

21 October 2011 Last updated at 00:29 GMT

Global warming 'confirmed' by independent study

By Richard Black Environment correspondent, BBC News



Weather stations are giving a true picture of global warming, the group found

The Earth's surface really is getting warmer, a new analysis by a US scientific group set up in the wake of the "Climategate" affair has concluded.

The [Berkeley Earth Project](#) has used new methods and some new data, but finds the same warming trend seen by groups such as the UK Met Office and Nasa.

The project received funds from sources that back organisations lobbying against action on climate change.

"Climategate", in 2009, involved claims global warming had been exaggerated.

Emails of University of East Anglia (UEA) climate scientists were hacked, posted online and used by critics to allege manipulation of climate change data.

Fresh start

The Berkeley group says it has also found evidence that changing sea temperatures in the north Atlantic may be a major reason why the Earth's average temperature varies globally from year to year.



The group includes physicist Saul Perlmutter, a Nobel Prize winner this year

The project was established by University of California physics professor Richard Muller, who was concerned by claims that established teams of climate researchers had not been entirely open with their data.

He gathered a team of 10 scientists, mostly physicists, including such luminaries as Saul Perlmutter, winner of this year's Nobel Physics Prize for research showing the Universe's expansion is accelerating.

Funding came from a number of sources, including charitable foundations maintained by the Koch brothers, the billionaire US industrialists, who have also donated large sums to organisations lobbying against acceptance of man-made global warming.

"Our biggest surprise was that the new results agreed so closely with the warming values published previously"

Richard Muller Berkeley group founder

"We were concerned that the climate scientists were not putting all their data into the public domain, whether using Freedom of Information rules or anything else," he told BBC News.

"Science should be open, and data should be open, as a matter of principle."

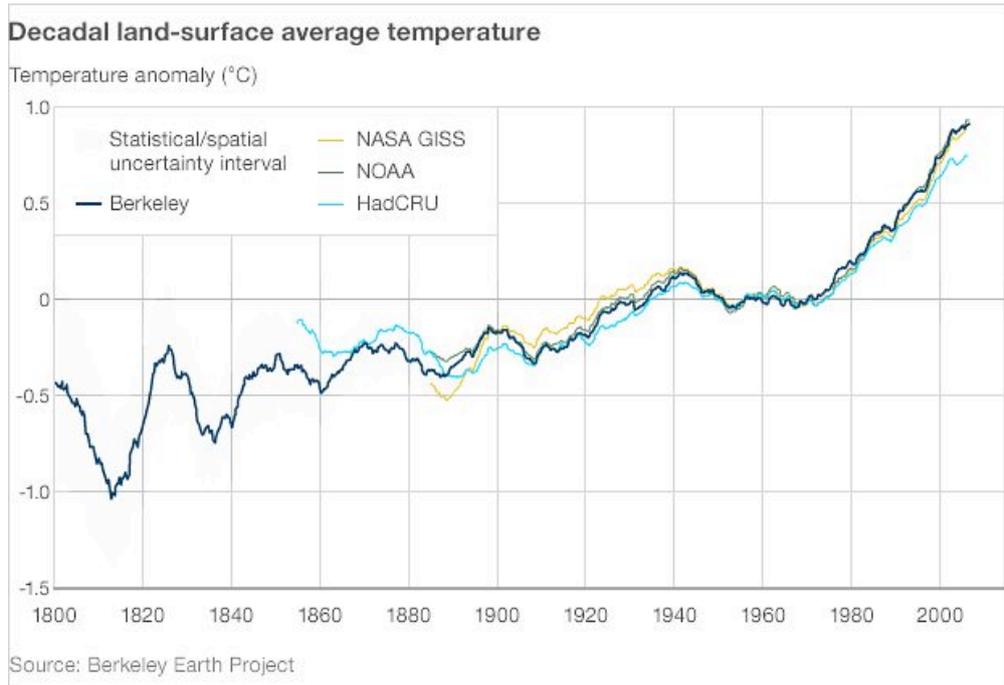
The group's work also examined claims from "sceptical" bloggers that temperature data from weather stations did not show a true global warming trend.

The claim was that many stations have registered warming because they are located in or near cities, and those cities have been growing - the urban heat island effect.

The Berkeley group found about 40,000 weather stations around the world whose output has been recorded and stored in digital form.

It developed a new way of analysing the data to plot the global temperature trend over land since 1800.

What came out was a graph remarkably similar to those produced by the world's three most important and established groups, whose work had been derided as unreliable and shoddy in climate sceptic circles.



The Berkeley group's

record of global land temperature mirrors existing ones closely

Two of those three records are maintained in the US, by the National Oceanic and Atmospheric Administration (Noaa) and National Aeronautics and Space Administration (Nasa).

The third is a collaboration between the UK Met Office and UEA's Climatic Research Unit (CRU), from which the e-mails that formed the basis of the "Climategate" furore were hacked two years ago.

"Our biggest surprise was that the new results agreed so closely with the warming values published previously by other teams in the US and the UK," said Professor Muller.

"This confirms that these studies were done carefully and that potential biases identified by climate change sceptics did not seriously affect their conclusions."

Since the 1950s, the average temperature over land has increased by 1C, the group found.

They also report that although the urban heat island effect is real - which is well-established - it is not behind the warming registered by the majority of weather stations around the world.

They also showed that in the US, weather stations rated as "high quality" by Noaa showed the same warming trend as those rated as "low quality".

'Time for apology'

Professor Phil Jones, the CRU scientist who came in for the most personal criticism during "Climategate", was cautious about interpreting the Berkeley results because they have not been published in a peer-reviewed journal.

"I look forward to reading the finalised paper once it has been reviewed and published," he said.



The findings so far provide validation for Phil Jones, targeted during the "Climategate" affair

"These initial findings are very encouraging, and echo our own results and our conclusion that the impact of urban heat islands on the overall global temperature is minimal."

The Berkeley team has chosen to release the findings initially on its own website.

They are asking for comments and feedback before preparing the manuscripts for formal scientific publication.

In part, this counters the accusation made during "Climategate" that climate scientists formed a tight clique who peer-reviewed each others' papers and made sure their own global warming narrative was the only one making it into print.

But for Richard Muller, this free circulation also marks a return to how science should be done.

"That is the way I practised science for decades; it was the way everyone practised it until some magazines - particularly Science and Nature - forbade it," he said.

"That was not a good change, and still many fields such as string theory practice the traditional method wholeheartedly."

This open "wiki" method of review is regularly employed in physics, the home field for seven of the 10 Berkeley team.

Bob Ward, policy and communications director for the Grantham Institute for Climate Change and the Environment in London, said the warming of the Earth's surface was unequivocal.

"So-called 'sceptics' should now drop their thoroughly discredited claims that the increase in global average temperature could be attributed to the impact of growing cities," he said.

"More broadly, this study also proves once again how false it was for 'sceptics' to allege that the e-mails hacked from UEA proved that the CRU land temperature record had been doctored.

"It is now time for an apology from all those, including US presidential hopeful Rick Perry, who have made false claims that the evidence for global warming has been faked by climate scientists."

Ocean currents

The Berkeley group does depart from the "orthodox" picture of climate science in its depiction of short-term variability in the global temperature.

The El Nino Southern Oscillation (ENSO) is generally thought to be the main reason for inter-annual warming or cooling.

But by the Berkeley team's analysis, the global temperature correlates more closely with the state of the Atlantic Multidecadal Oscillation (AMO) index - a measure of sea surface temperature in the north Atlantic.

There are theories suggesting that the AMO index is in turn driven by fluctuations in the north Atlantic current commonly called the Gulf Stream.

The team suggests it is worth investigating whether the long-term AMO cycles, which are thought to last 65-70 years, may play a part in the temperature rise, fall and rise again seen during the 20th Century.

But they emphasise that anthropogenic global warming (AGW) driven by greenhouse gas emissions is very much in their picture.

"Had we found no global warming, then that would have ruled out AGW," said Professor Muller.

"Had we found half as much, it would have suggested that prior estimates [of AGW] were too large; if we had found more warming, it would have raised the question of whether prior estimates were too low.

"But we didn't; we found that the prior rise was confirmed. That means that we do not directly affect prior estimates."

The team next plans to look at ocean temperatures, in order to construct a truly global dataset.

Published online 20 October 2011 | Nature | doi:10.1038/news.2011.607

News: Explainer

Different method, same result: global warming is real

Independent analysis confirms earlier results but aims for greater transparency.

[Jeff Tollefson](#)



Richard Muller led the Berkeley Earth Surface Temperature Group's review of global climate

data. Dan Tuffs/Getty Images

After generating considerable attention with a preview on Capitol Hill last spring, an independent team of scientists has formally released their analysis of the land surface temperature record. Led by Richard Muller, a physicist at the University of California, Berkeley, the Berkeley Earth Surface Temperature study takes a different and more comprehensive approach than earlier assessments, but reaches the same basic conclusion: global warming is happening. Nature examines how the new study differs from its predecessors.

What is the Berkeley Earth Surface Temperature study?

Until now, instrumental temperature records dating back to the middle of the nineteenth century have been compiled by three main research groups: NASA's Goddard Institute for Space Studies in Greenbelt, Maryland; the US National Oceanic and Atmospheric Administration in Washington DC; and a collaboration between Britain's Met Office and the Climatic Research Unit at the University of East Anglia in Norwich, UK. All three records were developed in different ways, using separate, but overlapping, sets of data. By and large, all three studies line up fairly well as they document rising temperatures, particularly the sharp spike in recent decades, but that hasn't halted criticism from climate sceptics regarding the quality of the data and the rigor of the analysis.

What was the research team's goal, and did they achieve it?

Muller says he listened to the sceptics and decided that an independent analysis was in order. He and his team decided to tackle the temperature record independently, on the basis of first principles. They say their results line up with previously published studies and suggest that the average global land

temperature has risen by roughly 0.9 °C since the 1950s.

Muller says he is surprised at how well the findings line up with previous analyses, which he takes as evidence that the various scientific teams working on these data did indeed go about their work "in a truly unbiased manner".

What did the team do differently?

The Berkeley researchers developed their own statistical methods so that they could use data from virtually all of the temperature stations on land — some 39,000 in all — whereas the other research groups relied on subsets of data from several thousand sites to build their records. This meant that they also had to figure out ways to handle shorter temperature records from instruments or stations where the record was interrupted.

Muller and his team also used a different approach to analysing the data. Scientists working on the earlier studies adjusted raw data to account for differences in the time of day when readings were made, for example, or for higher temperatures caused by the urban heat island effect, in which cities tend to be warmer than natural landscapes. Muller says his team included the raw data in its analysis and then applied standard statistical techniques to remove outliers.

Is there an advantage to tackling the problem this way?

The team claims that this method is more transparent than those used by the other groups. And it may be true that this kind of analysis could make it easier for outside groups to reproduce and analyse the study.

Has the study been peer-reviewed?

Not yet, which is a common criticism among many scientists who were already convinced that the earlier analyses were solid. The Berkeley team is preparing to submit four papers to the Journal of Geophysical Research for peer review. One paper describes the method and how it was applied to the larger temperature record. Another discusses the various methods for dealing with known problems and biases in the temperature record. A third focuses on the urban heat island effect and a fourth looks specifically at temperature stations that have been labelled as problematic by sceptics.

Is the latest study likely to win over any sceptics?

It's too early to tell what kind of effect the report will have, but there are already signs of scepticism among the sceptics. Nonetheless, Steve McIntyre, who runs the sceptic blog Climate Audit, said in an interview that the team deserves credit for going back to the primary data and doing the work. Although he hasn't gone through the papers in detail, he is already questioning the results reported by the Berkeley team regarding the questionable research stations and the urban heat island effect. McIntyre, a statistician, says he has already run a preliminary analysis and was unable to reproduce the results reported by Muller and his crew.

What comes next?

Now we wait to see how the peer-review process plays out. Meanwhile, the Berkeley team will post a complete file of the temperature record on its website by the end of this week. "Previously, the data were spread over 15 different databases with almost as many different formats, and a great deal of overlap," Muller says. "I would like to think that we are opening this field up to a much larger community by reducing the barrier to entry."