

Thunderstorms Might be a Source of Producing Chemicals that Purify the Air

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EDITORIAL

Researchers report that lightning has the potential to help flush pollutants from the atmosphere. During observations from a storm-chasing plane suggest that lightning can produce a large number of air-cleaning chemicals known as oxidants. Oxidants clean the air by combining with contaminants like methane to produce molecules that are more water soluble or stickier, making them easier to rain out of the atmosphere or stick to the Earth's surface. Until now, scientists understood that lightning creates nitric oxide, which can cause oxidants like hydroxyl radicals to develop. However, no one has ever observed lightning directly produce a large number of these oxidants.

A NASA jet monitored two oxidants in storm clouds over Colorado, Oklahoma, and Texas in May and June 2012. One of them was the hydroxyl radical, abbreviated as OH. The other was the hydroperoxyl radical (HO_2), which was a comparable oxidant.

In some portions of these clouds, the combined concentration of OH and HO_2 molecules created by lightning and other electrified regions of air reached thousands of parts per trillion. Previously, the maximum concentration of OH in the atmosphere was only a few parts per trillion. The highest concentration of HO_2 found was around 150 parts per trillion.

We weren't expecting to see anything like this, it was so extreme, says one researcher. However, laboratory research later demonstrated that electricity could generate such high amounts of OH and HO_2 , confirming that these oxidant signals were real. Since there are an estimated 1,800 lightning storms raging around the planet at any given time, a research team calculated that lightning might account for 2 percent to 16 percent of atmospheric OH. More thunderclouds would be needed to get a more accurate assessment. As climate change causes more lightning, understanding how lightning affects atmospheric chemistry will become more critical.

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