

North Texas storms may worsen because of climate change, scientists say

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In recent weeks, a deadly tornado ripped through North Texas and severe thunderstorms knocked out power for hundreds of thousands of area residents and brought flash flooding and hail.

Texas is no stranger to volatile weather. The state leads the nation in heavy weather events in 2024, with 706 hail storms, 530 strong wind events and 96 tornadoes, according to a May 29 report by The Dallas Morning News that used preliminary data from the National Oceanic and Atmospheric Administration's National Weather Service.

Severe storms have caused more than 1,400 deaths and more than \$50 billion in damage in Texas since 1980. As emissions of planet-warming greenhouse gases continue to increase, [climate scientists](#) said the risk and intensity of severe weather in the state is likely to worsen.

"The underlying conditions that would make these events possible are becoming more frequent," said Avantika Gori, an assistant professor of civil and environmental engineering at Rice University in Houston.

"We're basically stacking the odds that we're going to observe these [extreme events](#)."

Climate change and severe weather

It's impossible to say whether climate change has caused any specific weather event, Gori said. But scientists can determine if climate change increased the likelihood or intensity of severe weather by using a method called extreme weather attribution. This involves running computer simulations of weather events with or without rising levels of greenhouse gases, said Kerry Cook, a professor of earth and planetary sciences at The University of Texas at Austin.

An attribution analysis from 2018 found that climate change made the rainfall from 2017's Hurricane Harvey about 15% more intense or three times more likely to happen. Hurricane Imelda in 2019 was 9 to 17% more intense or up to 2.6 times more likely to happen because of climate change, according to a report by the World Weather Attribution, a scientist-led climate initiative.

Texas is prone to severe weather, particularly during warmer months, because of its location, said Feifei Pan, a professor of geography and the environment at the University of North Texas.

Here in the spring, [cold air](#) from Canada meets warm, moist air from the Gulf of Mexico, Pan said. The air temperature difference produces [strong winds](#) that can shift rapidly in speed or direction, potentially causing intense thunderstorms and tornadoes.

A 2023 study in the *Bulletin of the American Meteorological Society* projected a 6.6% nationwide increase in the frequency of supercell thunderstorms—the rarest and most devastating kind—by the end of the century because of global warming.

Another study, from 2021, predicted that conditions favorable to severe thunderstorms, such as convective available potential energy (or CAPE, a measure of how unstable an air mass is), could make these weather events about 5 to 20% more frequent for every 1.8 degrees Fahrenheit of global warming. A high CAPE value is a strong indicator that a storm could develop.

The highest CAPE values typically happen between April and September in the United States, according to a 2022 analysis from Climate Central, a nonprofit news organization. These values have risen dramatically since 1979 in some regions of the country that have had up to "10 to 15 more days of high CAPE values during both spring and summer—prime time for thunderstorms," Climate Central reported.

Rising CAPE levels may lead to an increase in the number of days with conditions favorable for [severe thunderstorms](#) in Texas, according to a report by Texas A&M University in collaboration with Texas 2036, a nonprofit public policy group. But it's difficult to determine how much more severe and frequent thunderstorms will be.

Tornadoes and climate change

Tornadoes have caused hundreds of deaths, thousands of injuries and billions of dollars in property damage across Texas since 1950, according to data from The Austin American-Statesman.

As the world warms, it's likely that tornadoes are becoming more prevalent, according to Gori and Cook. That's because tornadoes need warm moist air to develop. But scientists are still investigating the possible link between tornadoes and climate change.

Climate change is projected to cause a decline in [vertical wind shear](#), or the changing wind speed at different altitudes that is a key ingredient in tornado formation. According to the National Oceanic and Atmospheric Administration, vertical wind shear is expected to decrease over parts of North America, including North Texas, by the end of the 21st century.

Tornadoes also may be shifting away from Texas and appearing more in the eastern U.S. An April 2024 study found that from 1951 to 2020, annual tornado activity in the western states—including Texas—decreased by 25% while increasing by 12% in the eastern U.S. Although the study didn't explore the influence of global warming on tornadoes, the researchers noted their findings are consistent with climate change projections, such as the increase in CAPE values across the U.S.

Texas' climate future?

As climate change continues to affect Texas, scientists said the state needs to prepare for extreme temperatures and accompanying weather events.

"We know that we're going to have to live with extreme weather," Gori said. "Let's invest in better flood mitigation, better early warning systems even if it's just a few hours in advance about flood roads. Let's invest in upgrades to our power and road systems, because these things can really reduce the impact extreme weather events have."

More research is needed to better predict how frequently [severe weather](#) events will happen in Texas, how intense they will be and who will be the most vulnerable, said John Nielsen-Gammon, a professor of atmospheric science at Texas A&M University and lead author of the university's extreme weather report.

"We're working on a project with the Texas Water Development Board right now looking at how the risk of extreme rainfall has changed historically," Nielsen said, "and how that might change in the future so that we can build for the storms of the future rather than the storms of the past."

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