

Media Release



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Climate warming faster than in last 2000 years

Scientists have found that the average global temperature in the 20th Century was higher than at any time in the past 2000 years and that the current warming period is affecting the whole planet at the same time.

The speed of global warming has also never been as high as it is today – due mostly to human emissions of heat trapping gases.

The findings are the result of a two-year study and have been published today in three separate papers in *Nature* and *Nature Geoscience*.

The study is also an update of the original ‘hockey stick’ curve, published by Mann, Bradley & Hughes 20 years ago. It was the first to note that late 20th century warmth in the Northern Hemisphere was unprecedented during at least the last 1000 years.

Since then, scientists from the paleoclimate community have been working for more than two decades to construct a larger data set and enhance statistical methods underlying the reconstruction of global climate.

Dr Benjamin Henley, from the School of Earth Sciences at the University of Melbourne, and the only Australian scientist in the group, said the robust data set gave them confidence in the validity of the reconstructions. The new reconstructions will allow scientists to further test global climate models, which are used to predict what will happen over the next few decades under continued human emissions of heat-trapping gases.

“The reconstructions also allow us to quantify the relative importance of causes of global temperature changes during the past, including volcanic eruptions, solar variability, and natural ups and downs inherent to the climate system,” Dr Henley said.

Scientists from eight countries assessed the global patterns of climate variability, using data compiled from nearly 700 proxy records of temperature, to find that before the 20th century, temporary warming and cooling events did not occur simultaneously across the globe as earlier suggested.

Using seven different statistical methods to look at 2000-year-long global data from natural records such as tree rings, ice cores, corals and sediments, as well as instrumental data, the group found that the largest warming trends occurred during the most recent period.

PURSUIT

CUTTING-EDGE RESEARCH AND INSIGHTFUL COMMENTARY BY WORLD-LEADING EXPERTS

Lead author, Dr Raphael Neukom of the Oeschger Centre for Climate Change Research and Institute of Geography at the University of Bern in Switzerland, said in the past, various studies had attempted to do this, using different input data or methods (often both), leading to a "spaghetti diagram" with disparate estimates.

"By using a new, highly-curated set of input data and comparing seven statistical methods within a common protocol, the study is the first to cleanly isolate the impact of methodological choices. The seven methods lead to different results on time scales longer than about 50-100 years, but remarkably similar estimates on timescales of a few decades," he said.

By analyzing the spatial temperature patterns of previous centuries, the authors discovered that warm and cold temperatures were not globally synchronous in the pre-industrial era. For example, during the Little Ice Age temperatures were lowest in the central and eastern Pacific regions in the 15th century, in northwestern Europe and southeastern North America in the 17th century, and elsewhere during the 19th century.

"Similarly, during the Medieval Climate Anomaly (800–1200 AD), maximum temperatures did not occur simultaneously across the globe. By contrast, the warmest period during the entire Common Era (1-2000 AD) occurred in its final decades for more than 98% of the globe," Dr Neukom said.

The new study uses improved methods and additional data to refine the temperature reconstructions. It confirms the finding that recent warming is highly unusual relative to past millennia.

Dr Henley said prior to the industrial revolution of the 19th Century, it was found that global-mean temperature fluctuations at multi-decadal time-scales were mainly controlled by major volcanic eruptions - not variations in the Sun's output.

"The most rapid warming of the past 2000 years occurred during, and since, the 20th century, highlighting the extraordinary character of current climate change."

Dr Henley said the findings give us the clearest picture yet of the speed and global extent of modern climate change, relative to the pre-industrial climate of the last 2000 years.

"We humans are already responsible for immense changes to the global climate. It is up to the international community to decide whether or not we turn this around now," Dr Henley said.

Media enquiries: Lito Vilisoni Wilson | 0466 867 909 | litovilisoni.wilson@unimelb.edu.au