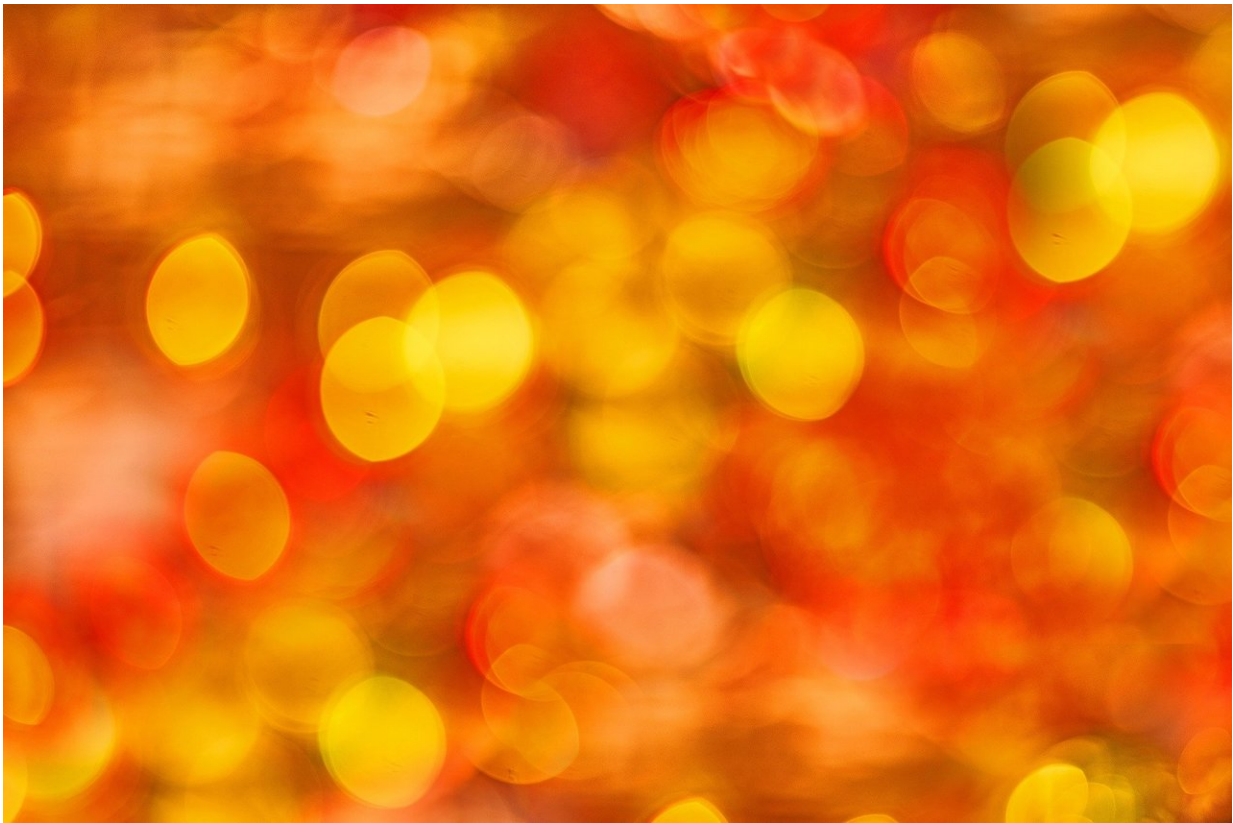


# Winter warm spells see a two- to three-fold increase in duration and frequency

May 6 2020, by Peter Thorley

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Warm winter spells have increased in frequency and duration two- to three times over since 1878, according to scientists led by the University of Warwick.

In a new analysis of historical daily temperature data published in the *Journal of Applied Meteorology and Climatology*, scientists from the Department of Physics at the University of Warwick, the British Antarctic Survey, and at the London School of Economics and Political Science examined data from the Central England Temperature (CET) record, the longest available instrumental record of temperature in the world. They focused on warm spells during the [winter](#) months, defined as sustained periods of time above a fixed temperature threshold.

The conclusions do not rely on identifying and counting winter warm spells directly but instead use observations of daily temperatures to show how the likelihood of different temperatures has changed. By applying a method called crossing theory to these probabilities, the scientists have provided information on the changing relationship between frequency, duration and intensity of these warm spells.

The researchers focused on the maximum daily temperatures in December, January and February in observations from 1878. Week-long warm intervals that return on average every five years now consistently exceed 13 degrees C. In the 1850s, a winter warm spell lasting more than five days with a daily maximum temperature above 12-13°C would typically take at least five years to reoccur. Nowadays they occur more often, typically every four years or less.

Climate variability is expected to increase as the [global climate](#) warms, and the increase of extended warm spells during winter can have an important impact on agriculture and the sustainability of [ecosystems](#). However, ecosystems are not uniformly sensitive to changes at different temperatures. They are instead vulnerable to changes around critical temperature thresholds and these thresholds may be far from the distribution mean.

Lead author Professor Sandra Chapman of the University of Warwick

Department of Physics said: "Our results show that it is possible to focus on warm spells above specific [temperature](#) thresholds that are critical for individual species and ecosystem functioning. It thus can be of direct value in supporting our understanding and assessment of climate change impacts."

Professor Stainforth from the Grantham Research Institute at the London School of Economics and Political Science said: "Sustained periods of warm weather can have a significant impact on agriculture and ecosystems even when they don't involve record-breaking extremes. The changing frequency and characteristics of such events may have substantial impacts and this new work demonstrates a novel and flexible method for deducing how they are changing. It provides a valuable new approach for studying the less obvious consequences of climate change."

Professor Eugene Murphy, Science Leader of the Ecosystems Team at British Antarctic Survey said: "Unusually extended periods of warm weather in winter can disrupt [biological processes](#) causing changes in the development of populations of plants and animals during the following spring. These changes can affect the biological balance that sustains ecosystems and the diverse biological communities they support, potentially reducing their resilience and capacity to cope with future change."

**More information:** S C Chapman et al. Trends in Winter Warm Spells in the Central England Temperature Record, *Journal of Applied Meteorology and Climatology* (2020). [DOI: 10.1175/JAMC-D-19-0267.1](https://doi.org/10.1175/JAMC-D-19-0267.1)

Provided by University of Warwick

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