EXTREME TEMPERATURES IN EUROPE

Have there been more frequent hot weather events during the past century?
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One of the projected negative consequences of global warming is a concomitant increase in climatic variability, including more frequent hot weather events. It is a relatively easy matter to either substantiate or refute such claims by examining trends in extreme temperatures over the past century or so; because if global warming has truly been occurring at an unprecedented rate over the past hundred years, as climate alarmists claim it has, temperature variability and extreme temperature events should be increasing, according to them. Therefore, this review investigates this issue as it pertains to locations in Europe.

Beginning with a historic view of the topic, the study of Jones and Briffa (2006)\(^1\), in their words, focused "on one of the most interesting times of the early instrumental period in northwest Europe (from 1730-1745), attempting to place the extremely cold year of 1740 and the unusual warmth of the 1730s decade in a longer context." In doing so the authors relied primarily on "long (and independent) instrumental records together with extensive documentary evidence," as well as "unpublished subjective circulation charts developed by the late Hubert Lamb" and "others recently developed using more objective modern reconstruction techniques."

According to the two researchers from the Climatic Research Unit of the University of East Anglia (who are by no means climate skeptics), results of the analysis revealed that "the period 1740-1743 has been shown to be the driest period of the last 280 years [italics added], with the year 1740 the coldest recorded over the British Isles since comparable records began in 1659 [italics added]." What is more, they note that the record cold of the year 1740 "is all the more remarkable [italics added] given the anomalous warmth of the 1730s [italics added]," which was "the warmest [italics added] in three of the long temperatures series (Central England Temperature, De Bilt and Uppsala) until the 1990s occurred [italics added]."

In discussing their findings, Jones and Briffa say their study "highlights how estimates of natural climatic variability in this region based on more recent data may not fully encompass the possible known range," stating that "consideration of variability in these records from the early 19th century, therefore, may underestimate the range that is possible." Consequently, as with droughts and floods, the instrumental record is simply not long enough to provide a true picture of natural temperature variability in terms of what is possible in the absence of the influence of anthropogenic greenhouse gases.

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\(^1\) http://www.co2science.org/articles/V10/N13/C1.php.
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Further support for the preceding sentence comes from the work of Manrique and Fernandez-Cancio (2000), who employed a network of approximately 1000 samples of tree-ring series representative of a significant part of Spain to reconstruct thousand-year chronologies of temperature and precipitation, after which they used this data base to identify anomalies in these parameters that varied from their means by more than four standard deviations. In doing so, they found that the greatest concentration of extreme climatic excursions, which they describe as "the outstanding oscillations of the Little Ice Age," occurred between AD 1400 and 1600, during a period when extreme low temperatures reached their maximum frequency.

Focusing on just the past century, Rebetez (2001) analyzed day-to-day variability in two temperature series from Switzerland over the period 1901-1999, during which time the two sites experienced temperature increases of 1.2 and 1.5°C. Their work revealed that warmer temperatures led to a reduction in temperature variability at both locations. As they describe it, "warmer temperatures are accompanied by a general reduction of variability, both in daily temperature range and in the monthly day-to-day variability," indicating that even on a much finer time scale, it is cooling (not warming!) that brings an increase in temperature variability.

Also working in Switzerland and over roughly the same time period, Beniston and Goyette (2007) write that "it has been assumed in numerous investigations related to climatic change that a warmer climate may also be a more variable climate (e.g., Katz and Brown, 1992; IPCC, 2001; Schar et al., 2004)," noting that "such statements are often supported by climate models results, as for example in the analysis of GCM and/or RCM simulated temperature and precipitation (Mearns et al., 1995; Mearns et al., 1990)." Hence, they say "it is of interest to investigate whether, based on long time-series of observational data, this hypothesis is indeed verified in a climate that has experienced a warming of 2°C or more."

Noting that 20th-century warming in the alpine area of Europe "is 2-3 times greater than the global average (Jungo and Beniston, 2001) and provides an observational framework that allows to address the issue of links between mean temperature and its variance," the researchers focused on one Swiss site representative of low elevation (Basel, 369 m above sea

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4 http://www.co2science.org/articles/V10/N34/C1.php.
level) and another Swiss site representative of high elevation (Saentis, 2500 m above sea level), both of which sites, in their words, "have proven their quality in a number of previous studies (Jungo and Beniston, 2001; Beniston and Jungo, 2002; Beniston and Stephenson, 2004; Beniston and Diaz, 2004)," where they say it was determined that conclusions based on data from these sites "also apply to most of the other Swiss sites."

Beniston and Goyette report that based upon observational data since 1900 at both the low and high elevation sites, "the inter-annual and decadal variability of both maximum and minimum daily temperatures has in fact decreased [authors' italics] over the course of the 20th century despite the strong warming that has been observed in the intervening period [italics added]," which findings, they add, "are consistent with the temperature analysis carried out by Michaels et al. (1998), where their results also do not support the hypothesis that temperatures have become more variable as global temperatures have increased during the 20th century." In addition, they found that "the principal reason for this reduction in variability is related to the strong increase in the persistence of certain weather patterns at the expense of other types." Thus, the Swiss researchers say their observations show that "contrary to what is commonly hypothesized, climate variability does not necessarily increase as climate warms." In fact, they emphasize that "the variance of temperature has actually decreased [italics added] in Switzerland since the 1960s and 1970s at a time when mean temperatures have risen considerably [italics added]."

Introducing their study of the subject, Chase et al. (2006) note that much was made of the supposed uniqueness of the summer of 2003 European heat wave, its implied connection to CO2-induced global warming, and the proposal that it was evidence of a climatic regime shift to one of greater variability that supports the more frequent occurrence of more extreme warm events (Schar et al., 2004; Stott et al., 2004; Trigo et al., 2005). Against this backdrop, the group of four researchers utilized NCEP global reanalysis data for the period 1979-2003 to calculate extreme tropospheric temperature events over the region 22°N to 80°N throughout the June-July-August period (and globally using annual averages), after which they compared the results with the corresponding particulars of the European heatwave of 2003 in terms of "standard deviations exceeded and correlations between regional extremes and temperatures at larger spatial scales."

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Quoting the authors, their analysis revealed that (1) "extreme warm anomalies equally, or more, unusual than the 2003 heat wave occur regularly," (2) "extreme cold anomalies also occur regularly and can exceed the magnitude of the 2003 warm anomaly," (3) "warmer than average years have more regional heat waves and colder than average years have more cold waves," (4) "natural variability in the form of El Niño and volcanism appears of much greater importance than any general warming trend in causing extreme regional temperature anomalies," and (5) "regression analyses do not provide strong support for the idea that regional heat or cold waves are significantly increasing or decreasing with time during the period considered here." And as a result of these findings, Chase et al. conclude by saying their analysis "does not support the contention that similar anomalies as seen in summer 2003 are unlikely to recur without invoking a non-stationary statistical regime with a higher average temperature and increased variability." In other words, the 2003 European summer heat wave implies nothing at all about CO₂-induced global warming. It was merely a rare, but not unprecedented, weather event, of which there have been several other examples (both hot and cold, and some stronger) over the past quarter-century.

In another study conducted out of a desire to understand the significance of a modern heat wave from an historical perspective, Dole et al. (2011)⁶ write that "the 2010 summer heat wave in western Russia was extraordinary, with the region experiencing the warmest July since at least 1880 and numerous locations setting all-time maximum temperature records." And as a result, they say that "questions of vital societal interest are whether the 2010 Russian heat wave might have been anticipated, and to what extent human-caused greenhouse gas emissions played a role."

In broaching this question, Dole et al. used both climate model simulations and observational data "to determine the impact of observed sea surface temperatures, sea ice conditions and greenhouse gas concentrations." In doing so, the nine U.S. researchers found that "analysis of forced model simulations indicates that neither human influences nor other slowly evolving ocean boundary conditions contributed substantially to the magnitude of the heat wave." In fact, they say that the model simulations provided "evidence that such an intense event could be produced through natural variability alone." Similarly, on the observation front, they state that "July surface temperatures for the region impacted by the 2010 Russian heat wave show

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no significant warming trend over the prior 130-year period from 1880-2009," noting, in fact, that "a linear trend calculation yields a total temperature change over the 130 years of -0.1°C." In addition, they indicate that "no significant difference exists between July temperatures over western Russia averaged for the last 65 years (1945-2009) versus the prior 65 years (1880-1944)," and they state that "there is also no clear indication of a trend toward increasing warm extremes." Last of all, they say that although there was a slightly higher variability in temperature in the latter period, the increase was "not statistically significant."

"In summary," to quote Dole et al., "the analysis of the observed 1880-2009 time series shows that no statistically significant long-term change is detected in either the mean or variability of western Russia July temperatures, implying that for this region an anthropogenic climate change signal has yet to emerge above the natural background variability." Thus, they say their analysis "points to a primarily natural cause for the Russian heat wave," noting that the event "appears to be mainly due to internal atmospheric dynamical processes that produced and maintained an intense and long-lived blocking event," adding that there are no indications that "blocking would increase in response to increasing greenhouse gases."

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In one final study of European heat waves, Jeong et al. (2010) begin by recognizing the model-based IPCC Fourth Assessment Report claim suggest that future heat waves over Europe will be more severe, longer lasting and more frequent than those of the recent past, due largely to an intensification of quasi-stationary anticyclone anomalies accompanying future warming, citing in support of this statement the publications of Meehl and Tebaldi (2004) and Della-Marta et al. (2007). In a model-based assessment of this hypothesis, Jeong et al., as they describe it, "investigate the impact of vegetation-climate feedback on the changes in temperature and the frequency and duration of heat waves in Europe under the condition of doubled atmospheric CO₂ concentration in a series of global climate model experiments," where land surface processes are calculated by the Community Land Model (version 3) described by Oleson et al. (2004), which includes a modified version of the Lund-Potsdam-Jena scheme for computing vegetation establishment and phenology for specified climate variables. So what did they find?

The six scientists say their calculations indicate that "the projected warming of 4°C over most of Europe with static vegetation has been reduced by 1°C as the dynamic vegetation feedback effects are included," adding that "examination of the simulated surface energy fluxes suggests that additional greening in the presence of vegetation feedback effects enhances evapotranspiration and precipitation, thereby limiting the warming, particularly in the daily maximum temperature." In addition, they state that "the greening also tends to reduce the frequency and duration of heat waves."

Although Jeong et al.'s model-based findings by no means constitute the final word on the subject of the ultimate climatic consequences of a doubling of the air's CO₂ content, they indicate just how easily the incorporation of a new suite of knowledge, in even the best climate models of the day, can dramatically alter what the IPCC and other climate-alarmist organizations and individuals purport to be reality, including what they say about the frequency and duration of heat waves. Yet in conjunction with their model-based work, real-world data from the past bear witness that extreme temperatures tend to be less frequent and less severe during warmer climatic periods than they are during colder ones.

REFERENCES


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