

Extreme-weather winters are becoming more common in US, research shows

September 2 2016, by Rob Jordan



The nearly snowless Tioga Pass in January 2015 and last winter's blizzard in Washington, D.C., show the dramatic differences in recent West Coast and East Coast winter weather. Credit: Left, Bartshé Miller; right, Alejandro Alvarez

This past July was the hottest single month in Earth's recorded history,

but warming isn't the only danger climate change holds in store. Recent years have seen a dramatic increase in the simultaneous occurrence of extremely cold winter days in the Eastern United States and extremely warm winter days in the West, according to a Stanford-led study published in *Journal of Geophysical Research Atmospheres*. Human-caused emissions of greenhouse gases are likely driving this trend, the researchers report.

"There's this idea that the past few winters were more extreme than usual, particularly since the conditions in the East and West were so different," said senior author Noah Diffenbaugh, an associate professor of Earth system science at the School of Earth, Energy & Environmental Sciences and a senior fellow at the Stanford Woods Institute for the Environment. "Looking back at temperature data from the past 35 years, we've found that in fact 2013-2014 and 2014-2015 did have the biggest difference in winter temperature between the East and West."

Better planning

Understanding the physical factors driving extreme weather could provide policymakers with more reliable information with which to prepare for short-term weather disasters such as blizzards and [cold snaps](#). Long-term planning and development would benefit too. For instance, understanding the likelihood of droughts could help engineers better plan the development and management of infrastructure to provide reliable water supplies.

In the past three years alone, the combination of heat-related drought in the West and Arctic conditions in the East have pinched the national economy, costing several billion dollars in insured losses, government aid and lost productivity ([read more](#)). When such weather extremes occur at the same time, they threaten to stretch emergency responders' disaster assistance abilities, strain resources such as interregional transportation

and burden taxpayer-funded disaster relief.

'Warm West, cold East' trends related

The Stanford study finds that the occurrence and severity of "warm West, cold East" winter events increased significantly between 1980 and 2015. This is partly because the winter temperature has warmed more in the West than in the East, increasing the odds that warm days in the West coincide with cold days in the East. Along with [warming](#) of the West, a "ridge-trough" pattern of high atmospheric pressure in the West and low atmospheric pressure in the East has also been producing greater numbers of winter days on which large areas of the West and East experience extreme temperatures at the same time.

"What we've found is that this particular atmospheric configuration connects the cold extremes in the East to the occurrence of warm extremes in the West," said lead author Deepti Singh, a former graduate student in Diffenbaugh's research group who is now at Columbia University's Lamont-Doherty Earth Observatory.

Despite long-term warming across most of the globe, some regions can experience colder than normal temperatures associated with anomalous circulation patterns that drive cold air from the poles to the mid-latitudes. In fact, circulation patterns that facilitate such extremes are potentially a response to enhanced warming, the study's authors point out.

"Although the occurrence of cold extremes is often used as evidence to dismiss the existence of human-caused global warming, our work shows that the warm West, cool East trend is actually consistent with the influence of human activities that have modified Earth's climate in recent decades," Singh said.

That said, the simultaneous occurrence of extreme western warmth and extreme eastern cold will likely decrease if global warming continues through the 21st century, because warming of winters in both the West and East will likely reduce the occurrence of cold winters in the East. Still, the researchers project that some extremely cold events will still occur even with high levels of global warming.

"We can absolutely expect further increases in hot events if global warming continues," Diffenbaugh said. "But our results also highlight how complex climate change can be. We should be prepared for both warm and cold extremes – sometimes simultaneously – now and in the future."

More information: Deepti Singh et al. Recent amplification of the North American winter temperature dipole, *Journal of Geophysical Research: Atmospheres* (2016). [DOI: 10.1002/2016JD025116](https://doi.org/10.1002/2016JD025116)

Provided by Stanford University

Citation: Extreme-weather winters are becoming more common in US, research shows (2016, September 2) retrieved 26 April 2024 from <https://phys.org/news/2016-09-extreme-weather-winters-common.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.