

European heat waves double in length since 1880

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The most accurate measures of European daily temperatures ever indicate that the length of heat waves on the continent has doubled and the frequency of extremely hot days has nearly tripled in the past century. The new data shows that many previous assessments of daily summer temperature change underestimated heat wave events in western Europe by approximately 30 percent.

Paul Della-Marta and a team of researchers at the University of Bern in Switzerland compiled evidence from 54 high-quality recording locations from Sweden to Croatia and report that heat waves last an average of 3 days now—with some lasting up to 4.5 days—compared to an average of around 1.5 days in 1880.

The results are published 3 August in the *Journal of Geophysical Research-Atmospheres*, a publication of the American Geophysical Union. The researchers suggest that their conclusions contribute to growing evidence that western Europe's climate has become more extreme and confirm a previously hypothesized increase in the variance of daily summer temperatures since the 19th century.

The study adds evidence that heat waves, such as the devastating 2003 event in western Europe, are a likely sign of global warming; one that perhaps began as early as the 1950s, when their study showed some of the highest trends in summer mean temperature and summer temperature variance.

"These results add more evidence to the belief among climate scientists that western Europe will experience some of the highest environmental and social impacts of climate change and continue to experience devastating hot summers like the summer of 2003 more frequently in the future," Della-Marta said.

The authors note that temperature records were likely overestimated in the past, when thermometers were not kept in modern Stevenson screens, which are instrument shelters used to protect temperature sensors from outside influences that could alter its readings. The researchers corrected for this warm bias and other biases in the variability of daily summer temperatures and show that nearly 40 percent of the changes in the frequency of hot days are likely to be caused by increases in summer temperatures' variability. This finding demonstrates that even a small change in the variance of daily summer temperatures can radically enhance the number of extremely hot days.

"These findings provide observational support to climate modeling studies showing that European summer temperatures are particularly sensitive to global warming," Della-Marta said. "Due to complex reactions between the summer atmosphere and the land, the variability of summer temperatures is expected to [continue to] increase substantially by 2100."

Source: American Geophysical Union

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