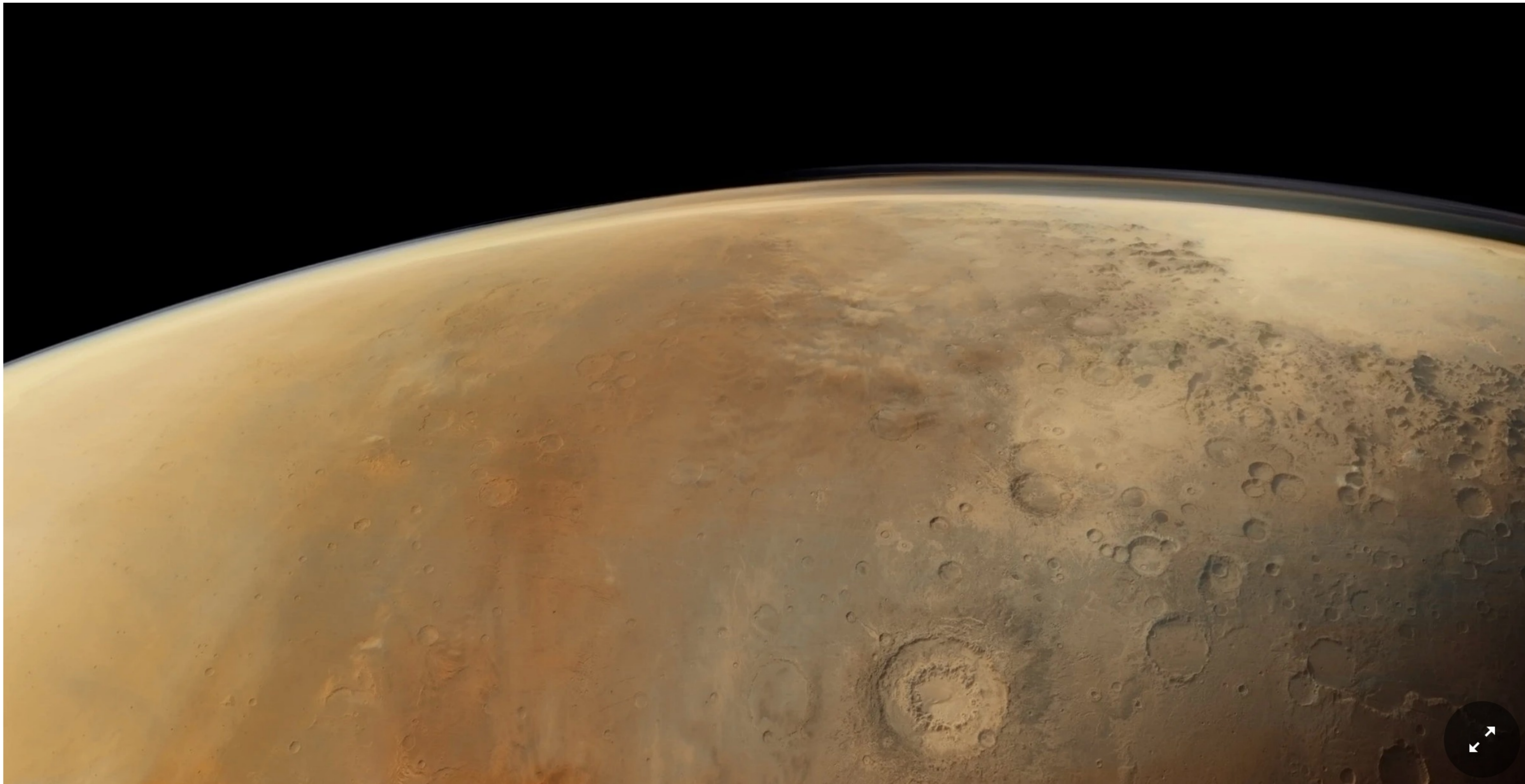


Something on Mars Is Producing Gas Usually Made by Living Things on Earth

Mars emits methane, a European orbiter has confirmed. But scientists can't say yet whether the source is geological or biological.



A view of Mars taken by the European Space Agency's Mars Express spacecraft in 2016. ESA/DLR/FU Berlin/Justin Cowart



By Kenneth Chang

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Methane gas periodically wafts into the atmosphere of Mars; that notion, once considered implausible and perplexing, is now widely accepted by planetary scientists.

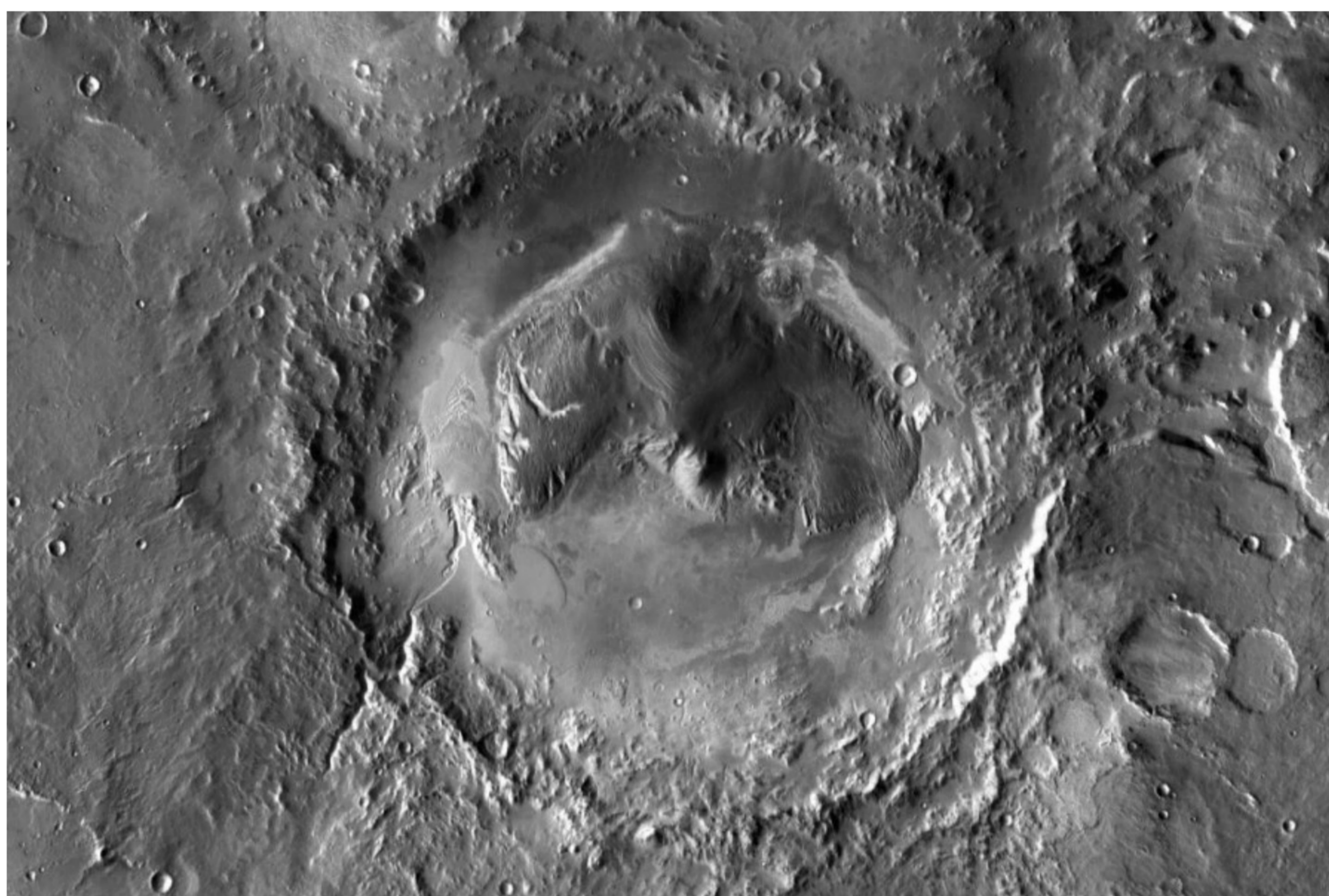
Why the methane is there is still a bewildering mystery. It may even point to present-day Martian microbes living in the rocks below the surface.

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In [Nature Geoscience on Monday](#), scientists working with the [European Space Agency's Mars Express orbiter](#) reported that in the summer of 2013, the spacecraft detected methane within Gale Crater, a 96-mile-wide depression near the Martian equator.

That is noteworthy, because NASA's Curiosity rover has been exploring that region since 2011, and in the summer of 2013 it, too, [measured a marked rise of methane in the air](#) that lasted at least two months.

“Our finding constitutes the first independent confirmation of a methane detection,” said Marco Giuranna, a scientist at the National Institute for Astrophysics in Italy, in an email. Dr. Giuranna is principal investigator for the Mars Express instrument that made the measurements.



A view of the Gale Crater on Mars, taken by NASA's Mars Odyssey. NASA/JPL-Caltech/ASU

The presence of methane is significant because the gas decays quickly. Calculations indicate that sunlight and chemical reactions in the thin Martian atmosphere would break up the molecules within a few hundred years, so any methane detected must have been created recently.

It might have been created by a geological process known as serpentinization, which requires both heat and liquid water. Or it could be a product of life — specifically methanogens, microbes that release methane as a waste product. Methanogens thrive in places lacking oxygen, such as rocks deep underground and the digestive tracts of animals.

Even if the source of the methane turns out to be geological, the hydrothermal systems that produce the emissions would still be prime locations to search for signs of life.

A decade and a half ago, three teams of scientists reported that they had detected methane in the Martian atmosphere. Two used observations from Earth, and the third used data from Mars Express. All of the measurements were at the edge of the instruments' capabilities.

Two years later, the methane seemed to have disappeared. If that finding was accurate, it suggested not only that something was creating methane on Mars, but that something else was quickly destroying it.

The Curiosity mission initially cast more doubt on the methane claims, as it detected very little of the gas, about 0.7 parts per billion. Then in 2013, the levels jumped by a factor of 10. The following January, levels fell back to below 1 part per billion. The methane disappeared so quickly, and the usual levels are so low, that scientists are now trying to explain how methane could have been destroyed so quickly.

In the new research, the scientists looked at passes that Mars Express made over Gale Crater during the first 20 months of Curiosity's mission. For all but one of the orbiter's observations, no methane was detected. But on June 16, 2013, the instrument measured about 15 parts per billion of methane. A day earlier, Curiosity had also measured elevated methane.

“It reaffirms the hypothesis that Mars is presently active,” said Sushil Atreya, a planetary scientist at the University of Michigan and a member of the Curiosity science team.

The Mars Express findings also point to a possible source of the methane, about 300 miles east of Gale. In that region, ice must exist just below the surface. “That methane could be released episodically along faults that break through the permafrost due to partial melting of ice,” Dr. Giuranna said.

If true, that could be a tempting site for a future spacecraft to untangle the methane mystery.

Dr. Atreya is less certain of that conclusion, which involves assumptions about Martian weather. The Curiosity scientists thought the methane originated within Gale, to the north of the rover.

A [newer European Mars spacecraft, the Trace Gas Orbiter](#), with a more sophisticated methane detector, has been in orbit since 2017, but no results have been reported yet.

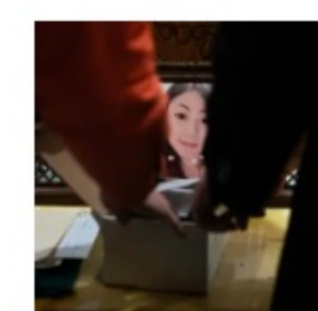
“I think the game is afoot,” said Michael J. Mumma, a scientist at NASA's Goddard Space Flight Center in Greenbelt, Md. He led ground-based observations that identified methane plumes in the Martian atmosphere in 2003. “The story is continuing to evolve, and evolving rapidly now.”

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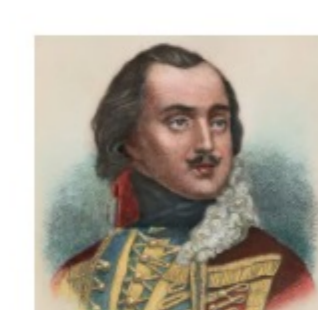
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