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Clim. Past, 3, 659-668, 2007
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How unusual was autumn 2006 in Europe?

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Abstract. The temperatures in large parts of Europe have been record high during the meteorological autumn of 2006. Compared to 1961–1990, the 2 m temperature was more than three degrees Celsius above normal from the North side of the Alps to southern Norway. This made it by far the warmest autumn on record in the United Kingdom, Belgium, the Netherlands, Denmark, Germany and Switzerland, with the records in Central England going back to 1659, in the Netherlands to 1706 and in Denmark to 1768. The deviations were so large that under the obviously false assumption that the climate does not change, the observed temperatures for 2006 would occur with a probability of less than once every 10 000 years in a large part of Europe, given the distribution defined by the temperatures in the autumn 1901–2005.

A better description of the temperature distribution is to assume that the mean changes proportional to the global mean temperature, but the shape of the distribution remains the same. This includes to first order the effects of global warming. Even under this assumption the autumn temperatures were very unusual, with estimates of the return time of 200 to 2000 years in this region. The lower bound of the 95% confidence interval is more than 100 to 300 years.

Apart from global warming, linear effects of a southerly circulation are found to give the largest contributions, explaining about half of the anomalies. SST anomalies in the North Sea were also important along the coast.

Climate models that simulate the current atmospheric circulation well underestimate the observed mean rise in autumn temperatures. They do not simulate a change in the shape of the distribution that would increase the probability of warm events under global warming. This implies that the warm autumn 2006 either was a very rare coincidence, or the local temperature rise is much stronger than modelled, or non-linear physics that is missing from these models increases the probability of warm extremes.

▣ [Final Revised Paper](#) (PDF, 968 KB) ▣ [Discussion Paper](#) (CPD)

Citation: van Oldenborgh, G. J.: How unusual was autumn 2006 in Europe?, *Clim. Past*, 3, 659-668, 2007. ▣ [Bibtex](#) ▣ [EndNote](#) [Reference Manager](#)



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