SPACE & SPACEFLIGHT

We've Detected Lightning on Mars for the First Time

Scientists analyzed 28 hours of recordings over two Martian years, listening for electrical signals.

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A dust devil on Mars, as captured by the Mars Reconnaissance Orbiter on March 14, 2012. Image: NASA/JPL-Caltech/Univ. of Arizona Animation Credit: NASA/JPL-Caltech

Dust devils on Mars could be brewing electric currents, and scientists may have just heard them strike the arid landscape in a first-of-its-kind discovery.

Planetary scientists detected new evidence of lightning on Mars in sounds and electrical signals captured by the Perseverance rover, suggesting the Red Planet's dusty surface causes electrification. Astronomers have long theorized that lightning exists on Mars but have thus far failed to find direct evidence of it. The new study, published Wednesday in the journal *Nature,* further deepens our understanding of Mars' atmosphere and may have implications for future human-led missions to the neighboring planet.

Lightning doesn't strike twice

NASA's Perseverance rover landed on Mars in February 2021, and it's equipped with a microphone to capture the sounds of the planet. The team of researchers behind the new study analyzed 28 hours of recordings captured by the rover's SuperCam microphone.

By listening to the sounds of Mars, the team identified interference and acoustic signatures in the recordings that are characteristic of lightning. A total of 55 events were detected over a period of two Martian years (nearly four years on Earth). The majority of the time when lightning was detected, it correlated with strong winds on Mars, dust devils, and dust storms. The study suggests that wind plays an important role in sparking lightning.

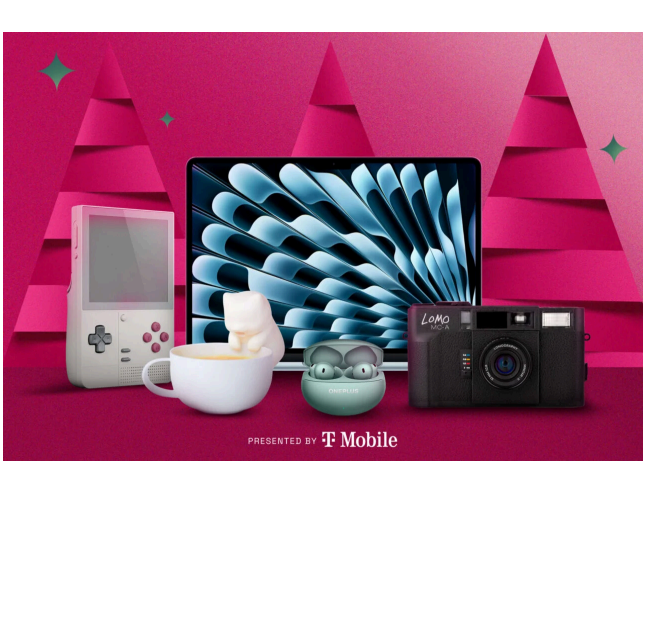
Unlike Earth, Mars' atmosphere is too thin to support tornadoes. Instead, as air near the planet's surface heats up and rises to meet the cooler, denser air, it begins to rotate. As more air joins the column, it picks up speed, as well as dust, and creates a swirling dust devil. NASA's Viking mission was the first to spot the devils on Mars in the 1970s, and the dusty phenomenon was later captured by the Curiosity and Perseverance rovers.

On Earth, lightning commonly strikes along with thunderstorms. Dust devils on Earth, however, also produce similar friction that sometimes generates electric charges, with dust particles rubbing against each other instead of water and ice inside thunderclouds. That friction builds up charges, and the increasing buildup can be released in the form of lightning.

For that reason, scientists have theorized that lightning, or electrical discharges within the atmosphere, takes place on Mars. A 2009 study found signs of electrical discharges during dust storms on the Red Planet, suggesting evidence for dry lightning. Follow-up research, however, failed to detect radio evidence of the so-called dry lightning.

The new study presents an unprecedented direct detection of lightning on Mars, based on the acoustics produced by electric discharges. The scientists behind the study, an international team of researchers led by Baptiste Chide from the Research Institute in Astrophysics and Planetology in France, note that the electrostatic discharges could pose a threat to the roaming rovers, as well as future astronaut missions to the Red Planet.

"A better understanding of these discharges will help to protect future explorers (robots or astronauts) from their effects," the researchers wrote.



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