

To the media

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## **Media release**

### **New evidence for climate impacts on ancient societies**

**Annual-resolved European summer climate has, for the first time ever, been reconstructed over the past 2,500 years. Tree rings reveal possible links between past climate variability and changes in human history. Climate change coincided with periods of socioeconomic, cultural and political turmoil associated with the Barbarian Migrations, the Black Death and Thirty Years' War.**

An international research team of archaeologists, climatologists, geographers and historians led by Ulf Büntgen (Swiss Federal Research Institute WSL and Oeschger Centre for Climate Change Research, University of Berne) compared variations in European summer climate with conspicuous events and episodes in human history. Their study, scheduled for publication in the 13 January online version of the renowned journal *Science*, provides new evidence that agrarian wealth and overall economic growth may have been impacted by climate change.

The researchers reconstructed the history of central Europe's summer precipitation and temperature for the past 2,500 years, extending the record more than 1,000 years further than previous studies into the past. Their results are based on measurements of annual tree-rings from thousands of sub-fossil, archaeological, historical and living tree samples from Germany, France, Italy and Austria.

The climate information stored in these trees allows comparison of natural precipitation and temperature fluctuations with the development of European societies. European summer climate during the Roman Era about 2,000 years ago was relatively warm and

wet and characterized by less variability. Increased climate variations from around 250-600 A.D. coincided with the demise of the Western Roman Empire and the exceptional turmoil of the Migration Period during which the continent's population was substantially reordered.

The new study also revealed that humid and mild summers paralleled the rapid cultural and political growth of Medieval Europe, whereas unfavourable climate may have played a role in the underlying health conditions that contributed to the devastating economic crisis that arose in connection with the Black Death plague pandemic in the 14th century. More recently, temperature minima in the early 17th and 19th centuries coincided with large-scale settlement abandonment during the Thirty Years' War and the modern mass migrations from Europe to America.



The lead author of the study, Ulf Büntgen (Swiss Federal Research Institute WSL) pointed out "that past hydroclimatic variations may have exceeded the magnitude and duration of variations seen in modern times. The situation is different for temperature though, as the recent warming in the late 20th and early 21st century appears unprecedented with respect to the past 2,500 years."

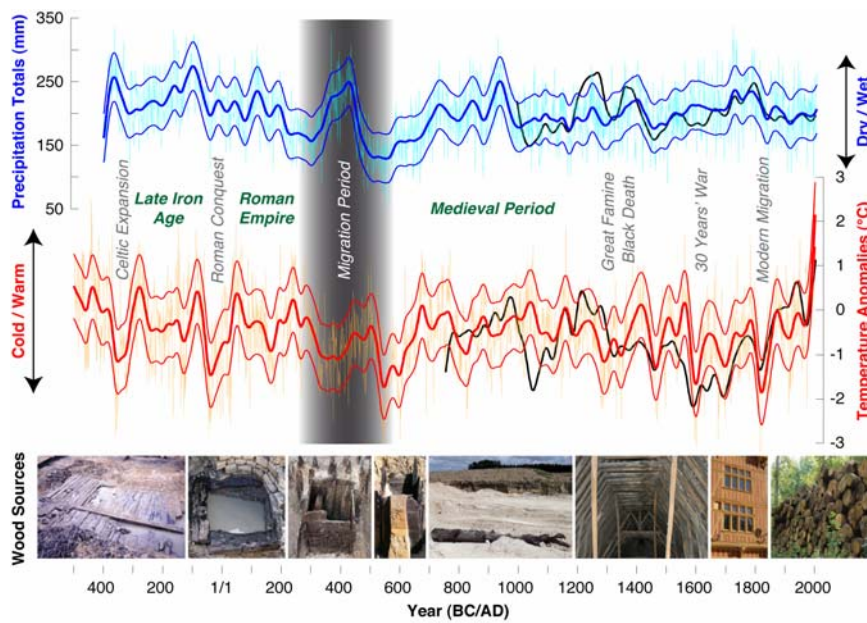
The authors, however, note that such comparative studies cannot be used to indicate a direct and simple relationship between climate variability and human history. Their detailed palaeoclimatic history, however, lends new credence to the idea that climate variability can impact human society. Sounding a cautionary note, the researchers suggest that projected global climate change may affect human societies more than is currently expected, and that complex causal links between past climate changes and human responses urgently require more investigation.

#### Original publication

Ulf Büntgen, Willy Tegel, Kurt Nicolussi, Michael McCormick, David Frank, Valerie Trouet, Jed O. Kaplan, Franz Herzig, Karl-Uwe Heussner, Heinz Wanner, Jürg Luterbacher, Jan Esper (2011): *500 Years of European Climate Variability and Human Susceptibility*. Science Express (published online 13.01.2011 at <http://www.sciencemag.org>).

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Reconstructed precipitation (April-June) and temperature (June-August) of the last 2500 years, together with possible archaeological, subfossile, historic and current wood samples. (Copyright Ulf Büntgen, WSL)



Subfossile Oak from the 6<sup>th</sup> century, found and sampled in gravel of the river Marne, Nordeastern France (Photo: Willy Tegel).