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Statistical downscaling of daily precipitation extremes using the concept of data depth

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Hydrological extremes like floods or droughts are usually caused by unusual atmospheric states. The identification of those states can be performed by calculating the closeness or the similarity between two atmospheric states to identify a suitable set of analogues. However, unusual atmospheric states are rare events. In this case, it can be possible that no suitable analogue has been observed so far. In this investigation we present a methodology for a robust identification of unusual atmospheric states. This technique is based on the concept of data depth. It is a geometrical approach which is used to measure the centrality of an atmospheric state. The closer an atmospheric state is to the mean state of the atmosphere, the higher the data depth of a state becomes. To investigate the performance of this technique for the downscaling of local extremes, the methodology is tested for the detection of intensive daily precipitation. The test region is located in the Rhine basin, Germany. The predictors are daily anomalies of the geopotential height and the moisture flux calculated from the NCEP/NCAR reanalysis information. The investigation is performed for a period of more than 50 years. In this presentation we will highlight the basic concept of data depth for the identification of unusual atmospheric states and the application of the methodology for the downscaling of daily precipitation. We will also demonstrate the high performance of this technique for the detection of precipitation extremes and the suitable transferability of this approach to another time period.