

Atmospheric Dry Spell Eases Global Warming

by Richard Harris

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All Things Considered



Space Frontiers/Getty Images

Water in the atmosphere traps heat, like glass in a greenhouse. When there's less water vapor in the atmosphere, less heat is trapped.

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A new study helps explain why the planet didn't warm up dramatically over the course of the past decade, even though the gases that cause global warming increased dramatically.

Scientists have identified a surprising phenomenon 10 miles above our heads that explains part of this unexpected pause in warming.

"People very reasonably have asked me why is it that in the last decade, it just doesn't look it got that much warmer, when CO₂ has continued to increase, and in fact has increased quite fast," says Susan Solomon at the National Oceanic and Atmospheric Administration in Boulder, Colo. So she set out to find an answer.

Scientists say they don't expect every year to be hotter than the one before because there's lots of natural variability in the climate. Tropical ocean patterns called El Niño and La Niña can have strong warming, or cooling, effects. The sun even gets slightly brighter or dimmer.

And now, Solomon pinpoints another cause in a study published online in *Science* magazine. It has to do with vapor way up high, in the stratosphere.

"There have been some surprising changes in stratospheric water vapor that have really packed a wallop as far as surface climate goes," she says.

Less Stratospheric Water Means Less Warming

It turns out that starting in the year 2000, a narrow layer of the stratosphere dried out quite rapidly. And water in the atmosphere traps heat, like glass in a greenhouse. So less stratospheric water means less warming.

"It's amazing that the stratosphere, which is so far removed from the surface, can exert such a big effect," Solomon says.

In fact, she calculates that the loss of water in the stratosphere has offset about a quarter of the warming that would otherwise have occurred.

"I hasten to say it is not the whole reason there has been so little obvious warming in the last decade, but I think it's probably part of it."

Solomon figures that the stratosphere is dry because there have been fewer towering thunderstorms in the tropics to push water up there.

A Temporary Remedy To A Long-Term Problem

Andrew Dessler at Texas A&M University says this is almost certainly a temporary state of affairs.

"This can't keep cooling or offsetting carbon dioxide forever," he says. For one thing, the stratosphere can get only so dry. For another, the weather patterns that caused the stratosphere to dry out are bound to change.

So this is clearly part of a shorter-term variation in the climate. Dessler compares it to the gyrations of the stock market.

"You've got day-to-day or month-to-month ups and downs, but there's this long-term trend, whether it's going up or down, and that's really what you care about — in the stock market and in the climate," he says.

Still, it's very useful to identify the factors that drive the short-term ups and downs. That way you aren't fooled into thinking that a temporary change is actually part of a long-term trend.

"You can often be confused with what looks like a trend, that may go on for a long time, but turns out not to be a trend," he says. "In the housing market, that's the problem in a nutshell. People saw it was going up and thought it was going up forever, but it wasn't."

The long-term trend of climate change is obvious. The past decade is the warmest since temperature record-keeping began (in fact, 2009 was one of the warmest years ever recorded). And that decade was hotter than the 1990s, the 1990s were hotter than the 1980s, and so on.

NOAA's Solomon says the science behind that long-term trend is well understood. Water in the stratosphere is not driving that trend, "but it's really helpful and fascinating, I think, to better understand the ups and downs that may go on from one year to another, from one decade to another. There's a lot more to understand there."