

Hurricanes have become bigger and more destructive for the U.S., study finds

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An Oct. 14, 2018, view of Mexico Beach, Fla., shows the aftermath of Hurricane Michael making landfall four days earlier. Credit: K.C. Wilsey, FEMA

A new study by researchers at the Niels Bohr Institute, University of Copenhagen, Aslak Grinsted, Peter Ditlevsen and Jens Hesselbjerg

shows that hurricanes have become more destructive since 1900, and the worst of them are more than three times as frequent now than 100 years ago. A new way of calculating the destruction, compensating for the societal change in wealth, unequivocally shows a climatic increase in the frequency of the most destructive hurricanes that routinely raise havoc on the North American southern and east coasts. The study is now published in *PNAS*.

In order to compare hurricanes and follow their development over time, the traditional way of calculating [hurricane](#) damage was to survey the subsequent cost of the damage done by each storm. In other words, what would a hurricane from the 1950s cost if it made landfall today? Using this method, a typical finding is that the majority of the rising tendency in damage can be attributed to the fact that there are more of people with greater wealth, and there is quite simply more costly infrastructure to suffer damage. But evidence of a climatic change in destructive force by hurricanes has been obscured by statistical uncertainty.

Hurricanes are becoming bigger, stronger and more dangerous

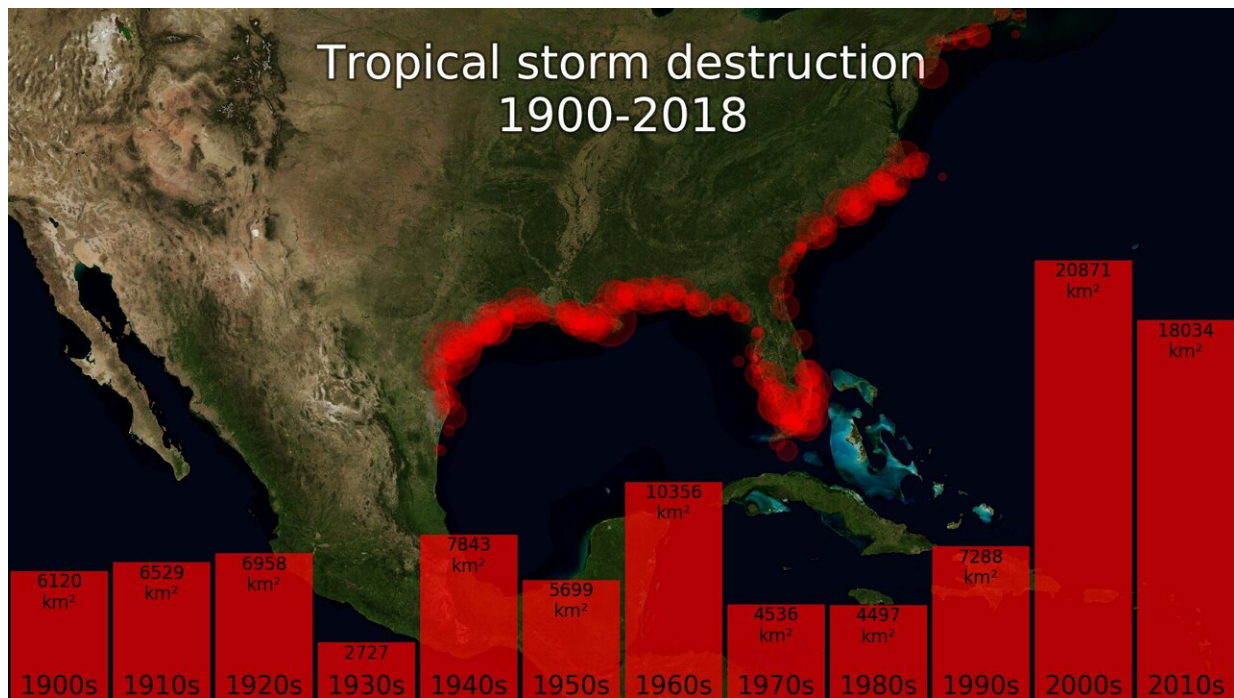
Aslak Grinsted has calculated the historical figures in a new way. Instead of comparing single hurricanes and the damage they would cause today, he and his colleagues have assessed how big an area could be viewed as an "area of total destruction," meaning how large an area a storm would have to destroy completely in order to account for the financial loss. Simultaneously, this makes comparison between [rural areas](#) and more densely populated areas like cities easier, as the unit of calculation is now the same: the size of the "area of total destruction."



Destruction caused by Hurricane Katrina - a collapsed house, downed trees, and downed powerlines. Mississippi. September, 2005. Credit: Barbara Ambrose NOAA/NODC/NCDDC

In previous studies, it proved difficult to isolate the [climate](#) signal. The climate signal should be understood as the effect climate change has on hurricane size, strength and destructive force. It was hidden behind variations due to the uneven concentration of wealth, and it was statistically uncertain whether there was any tendency in the [destruction](#). But with the new method, this doubt has been cleared. The weather has, indeed, become more dangerous on the south and east coasts of the U.S. Furthermore, the result obtained by the research team is more congruent with the [climate models](#) used to predict and understand the development in extreme weather. It fits with the physics, quite simply, that global

warming has the effect that there is an increase in the force released in the most extreme hurricanes.



Tropical Storm destruction 1900 - 2018 on the North American south- and east coast. Credit: Aslak Grinsted, Niels Bohr Institute

More information: Aslak Grinsted et al., "Normalized US hurricane damage estimates using area of total destruction, 1900–2018," *PNAS* (2019). www.pnas.org/cgi/doi/10.1073/pnas.1912277116

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