



## Scientific Assessment Captures Effects of a Changing Climate on Extreme Weather Events in North America

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The [U.S. Climate Change Science Program](#) and the Subcommittee on Global Change Research today released a scientific assessment that provides the first comprehensive analysis of observed and projected changes in weather and climate extremes in North America and U.S. territories. The Intergovernmental Panel on Climate Change previously evaluated extreme weather and climate events on a global basis in this same context. However, there has not been a specific assessment across North America prior to this report.

Among the major findings reported in this assessment are that droughts, heavy downpours, excessive heat, and intense hurricanes are likely to become more commonplace as humans continue to increase the atmospheric concentrations of heat-trapping greenhouse gases.

The report is based on scientific evidence that a warming world will be accompanied by changes in the intensity, duration, frequency, and geographic extent of weather and climate extremes.

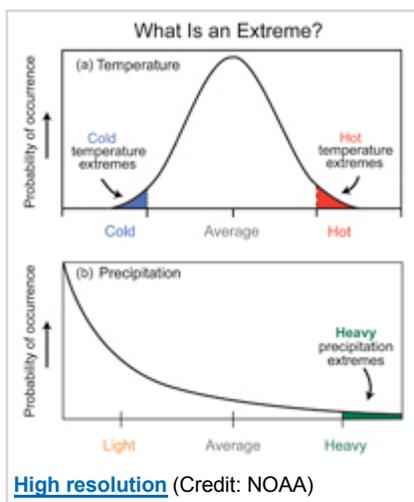
"This report addresses one of the most frequently asked questions about global warming: what will happen to weather and climate extremes? This synthesis and assessment product examines this question across North America and concludes that we are now witnessing and will increasingly experience more extreme weather and climate events," said report co-chair Tom Karl, Ph.D., director of [NOAA's National Climate Data Center](#) in Asheville, N.C.

Observed changes in North American extreme events, assessment of human influence for the observed changes, and likelihood that the changes will continue through the 21st century.

Phenomenon and direction of change	Where and when these changes occurred in past 50 years	Linkage of human activity to observed changes	Likelihood of continued future changes in this century
Warmer and fewer cold days and nights	Over most land areas, the last 10 years had lower numbers of severe cold days than any other 10-year period	Likely warmer extremes and drier nights, and fewer frosts	Very likely*
Warmer and fewer heavy rain events	Over most of North America	Likely for warmer nights	Very likely*
More frequent and intense heat waves and warm nights	Over most land areas, most pronounced over the eastern and central U.S. and parts of North America	Likely for certain nights, e.g., nighttime temperatures, & linkage to record high annual temperatures	Very likely*
More frequent and intense heavy precipitation and higher probability of total rainfall in heavy precipitation events	Over many areas	Linked indirectly through increased water vapor, a critical factor for heavy precipitation events	Very likely*
Increases in areas affected by drought	No overall average change for North America, but regional changes are evident	Likely. Southwest U.S. Evidence that 1997 & 2002's droughts were linked to natural patterns of sea surface temperature variability	Likely in Southwest U.S., parts of Mexico and Central*
More intense hurricanes	Substantial increase in Atlantic since 1970. Likely increase in Atlantic since 1970s, increasing tendency in W. Pacific and decreasing tendency in E. Pacific (El Niño-Vic. Cycle) since 1990	Linked indirectly through increasing sea surface temperatures. A critical factor for intense hurricanes; a confidence assessment requires further study	Likely*

\*Based on frequency and quality of IPCC evidence assessment  
\*Based on formal peer-review studies and expert judgment  
\*No overall trend for frequency and expert judgment  
\*No overall trend for frequency and expert judgment

[High resolution](#) (Credit: NOAA)



[High resolution](#) (Credit: NOAA)

"We will continue to see some of the biggest impacts of global warming coming from changes in weather and climate extremes," said report co-chair Gerry Meehl, Ph.D., of the National Center for Atmospheric Research in Boulder, Colo. "This report focuses for the first time on changes of extremes specifically over North America."

The full CCSP 3.3 report, *Weather and Climate Extremes in a Changing Climate*, and a summary FAQ brochure are available [online](#).

Global warming of the past 50 years is due primarily to human-induced increases in heat-trapping gases, according to the report. Many types of extreme weather and climate event changes have been observed during this time period and continued changes are projected for this century. Specific future projections include:

- Abnormally hot days and nights, along with heat waves, are very likely to become more common. Cold nights are very likely to become less common.

- Sea ice extent is expected to continue to decrease and may even disappear in the Arctic Ocean in summer in coming decades.
- Precipitation, on average, is likely to be less frequent but more intense.
- Droughts are likely to become more frequent and severe in some regions.
- Hurricanes will likely have increased precipitation and wind.
- The strongest cold-season storms in the Atlantic and Pacific are likely to produce stronger winds and higher extreme wave heights.

The National Oceanic and Atmospheric Administration, an agency of the U.S. Commerce Department, is dedicated to enhancing economic security and national safety through the prediction and research of weather and climate-related events and information service delivery for transportation, and by providing environmental stewardship of our nation's coastal and marine resources.

NOAA plays a key role in the Climate Change Science Program, which is responsible for coordinating and integrating climate research, observations, decision support, and communications of 13 federal departments and agencies.

The National Center for Atmospheric Research investigates climate, weather, and other topics related to the atmosphere. It is sponsored by the National Science Foundation and managed by a nonprofit consortium of universities, the [University Corporation for Atmospheric Research](#).

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