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More frequent heat waves in Europe by 2100

In Western Europe, the length of heat waves has doubled and the frequency of hot days has almost tripled since 1880, according to a recent study by an international team of scientists. Furthermore, the study, which uses more accurate data sets than previous studies, shows that earlier assessments of daily summer temperatures might have underestimated changes in heat wave events by about 30%.

Extreme temperature events such as the heat wave experienced in Europe in 2003 have devastating socio-economic and environmental effects. It has been estimated that 22,080 deaths occurred in England and Wales, France, Italy and Portugal during, and immediately after, the heat waves of the summer of 2003. To these should be added 6,595 – 8,648 deaths in Spain, and 1,400 – 2,200 in the Netherlands. Furthermore, forests were devastated by fires and the total mass of Alpine glaciers shrank by 10%. It is important to predict this type of event accurately in order to be able to develop adaptation strategies, especially for those that are most vulnerable.

Recently, an international team of researchers quantified the changes in extreme warm events in Europe. The scientists analysed daily maximum temperature data from 54 recording stations in 16 countries across Europe. Forty-six sets of records date back to the 19th century, the rest go back to the early 1900s.

The authors noted that in the past the temperatures were recorded as being hotter that they really were. This is due to the fact that prior observations were obtained from thermometers that were not protected from reflected sunlight and indirect radiation (heat) coming from the ground, which distorts temperature readings. This caused the increase in temperature over time to appear smaller that it actually was. The authors corrected these deviations and others in the variability of the daily summer temperatures and observed that previous estimates of the increase in the frequency of hot days and the length of heat waves over the entire western European region had been underestimated by approximately 30%.

The results suggest that heat waves now last an average of 3 days (with some lasting 13 days) compared with an average of 1.5 days in 1880. The study also highlights the work of other researchers who predict that by the late 21st century, heat waves will be around 50% longer than in the 1961 to 1990 period due to complex reactions between the summer atmosphere and the land. They also argue that nearly 40% of the changes in the frequency of hot days are likely to be caused by increases in the variability of summer temperatures. The study shows that the most pronounced increase in the summer mean temperatures and summer temperature variance began in the 1950s.

The results of this study show that western Europe's summer climate has become more extreme than previously thought and supports modelling studies showing that the region will experience devastating heat waves such as the event in 2003 more frequently in the future - a likely sign of global warming.

Source: P.M. Della-Marta et al. (2007) "Doubled length of western European summer heat waves since 1880", Journal of Geophysical Research 112 doi: 10.102972007JD008510.
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