

UAH

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— Dr. John Christy

Comparing satellite & balloon climate data corroborates slower rate of global warming

HUNTSVILLE, Ala. (May 1, 2003) — A detailed comparison of atmospheric temperature data gathered by satellites with widely-used data gathered by weather balloons corroborates both the accuracy of the satellite data and the rate of global warming seen in that data.

Using NOAA satellite readings of temperatures in the lower atmosphere, scientists at The University of Alabama in Huntsville (UAH) produced a dataset that shows global atmospheric warming at the rate of about 0.07 degrees C (about 0.13° Fahrenheit) per decade since November 1978.

“That works out to a global warming trend of about one and a quarter degrees Fahrenheit over 100 years,” said Dr. John Christy, who compiled the comparison data. “That’s a definite warming trend, which is probably due in part to human influences. But it’s substantially less than the warming forecast by most climate

models, and it isn't entirely out of the range of climate change we might expect from natural causes.

The UAH team's research is published in the May 2003 edition of the American Meteorological Society's "Journal of Atmospheric and Oceanic Technology."

"We know the climate is changing," said Christy, a professor of atmospheric science and director of UAH's Earth System Science Center. "Earth's climate has never been stable. What we don't know is the rate of natural climate change, which makes it really tough to say how much of the warming that we see might be due to things like adding greenhouse gases to the atmosphere."

The study published in the JAOT describes an updated global temperature dataset using NOAA satellite measurements of the atmosphere's microwave emissions, which change with the temperature. In this new version, the UAH team applied a more accurate accounting for temperature changes caused by the satellites' east-west drift.

To test the accuracy of the new dataset, Christy and his colleagues used independent data from 28 radiosonde weather balloon sites in an area bounded by eastern Canada, the Caribbean, Alaska and the Marshall Islands in the Western Pacific. They also used American, British and Russian composite datasets from hundreds of weather balloon sites around the world.

They used balloon data to test the satellite readings because balloon-borne thermometers and satellites both measure temperatures in deep layers of the atmosphere — comparing apples to apples.

"There is a 94 to 98 percent correlation between the satellite data and the different balloon datasets," said Christy. "The more difficult statistic to measure, the overall trend in the lower troposphere, agreed so well it was difficult to estimate the error bars."

Ultimately, the team calculated a 95 percent confidence in the satellite-based temperature trend within plus or minus 0.05 degrees Celsius per decade.

If the satellite data are reliable and accurate over the wide range of environments and climates represented by the balloon weather stations, Christy said, it is likely to be reliable over the rest of the globe.

Many climate models forecast that global warming should be happening at a rate much faster than that seen by either the UAH satellite dataset or the weather balloon data.

“But models don’t provide scientific measurements,” Christy said. “Climate models can be valuable for many scientific purposes, but models and their output shouldn’t be confused with data or used as a standard for validating real data.

“If you have reliable data that disagree with a computer model, it’s time to find out what’s wrong with the model. To do anything else might lead you to conclude that your theories are correct and the real world is wrong.”