

Study finds heavier precipitation in the northeast began in 1996

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Over the past century, the Northeast has experienced an increase in the number of storms with extreme precipitation. A Dartmouth-led study finds that the increase in extreme Northeast storms occurred as an abrupt shift in 1996, particularly in the spring and fall, rather than as a steady change over several decades. The findings were published in an early online release of the American Meteorological Society's *Journal of Hydrometeorology*.

With climate change, a warmer atmosphere is able to hold more moisture, which is likely to affect the frequency, intensity and location of [extreme precipitation](#). Understanding historical changes in extreme storms, including in the Northeast, can improve our understanding of future precipitation projections with continued [climate change](#).

"Looking at where the increases in extreme precipitation are occurring across the Northeast, interestingly we find that it's not just one part of the Northeast, say the coast, that is experiencing more [heavy rainfall](#) events, it's relatively uniform across the region," says Jonathan M. Winter, assistant professor of geography at Dartmouth, who served as one of the co-authors of the study.

For the study, the Northeast is defined as Maine, New Hampshire, Vermont, Mass., Conn., R.I., N.J., N.Y., Pa., Md., DC, Del., and W.Va., and draws on weather station data from the Global Historical Climatology Network, which is compiled by the National Oceanic and Atmospheric Association National Climatic Data Center. The threshold for extreme precipitation events depends on the station but regionally averaged is about 2 inches or more of rain in a day.

Previous research has referred to the increase in precipitation from 1901 to 2014 as a long-term increase that took place over several decades based on a linear analysis of the data. By analyzing individual changepoints or places where

the precipitation record "jumps," this study takes a different approach and finds that these extreme precipitation changes were not consistent with a long-term increase but were in fact due to a shift in extreme precipitation in 1996. From 1996 to 2014, the extreme precipitation in the Northeast was 53 percent higher than from 1901 to 1995. These increases applied to the entire Northeast region except for far western N.Y. and Pa., and a few areas in the mid-Atlantic. Given that the wetter period occurred towards the end of the defined period of the study from 1996 on, the authors note that a linear analysis may not be the most accurate in representing broader changes because the observed precipitation change will vary depending on the time period considered, especially the start date.

The study also looks at changes in precipitation across all seasons, finding that the increases in extreme precipitation were driven by extreme storms particularly in the spring and fall. The amount of heavy rainfall from 1996 to 2014 was 83 percent and 85 percent higher in the spring and fall, respectively, than from 1901 to 1995. Tropical cyclones and nor'easters may be the possible key drivers for such changes in the spring and fall.

With tropical cyclones in the fall, nor'easters in the winter and spring, and frontal changes in the summer, the Northeast's weather is largely affected by such seasonal systems. Through future work, the researchers plan to study what is driving the increases in total and extreme [precipitation](#) since 1996, and will look at the specific weather events associated with these changes.

More information: Huanping Huang et al. Total and extreme precipitation changes over the Northeastern United States, *Journal of Hydrometeorology* (2017). DOI: [10.1175/JHM-D-16-0195.1](https://doi.org/10.1175/JHM-D-16-0195.1)

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