

Global warming's influence on extreme weather

December 12 2014

Extreme climate and weather events such as record high temperatures, intense downpours and severe storm surges are becoming more common in many parts of the world. But because high-quality weather records go back only about 100 years, most scientists have been reluctant to say if global warming affected particular extreme events.

On Wednesday, Dec. 17, at the American Geophysical Union's Fall Meeting in San Francisco, Noah Diffenbaugh, an associate professor of environmental Earth system science at the Stanford School of Earth Sciences, will discuss approaches to this challenge in a [talk](#) titled "Quantifying the Influence of Observed Global Warming on the Probability of Unprecedented Extreme Climate Events." He will focus on weather events that - at the time they occur - are more extreme than any other event in the historical record.

Diffenbaugh emphasizes that asking precisely the right question is critical for finding the correct answer.

"The media are often focused on whether global warming caused a particular event," said Diffenbaugh, who is a senior fellow at the Stanford Woods Institute for the Environment. "The more useful question for real-world decisions is: 'Is the probability of a particular event statistically different now compared with a climate without [human influence](#)?'"

Diffenbaugh said the research requires three elements: a long record of

climate observations; a large collection of climate model experiments that accurately simulate the observed variations in climate; and advanced statistical techniques to analyze both the observations and the climate models.

One research challenge involves having just a few decades or a century of high-quality weather data with which to make sense of events that might occur once every 1,000 or 10,000 years in a theoretical climate without human influence.

But decision makers need to appreciate the influence of global warming on [extreme climate](#) and [weather events](#).

"If we look over the last decade in the United States, there have been more than 70 events that have each caused at least \$1 billion in damage, and a number of those have been considerably more costly," said Diffenbaugh. "Understanding whether the probability of those high-impact events has changed can help us to plan for future extreme events, and to value the costs and benefits of avoiding future [global warming](#)."

Provided by Stanford University

Citation: Global warming's influence on extreme weather (2014, December 12) retrieved 19 April 2024 from <https://phys.org/news/2014-12-global-extreme-weather.html>

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