



## Future extension of the UK Summer and its impact on Autumn precipitation

**Why this is important:** Both UK rainfall and temperature extremes are projected to increase significantly with human-induced climate change, though less is known about how atmospheric circulation changes are contributing. This is important as atmospheric circulation significantly impacts the probability of extreme events over Europe. To date, research has mainly focused on future weather circulation changes over the UK in the Summer and Winter seasons, with less analysis on seasonality and the transition seasons. Changes in seasonality are important as they can have large impacts on many sectors including agriculture, energy and tourism. Better understanding potential changes in seasonality will better inform adaptation planning in different sectors to support the increase in resilience of the UK to future climate variability and change.



**What the UKCR programme is doing:** Work has been undertaken to address three main scientific questions; 1) has human influence changed the frequency of weather patterns over the UK; 2) are future changes in seasonality due to weather circulation patterns, and if so, how does this change vary between greenhouse gas (GHG) emission scenarios and models; 3) what is the impact of these changes in seasonality on average and extreme rainfall for the UK. To answer these questions, a methodology has been applied, which combines rainfall and sea level pressure observations and projections from several climate models (out to 2100 and under GHG emission scenarios RCP2.6 and RCP8.5), with an operational weather forecasting tool of 30 weather patterns for the UK and NW Europe, to examine the influence of climate change on atmospheric circulation.

**Results so far:** The study finds a projected increase in the frequency of drier summer-type regimes and a decrease in stormy winter types during Autumn over the UK, with climate models showing this signal emerging in the 2020s and increasing out to 2100. The change in circulation signal is responsible for a 4-12% decrease in Autumn (SON) mean rainfall for England by 2085, with the lower value for the low GHG emissions scenario (RCP2.6) and the upper value for the high GHG emissions scenario (RCP8.5). Combined with UKCP18 projections of hotter drier summers, this result has the potential to further increase drought risk within the UK.

**What is next?** The study has been published in the journal *Climate Dynamics*, and will be communicated at appropriate conferences, workshops, and media channels to maximise exposure and uptake of the results by policy and decision makers.

**Reference:** Cotterill, D., Pope, J., Stott, P., 2021, Future extension of the UK Summer and its impact on Autumn precipitation, *Climate Dynamics*, <https://doi.org/10.1007/s00382-022-06403-0>

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