
Inside Climate News



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SCIENCE

Underestimating Heat Indexes

In the midst of a heat wave, your weather app will not only tell you how hot it is, but also how hot it feels, combining heat, humidity and your body's ability to respond into a metric known as the heat index.

But scientists from the University of California, Berkeley say that at high temperatures and relative humidities, the heat index **is way underestimated**, in some cases by as much as 20 degrees Fahrenheit.

In a paper earlier this year, Yi-Chuan Lu and David Romps updated a model from 1979 that estimated the heat index at temperatures up to about 88 degrees Fahrenheit for a high relative humidity of 80 percent. Beyond that, the mathematical model broke and could not calculate an accurate heat index.

Since then, the index has been extrapolated by the National Weather Service into the undefined area beyond where the 1979 model could calculate, and that's the number you likely see on your weather app, if it relies on the agency's heat index. At the time, these extreme conditions were so rare that this was not much of a concern. But now, a warming climate regularly drives up temperature and humidity into deadly zones.

For a temperature of 96 degrees and 70 percent relative humidity, the “feels like” temperature was calculated as 126 degrees based on the extrapolated National Weather Service heat index. With the updated model by Lu and Romps, that would now be 20 degrees higher at 146 degrees.

“We’re just on this path to potentially pushing the heat index in places around the world into conditions that just are not livable and workable,” said Romps, an earth and planetary science professor at Berkeley. “We’ll start to see real tightening of the number of hours and when people can work outside, when our children can be outside.”

The updated model found that the National Weather Service heat index far underestimates how the human body truly perceives extremely hot and humid conditions. Humid air interferes with the body’s ability to cool off using sweat, since the moisture does not readily evaporate in humid conditions. At a heat index of 161 degrees, Romps said, the human body hits a point where it “runs out of tricks” to keep its core temperature at 98.6 degrees, and careens into a danger zone. That may seem outrageously hot, but with the updated model, a temperature of just 97 degrees can combine with 80 percent humidity to hit that dangerous point.

In a [new paper](#) out this month, Romps and Lu take this new model and look back at significant heat waves that hit the United States in the last several decades. They found that the highest heat indexes occurred in the Midwest, not in the Southeast, as Romps said he expected. In a 1995 heat wave, which killed over 400 people in Chicago, the heat index reported at Midway Airport was 124 degrees. The updated model puts that now at 141 degrees. That signals a huge difference in the body’s physiological response, Romps said.

“That has implications for how stressful these heat waves were, because each value in the heat index corresponds to a unique behavioral and physiological state of a person,” he said. “These differences do indeed matter.”