Changes in the annual cycle of heavy precipitation events across the UK in future projections

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Heavy precipitation in the UK shows a pronounced annual cycle. To study past, present and future impacts on agriculture, ecosystems, etc. it is important to analyse intensity and frequency of extreme events together with their spatial and temporal occurrence throughout the year.

We design a statistical model based on extreme value statistics (EVS) and fit the statistical model to the projected precipitation output of 14 regional climate models (RCMs) driven by the SRES scenario A1B, used in the ENSEMBLES project.

Here we model extreme precipitation in the UK as a Poisson process with a non-stationary threshold. We use a sinusoidal model for the location and scale parameter of the corresponding generalized extreme value (GEV) distribution and a constant shape parameter.

We assess future changes of the local scale annual cycle in extreme precipitation in the ensemble of RCMs. To this end we fit the statistical model to the simulated precipitation for three time slices: 1961-2000, 2021-2060 and 2061-2100. As we have seen in the validation of the RCMs, the peak time of the annual return level conditioned on the month of their occurrence is sufficiently well modeled by all RCMs to compare the difference between the three slices and analyse the resulting spatial patterns. We detect a shift in the peak time of the annual cycle or a change in the amplitude of the annual cycle of the intesity of extreme precipitation events.