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Lightning will increase with climate change, study predicts

Lightning strikes north of Macworth Island in Portland, Maine, in September. A new study says lightning strikes in the U.S. will likely increase by nearly 50% by the end of the century because of climate change. (Robert F. Bukaty / Associated Press)

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Lightning strikes in the lower 48 U.S. states will increase about 12% for every degree rise in Earth's average temperature, potentially sparking more wildfires, according to a new study.

The new estimate was based on calculations of convective energy and precipitation from future thunderstorms, and fits three independent data sets chronicling past strikes, according to the study, published online Thursday in the journal Science.

"You need two ingredients to make lightning in a storm," said the study's lead investigator, David Romps, a climate scientist at UC Berkeley. "One of those is that you have water in its three phases — vapor, liquid and ice — coexisting in the cloud. And the other is that the storm clouds be rising quickly enough to loft that liquid and ice into the atmosphere and keep it suspended. So we've built our proxy around those two ideas."

Previous formulas were built around predicted cloud heights and did not account for as much of the variance in actual strikes as the new proxy does, according to the study. The new proxy explains about 77% of the variance in strikes.

A 12% rise for every degree Celsius works out to about a 50% rise over this century, according to the study. The error range was about 5% per degree.

At current rates of greenhouse gas emissions, the mean surface temperature of Earth is expected to rise as much as 4 degrees Celsius (7 degrees Fahrenheit) this century, according to the Intergovernmental Panel on Climate Change.

Even without an appreciable rise in precipitation in the contiguous U.S. states, lightning strikes would increase, largely due to more energetic storms, Romps said.

But without precise estimates of where and when those strikes are likely to occur, it will be hard to predict the incidence of wildfires, about half of which are sparked by lightning, Romps said.

"It could be that regions that already get a lot of lightning will get even more, or perhaps regions that don't get very much lightning now will be in store for more than they're used to," said Romps. "But it's certainly reasonable to speculate that with a 50% increase in lightning strikes, we'll have more wildfires."

A 2008 study of two decades of wildfire in Yosemite National Park showed that a decreased spring snowpack was associated with an exponential increase in lightning-ignited wildfires and an increase in areas that burned with higher intensity. The study, led by the University of Washington, also predicted a 19% increase in lightning-ignited wildfires by mid century.

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