

Newsletter archive about current climate issues

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Long-term cooling trend in Northern Europe over the last millennia has been precisely calculated for the first time: temperatures in Roman times and the Middle Ages were previously considered too cool

July 10, 2012 from Cold Sun

On July 8, 2012, a new paper on the pre-industrial temperature history of Northern Europe over the past 2,000 years was published in the specialist magazine [Nature Climate Change](#). The results are nicely summarized in the following [press release](#) from Johannes Gutenberg University Mainz:

Climate in Northern Europe over the last 2,000 years reconstructed: cooling trend precisely calculated for the first time

Calculations by the Mainz scientists also influence the assessment of current climate change / publication in Nature Climate Change

An international research team including scientists from Johannes Gutenberg University Mainz (JGU) has presented a 2,000-year climate reconstruction for Northern Europe based on tree rings. The group around Univ.-Prof. Dr. Jan Esp  from the JGU Institute of Geography combined the tree ring density measurements

of fossil pine trees from Finnish Lapland into a time series that goes back to 138 BC. reaches back. For the first time, scientists have precisely calculated a long-term cooling trend over the last millennia. "We found that the historical temperatures during Roman times and the Middle Ages were previously considered too cool," says Professor Esper. "These findings are also of climate policy importance because they influence the assessment of current climate change compared to historical warm phases." The new study was published in the journal *Nature Climate Change*.

Was the climate warmer in Roman times or in the High Middle Ages than today? And what significance do these early warm periods have for assessing global climate change as we know it today? Paleoclimatology attempts to clarify these questions: Scientists evaluate indirect climate evidence such as ice cores or lake sediments in order to reconstruct the climate of the past. For the last 1,000 to 2,000 years, the most important climate witnesses have been trees, whose tree rings store information about cold and warm conditions.

For their study, researchers from Germany, Finland, Scotland and Switzerland used measurements of the wood density of trees from the Finnish part of Lapland. In this large, cold landscape consisting primarily of bodies of water and forest, trees repeatedly fall into one of the numerous lakes and remain very well preserved there for thousands of years.

The international research team combined the tree ring density measurements of these fossil pine trees to create a time series back to 138 BC. The measurements of wood density correlate very well with summer temperatures in this area near the Nordic tree line; The researchers therefore managed to create a temperature reconstruction of unprecedented quality. This reconstruction now shows in high resolution the warm conditions during the Roman period and the High Middle Ages, but also the cold phases during the migration of peoples or the later Little Ice Age.

In addition to these cold and warm phases, the new climate curve shows another phenomenon that could not have been expected in this form. For the first time, researchers were able to use tree rings to precisely calculate a much longer-term cooling trend that has occurred continuously over the last 2,000 years. Based on the new findings, this trend, which was caused by slow changes in the position of the sun but also in the Earth's distance from the sun, accounts for a cooling of -0.3°C per millennium.

"This number actually doesn't seem particularly impressive," says Professor Es[^]
"but it is not negligible compared to global warming, which to date is less than 1°C .

We have now been able to show that the large-scale climate reconstructions, which are also used by the International Climate Council 'IPCC', underestimate the long-term cooling trend over the last millennia."

-End of press release-

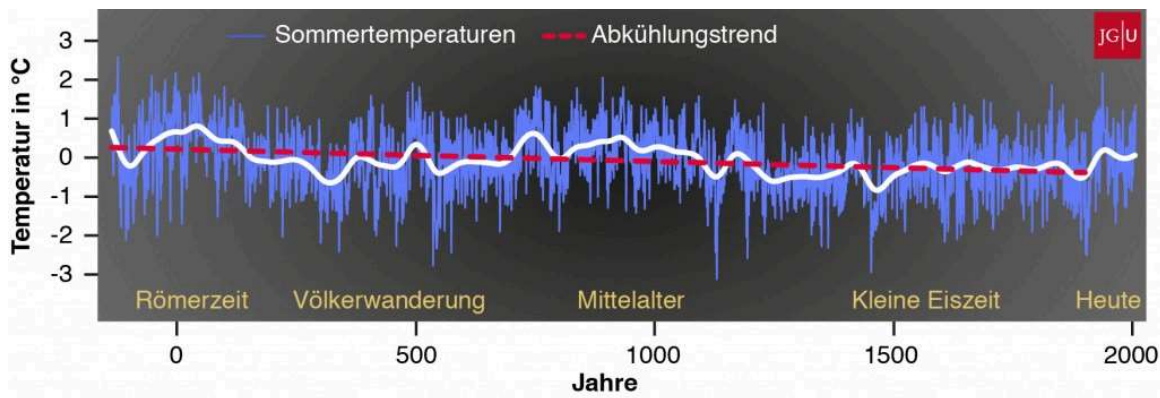


Figure 1: The reconstruction shows the warm conditions in Roman times and the High Middle Ages, but also the cold phases at the time of the migration of peoples or the later Little Ice Age, as well as a longer-term cooling trend. The temperature cycles, with fluctuations of about 1 degree, were largely in sync with changes in solar activity (see Figure 4). Source: [University of Mainz](#) .

In another paper that appeared online in January 2012 in the specialist magazine [Global and Planetary Change](#) , Jan Esper and his colleagues had already gone into more detail about the 1000-year cycle. The authors found that the Roman and Medieval Warm Periods were significantly warmer than the Modern Warm Period of the 20th century (Figure 2). The warmest and coldest 30-year periods in the 2,000-year study period differed by 2 degrees from each other. If you look at summer temperatures over 5-year periods, you will find differences of up to 5 degrees.

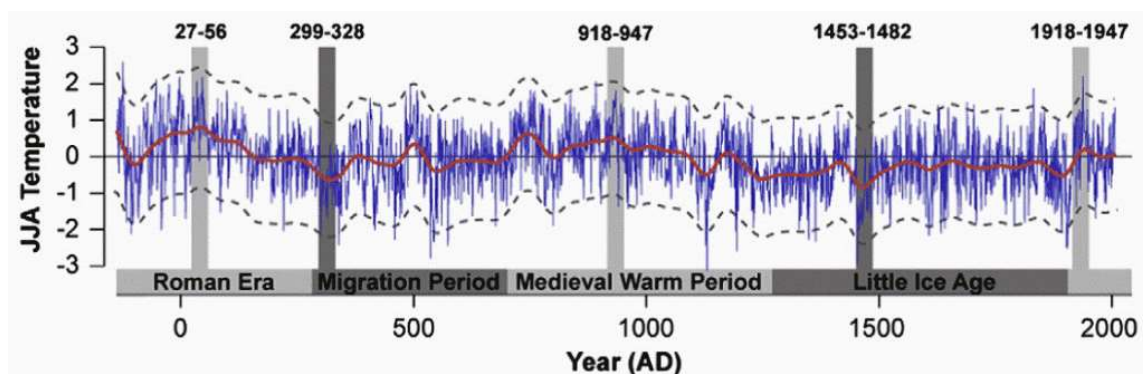


Figure 2: Temperature reconstruction of the last 2000 years for northern Scandinavia. Millennial temperature cycles are clearly visible and synchronous with solar activity (see Figure 4). Light gray bars mark thermal maximums, dark gray bars mark temperature minimums. Figure source: [Esper et al. \(2012a\)](#).

A Norwegian research team led by Ole Humlum, Jan-Erik Solheim and Kjell Stordahl had already published a similar temperature development for Greenland in 2011 in the specialist magazine [Global and Planetary Change](#) (Figure 3) (see also our blog article "[New Norwegian studies: A significant part of the recent climate warming 150 years is caused by the sun](#)").

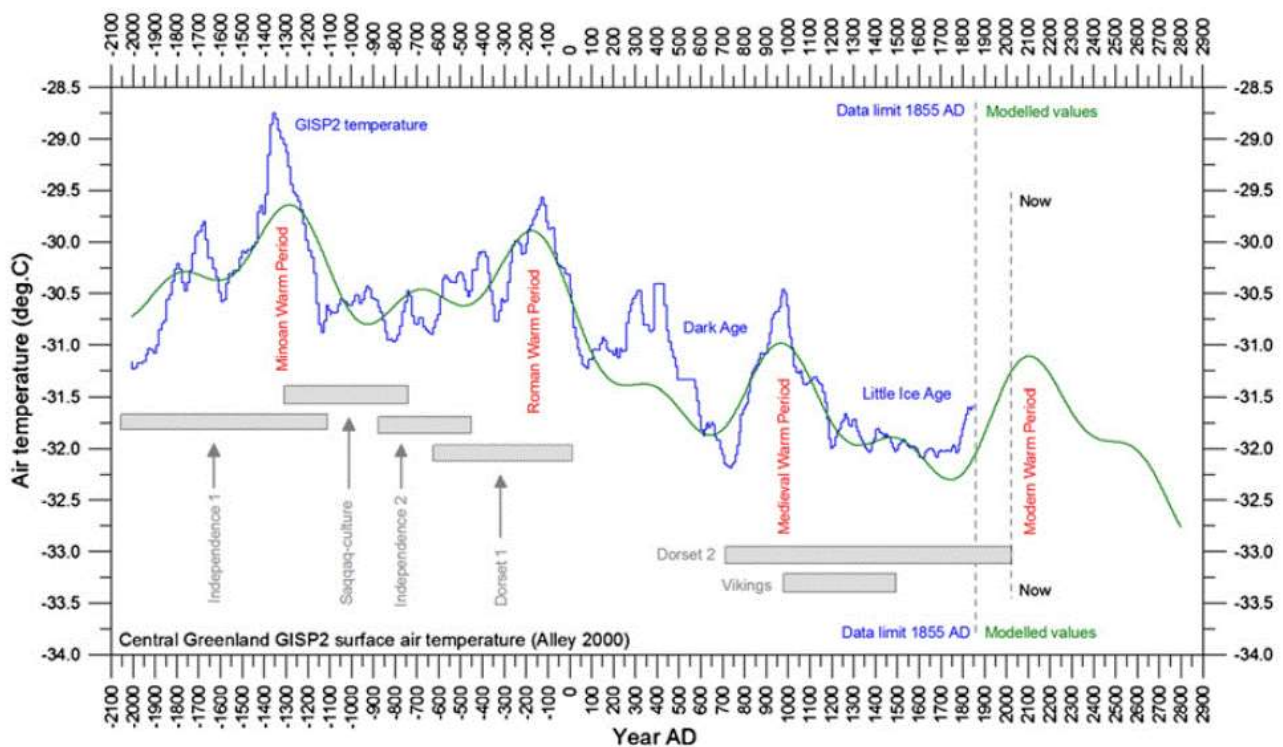


Figure 3: Temperature development of central Greenland for the last 4000 years. Image source: [Humlum et al. \(2011\)](#).

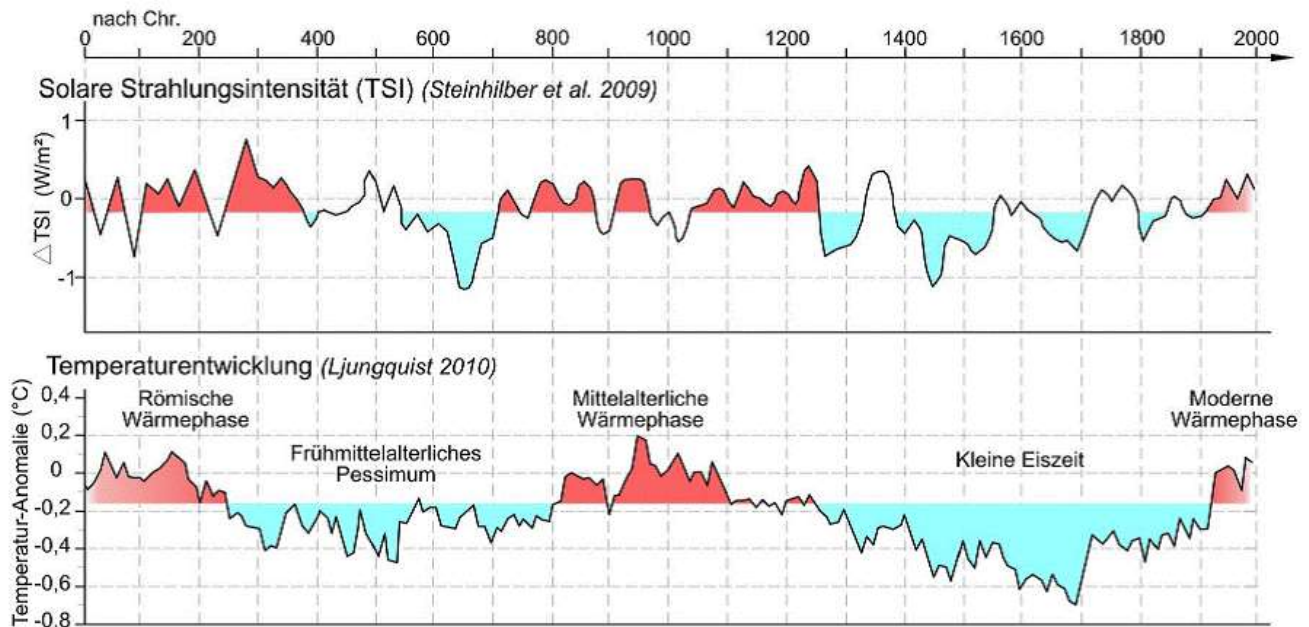


Figure 4: The temperature cycles, with fluctuations of around 1 degree, were largely in sync with changes in solar activity. Source: book " [The Cold Sun](#) ", p. 61.

See also reports in the [Wiener Zeitung](#) , [Daily Mail](#) , [New Scientist](#) , [notrickszone.c](#)

With thanks to Dr. Rainer Köthe for pointing out the Nature Climate Change publi

Split:

- < TV tip: Climate in concrete terms (Arte, July 17 and July 20, 2012)
- > Case studies from all over the world show that sea level rise has not accelerated over the last 30 years

