

Earth's temperature depends on where you put thermometer

January 20 2016, by Seth Borenstein

When it comes to measuring global warming, it's all about altitude.

Temperature readings taken close to Earth's surface—about 6 feet off the ground—show a slightly warmer planet than measurements taken from on high by satellites in orbit.

And that discrepancy has given ammunition to climate-change doubters.

Government agencies and most scientists rely primarily on [ground measurements](#), and they show that 2015 was the warmest year on record.

The National Oceanic Atmospheric Administration, NASA, the Japanese and British meteorological agencies and the World Meteorological Organization all use ground data. It's a matter of better accuracy and relevance, scientists say.

"We care about what's happening where we live. That's why ground-based temperatures are most relevant to humans," said Texas Tech climate scientist Katharine Hayhoe.

But those who try to cast doubt on accepted science—most often non-scientists—prefer [satellite data](#) that goes back to 1979. And the data shows that 2015 was only the third-warmest year on record.

Politicians who reject mainstream climate science, such as Republican presidential candidate Ted Cruz, especially cite one satellite

measurement system, Remote Sensing Systems, in asserting that there has been no [global warming](#) for 18 years. That's a claim scientists, including the one who runs RSS, say is misleading.

Carl Mears, senior scientist for Remote Sensing Systems, told The Associated Press in an email: "The [satellite measurements](#) do not measure the surface [warming](#). They are measurements of the average temperature of thick layers of the atmosphere" about 50,000 feet off the ground.

"For impacts on human society and the environment, the surface data are more important," Mears said.

Mears said his analysis of his own satellite data has five times the margin of error of ground measurements. That's because satellites use complex mathematical algorithms and thousands of bits of code to translate wavelength measurements into [temperature readings](#), Hayhoe said.

Scientists routinely use ground measurements to calibrate and validate satellite information, said Marshall Shepherd, a University of Georgia meteorology professor. He and several other scientists called surface measurements "the ground truth."

John Christy at the University of Alabama, Huntsville, who runs a separate satellite temperature monitoring system, said satellites are better for detecting warming from heat-trapping gases because the "surface is affected by too many other variables and doesn't represent the real mass of the climate system."

Both Christy's and Mears' satellite data show that the world has warmed since about 1980, when satellites started measuring temperature. The two [satellite](#) systems show about seven-tenths of a degree of warming in the past 35 years, while ground data shows about a full degree.

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