



Detecting changes in the frequency of high impact weather events using circulation analogue statistics

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Society is concerned about changes in extreme events due to their high impact on human activity and scientists are solicited to answer the question if the frequency of such events has changed. However, assessing those changes in the frequency of high impact weather remains a challenge.

Assuming that high impact events such as heavy precipitation, persistent drought conditions or extreme winds occur under specific atmospheric circulation configurations, circulation analogues are studied here. We present a method that consists of analysing distance statistics from the circulation analogue computation. This method allows to compare the probabilities of finding good circulation analogues for days with high impact weather such as heavy precipitation or strong winds during different historic periods using reanalysis data. An increasing probability of finding good analogues for those days over time can then be interpreted as an increase in the probability of occurrence of such events.

Given that the large-scale circulation can be reliably simulated by Global Climate Models compared to the more local high-impact events themselves, the circulation analogue distance statistics method can be used to analyse changes in the probability of high impact events in climate simulations. We present an application of the circulation analogue method to investigate the high precipitation episodes in Europe in January 2014.