to compare precipitation events in terms of their spatiotemporal extremity. The methods presented in the paper introduce spatial and temporal dimensions in the assessment of the extremity of heavy precipitation, which allows, among other things, to specify the predominant character of precipitation.

This study investigates the dependencies between temporal and spatial variability of heavy precipitation and their extremeness. Selected cases of heavy precipitation observed in the upper Elbe basin to the gauging station NĚmčice, Czech Republic, in the second half of the 20th century, are studied. SAD (severity–area–duration) curves and severity diagrams are developed for each precipitation event. These figures show a continuous view on the territory in which precipitation was concentrated during specific time interval. Methods in the evaluation of extremity precipitation events are based from the return period precipitation amounts measured in stations. The events are further characterized by the size of the area and rainfall duration. One-day to six-day return periods of precipitation are always confronted.

Applied methods allow comparing precipitation events not only in terms of extremity (return period precipitation) but also their temporal and spatial distribution. They show that the heavy precipitation concentrated over a large area, or conversely affected only a small area. Temporal scales are taken into account in the analysis of extremity of heavy precipitation and duration time of heavy precipitation is also displayed. Using a graphical representation of the SAD curves and severity diagrams, it is possible to identify the precipitation character (torrential rain caused by convection or large-scale precipitation). This information could help to understand the mechanisms of flood events development in the upper Elbe catchment area. These findings of heavy precipitation visualization could be useful in precipitation forecasting and in flood warning systems.