



Swansea University
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NEWS RELEASE

Recent summer temperatures in Europe are likely the warmest of the last two millennia

Most of Europe has experienced strong summer warming over the course of the past several decades, accompanied by severe heat waves in 2003, 2010 and 2015. New research now puts the current warmth in a 2100-year historical context using tree-ring information and historical documentary evidence to derive a new European summer temperature reconstruction.

Swansea University's [Professor Danny McCarroll](#) and [Dr Mary Gagen](#) of the [College of Science](#) were part of the research group of 45 scientists from 13 countries who worked on the research which was published today (29th January) in the journal of *Environmental Research Letters*.

Warm summers were experienced during Roman times, up to the 3rd century, followed by generally cooler conditions from the 4th to the 7th centuries. A generally warm medieval period was followed by a mostly cold Little Ice Age from the 14th to the 19th centuries. The pronounced warming early in the 20th century and in recent decades is well captured by the tree-ring data and historical evidence on which the new reconstruction is based.

The evidence suggests that past natural changes in summer temperature are larger than previously thought, suggesting that climate models may underestimate the full range of future extreme events, including heat waves. This past variability has been

associated with large volcanic eruptions and changes in the amount of energy received from the sun. The new research finding that temperatures over the past 30 years lie outside the range of these natural variations supports the conclusions reached by the Intergovernmental Panel on Climate Change (IPCC) that recent warming is mainly caused by anthropogenic activity.

Professor McCarroll said: "We now have a detailed picture of how summer temperatures have changed over Europe for more than two thousand years and we can use that to test the climate models that are used to predict the impacts of future global warming."

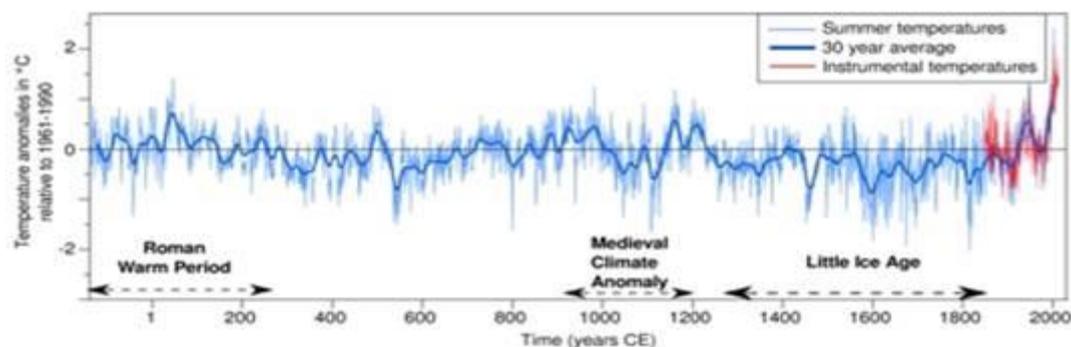
Professor McCarroll, who leads a team using tree rings to reconstruct the climate of the past, has warned: "These results are a clear indication that we have already changed the climate of Europe. There have been warm periods in the past, but summer temperatures over the last 30 years are beyond the range of natural variability."

The interdisciplinary study involved the collaboration of researchers from Past Global Changes' (PAGES) original European 2k Network working group, Euro-Med2k. PAGES, a core project of the International Geosphere-Biosphere Programme (until 2015) and Future Earth (2015-), is funded by the U.S. and Swiss National Science Foundation and the U.S. National Oceanic and Atmospheric Administration.

Read the paper [here](#)

More information, including the full list of authors, international contacts and a figure, can be found [here](#)

Figure 1: European summer temperature variations 137 BCE to 2003 CE and associated uncertainties.



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After embargo has passed:

Citation: Luterbacher J et al. 2016: European summer temperatures since Roman times. *Environmental Research Letters* 11, 024001, doi: 10.1088/1748-

9326/11/1/024001 <http://iopscience.iop.org/article/10.1088/1748-9326/11/2/024001>

Notes for Editors:

Swansea University is a world-class, research-led, dual campus university. The University was established in 1920 and was the first campus university in the UK. It currently offers around 330 undergraduate courses and 120 post-graduate courses to 16,800 undergraduate and postgraduate students.

The University's 46-acre Singleton Park Campus, established in 1920, is located in beautiful parkland with views across Swansea Bay. The University's 65-acre science and innovation Bay Campus, which opened in September 2015, is located a few miles away on the eastern approach to the city. It has the distinction of having direct access to a beach and its own seafront promenade. Both campuses are close to the Gower Peninsula, the UK's first Area of Outstanding Natural Beauty.

The results of the Research Excellence Framework (REF) 2014 showed the University has achieved its ambition to be a top 30 research University, soaring up the league table to 26th in the UK, with the 'biggest leap among research-intensive institutions' (*Times Higher Education*, December 2014) in the UK.

The University has ambitious expansion plans as it moves towards its centenary in 2020, as it continues to extend its global reach and moves closer to realising its ambition of being a top 200 Global University.

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