

3Qs: What is 'global weirding'?

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Auroop Ganguly, associate professor of civil and environmental engineering at Northeastern, is an expert in climate change and severe weather conditions. Credit: Mary Knox Merrill

Auroop Ganguly — an associate professor of civil and environmental engineering who heads Northeastern's Sustainability and Data Sciences Lab — explains how global climate change and extreme weather, such as hurricanes and heat waves, could affect water sustainability, critical infrastructures and human health.

What is the difference between global "weirding" and global warming?

Global weirding, a term coined by Rocky Mountain Institute co-founder Hunter Lovins and popularized by New York Times op-ed columnist Tom Friedman, primarily concerns climate extremes. In certain

situations, these need to be defined in terms of their impact on natural, engineered and human ecosystems.

Global warming, which addresses changes in average global temperature, does not begin to convey the range of severe weather-related events and changes in weather patterns that can occur as a consequence of climate change.

Depending on the trajectory of greenhouse gas emissions, average global temperatures could rise between 2°F and 11°F by the end of the century. But in Boston, for example, temperatures can fluctuate more than that in a single day. So why should that much global warming matter?

Global weirding is a concise way to express why. When we talk about average temperatures rising at the scale of the entire globe and over long time periods, the consequences on heat waves, heavy rainfall, or water stresses, for example, can be severe across different regions of the world.

In terms of climate change, is it surprising that this winter has been so warm?

This winter's weather may not necessarily relate to climate change. First of all, science cannot conclusively link climate change to any single severe weather event, or even one unusually warm or cold season. Second, just as one single cold winter does not dispute climate change, similarly one single warm winter does nothing to reinforce our degree of belief in climate change.

While seasonal fluctuations over specific regions of the earth may occur for a variety of naturally occurring reasons, climate change refers to a longer-term trend in the average global temperature. This does not imply

that climate change may not cause a seasonal warming over a specific region, just that current science does not afford that level of precision when delineating between the consequences of natural variability versus long-term change.

The culprit of the recent warm U.S. winter is most likely variations in a climate phenomenon known as the North Atlantic Oscillation (NAO). The positioning of this year's jet stream has resulted in warmer temperatures and lower precipitation because of fewer incidences of clashing warm and cold fronts. The NAO, which influences the jet-stream air current, has experienced unusually low pressure this year. What caused the pressure drop in the NAO this year? Some speculate that global-warming-related loss of Arctic sea ice may be the driver.

Which other weather events play into "global weirding?"

Last year, research suggested that about seven percent of the intensification of heavy rainfall globally is a consequence of climate change. Our own research on heat waves showed that while geographical variability of heat waves is uncertain, the rising trends in the projected intensity, frequency and duration of heat waves are unmistakable. On the other hand, our more recent research suggested that cold snaps may persist well into the end of this century. Thus, while the overall climate trend is one of warming, and heat waves are projected to intensify, extreme cold events on the average may continue to be as severe and long-lasting as they are currently.

The other aspect of the global weirding phenomenon is its impact on infrastructure, resources, species diversity and the economy. The impact of a warmer world and exacerbated extremes can be severe on both water and food security, especially in the more vulnerable parts of the world. According to the United States global Change Research Program, the consequences of climate change for the U.S. will include stressed

water resources, challenges to crop and livestock production, storm surges in coastal areas and threats to human health.

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