

How do blockings relate to heavy precipitation events in Europe?

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Atmospheric blockings are quasi-stationary high pressure systems that persist for several days. Due to their longevity, blockings can be key features for extreme weather events. While several studies have shown their relevant role for temperatures extremes, the link between blockings and extreme precipitation and floods is still poorly understood.

A case study of a Swiss lake flood event in the year 2000 reveals how different processes connected to blockings can favour the development of a flood.

First upstream blocks helped to form strongly elongated troughs that are known to be associated with heavy precipitation events south of the Alps. Second recurrent precipitation events upstream of a block led to a moistening of the catchment and an increase of the lake level. Third the progression of the upstream weather systems was slowed and thereby the precipitation period over a catchment prolonged. Additionally, cloud diabatic processes in the flood region contributed to the establishment and maintenance of blocking anticyclones.

Based on this case study we extend our analysis to all of Europe. Focusing on flood relevant precipitation events, i.e. extreme precipitation events that last for several days and affect larger areas, we show that different regions in Europe have very distinct seasonal precipitation patterns. Hence there is a strong seasonality in the occurrence of extreme events, depending on the geographical region. We further suggest that for different precipitation regimes, the preferred location of blockings varies strongly. Heavy precipitation events in southern France, for example, are often observed during Scandinavian blockings, while heavy precipitation events in south-eastern Europe coincide more often with eastern North-Atlantic blockings.