

Readings from NASA's Curiosity rover show how Mars is losing its air

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NASA An artist's conception shows how Mars' atmosphere might have been stripped away by a stream of electrically charged particles from the sun.

Scientists say new readings from NASA's Curiosity rover have confirmed how Mars lost its once-thick atmosphere.

The measurements from Curiosity's Sample Analysis at Mars instrument, or SAM, provide fresh support for the view that a high-velocity stream of electrically charged particles from the sun has been stripping off Mars' atmosphere from the top. Mars is more vulnerable to that kind of atmospheric loss than Earth because it doesn't have a global magnetic field to serve as a shield against the solar wind.

Today, Mars' atmosphere is only 1 percent as dense as of Earth's on the surface, and consists mostly of carbon dioxide.

The atmosphere is so thin that warmed-up ice turns directly into water vapor without passing through a liquid state. But scientists have seen geological evidence that water flowed abundantly over parts of the Red Planet billions of years ago. That implies that the atmospheric pressure was once much more Earthlike. So where did the missing air go?

Curiosity's science team presented the verdict from SAM on Monday during the European Geosciences Union's General Assembly in Vienna. The key clue is a precise measurement of various isotopes of argon, an inert gas that exists in trace amounts in the Martian atmosphere. Different isotopes of the same element have different atomic weights, and SAM was able to distinguish between those weights with unprecedented precision.

SAM's science team determined that the Martian atmosphere contains more of a lighter argon isotope (argon-36) than a heavier isotope (argon-38) — about four times as much. However, that ratio is lower than the solar system's original ratio of 5.5-to-1, as estimated from argon-isotope measurements of the sun and Jupiter. That would favor a process that stripped away Mars' ancient atmosphere from the top down, with more of the lighter isotopes of gases blown away.

Scientists have long suspected that the solar wind was the culprit for atmospheric loss, based on what happened to other isotopes in Martian air. But the argon measurements are more conclusive, because argon doesn't react with other elements. Thus, Curiosity's team could exclude a scenario in which constituents of the Martian atmosphere were removed by reacting with surface chemicals.

"We found arguably the clearest and most robust signature of atmospheric loss on Mars," Sushil Atreya, a SAM co-investigator at the University of Michigan at Ann Arbor, said in a [NASA news release](#).

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For more about the SAM team's findings, check out [this report from the BBC's Jonathan Amos](#).

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