

NEWS

Lightning Strikes Predicted to Increase as Climate Warms

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By the end of the 21st century, the frequency of lightning strikes in the United States may increase by 50% because of climate warming, up from an average 25 million lightning strikes per year, a paper published in the 13 November issue of *Science* reports.

Scientists already understand that warmer weather and increased precipitation lead to more thunderstorms, but lightning strike frequency has been left out of climate change models. With new data available about the rates of convection in the atmosphere, scientists now have a tool to forecast how lightning strike frequency will change with a warming climate.

Lightning is driven by two factors, explained David Romps, assistant professor in the Department of Earth and Planetary Science at the University of California, Berkeley, and lead author on the paper.

“Water vapor is the fuel of thunderstorms,” Romps explained. “On a warm planet, the air tends to have more of that fuel lying around.”

Romps and his team also looked at convective available potential energy (CAPE), a measurement of atmospheric convection that describes how a parcel of warmer, less dense air moves through the atmosphere.

“CAPE tells us theoretically what the max amount of kinetic energy that parcel [of air] could have if released,” Romps said.

Scientists know that precipitation and CAPE are well correlated with lightning strike frequency, Romps explained, so he and his team used these two factors as a proxy to predict how lightning strike frequency would change in the future. As temperature warms, an increase in CAPE—which is related to an increase in water vapor—drives more lightning strikes. Romps and his team found that for every degree rise in temperature, lightning strike frequency would increase by 12%.

More lightning strikes means more wildfires and possibly more human fatalities, Romps said. Lightning is the dominant cause of wildfires aside from human activities, and these fires tend to be harder to stop because they start in more remote areas, far from fire stations.

Increased lightning strike frequency also has another, more subtle effect, Romps said. Lightning strikes affect atmospheric chemistry, most notably the creation of nitrogen oxides, which play an important role in regulating ozone—a significant greenhouse gas.

“More lightning could result in more O₃ [ozone] that would amplify any existing warming due to CO₂ [carbon dioxide] and other greenhouse gases,” said Colin Price, a professor in the Department of Geosciences at Tel Aviv University, who was not involved in the study.

However, the effect of lightning on atmospheric science is still an area of active research that needs to be pursued further, Romps explained. “Atmospheric chemists are interested in nailing down that rate of lightning-produced NO_x [nitrogen oxides],” he said.

Romps hopes to expand on the new findings by studying any possible regional differences of lightning strike frequency. “Lightning will increase, but we’d like to get a better look at which regions of the country will experience this,” he said.

“These results agree pretty much with what previous studies have shown for global changes in lightning with warming,” Price said, “This gives us confidence that the results are quite robust, no matter what proxy or parameterization is used.”

—JOANNA WENDEL, Staff Writer



Oregon Department of Transportation, <http://bit.ly/11a43VA>

Lightning strike frequencies are expected to rise as the climate warms.