

# **In a response to skeptics, researchers use an entirely new method to prove Earth has warmed**

**Stephanie Paige Ogburn, Environment and Energy Publishing, 4-10-13**

In August 2012, John Christy, a climate scientist from the University of Alabama, Huntsville, testified to the Senate Environment and Public Works Committee that human-caused greenhouse gas emissions are not the main reason the Earth's surface is warming.

In part, Christy's testimony, a controversial one, was based on what he described as a problem with how surface temperatures are measured and averaged.

Climate scientist Gilbert Compo's response to that was: Well, I'll measure those temperatures differently.

So he set out to use an entirely different method to determine if the Earth's surface temperature had increased 1.2 degrees Celsius since preindustrial times.

The answer: Undeniably yes.

This new method shows that it is not a factor of measurement error and that the Earth has in fact warmed, said Compo.

## **Data from ships' logs and Army bases**

"If I had ever had any doubts about whether global warming was happening, then this [study], which I know has no relationship to the land-based observations, dashed all of my doubts," Compo said. The results of the study were published online Monday in the journal *Geophysical Research Letters*

The locations of weather stations, changes in instruments, the siting of weather stations in warmer urban areas, changes in land cover and other issues have all been cited as issues affecting the temperature trends often used to show that our planet is in fact warming.

Compo's method uses none of these. Instead, the researcher and his colleagues use historic measurements of air pressure and ocean temperatures, put into a model, to calibrate surface temperatures over the 20th century.

That project, called the 20th Century Reanalysis, gets those pressure data from historic data sources like ship logs and Army bases, which are compiled by volunteers at [oldweather.org](http://oldweather.org) and ACRE, two efforts that catalog old weather data and make them available to researchers.

Those many, many pieces of air pressure data help Compo and his team piece together a snapshot of what was happening in the weather at a given point in time; every six hours since the 1870s, in fact.

If the researchers can spot pressure highs and lows, then they know where the wind is blowing, for instance. As they continue to add data points from around the globe and move forward in time, a process of elimination takes place until they know what the temperature is in, say, Washington, D.C., 100 years ago.

"When I know where the highs and lows are, I know where the hot and cold spots have to be, I can start to line them up," said Compo. "It's like Sudoku."

## **Questions about warming measurement remain**

Eugenia Kalnay, a professor at the University of Maryland who reviewed the paper, called the model "very sophisticated."

Kalnay said it provides an answer to climate skeptics who point out that changes in land use or instrumentation make land-based temperature data unreliable.

Climate scientist Roger Pielke Sr. and Alabama's Christy, whose papers and testimony are cited in Compo's paper as part of the rationale for addressing the issue of whether surface temperatures have warmed, said they admired the research's approach but also said it does not address all the questions they have raised about warming trends.

Pielke, who said one issue ignored in the paper is that land surface temperature measurements over time show bigger warming trends than measurements from higher up in a part of the atmosphere called the lower troposphere, and that still needs more explanation.

Another issue, said Christy, is the role of maximum and minimum temperatures. Minimum temperatures have risen more than maximum temperatures, possibly due to land-use changes, which, as Christy pointed out in his Senate testimony, can be problematic when creating warming trend lines, since temperatures are calculated as an average of minimum and maximum.

Pielke agreed that despite this paper, the problem of maximum and minimum temperatures still exists.

"The Compo et al. paper is an original approach," Pielke said, "but they still need to look into this important issue."