



Curiosity Provides New Evidence for Warm, Wet Ancient Mars

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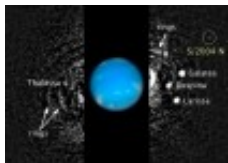
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A large international team of researchers used Curiosity’s Sample Analysis at Mars (SAM) suite of instruments to measure the abundances of different gases and isotopes in samples of Martian air.

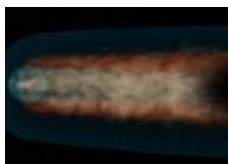
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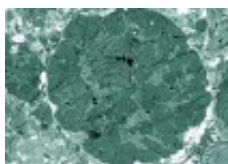
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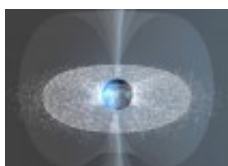
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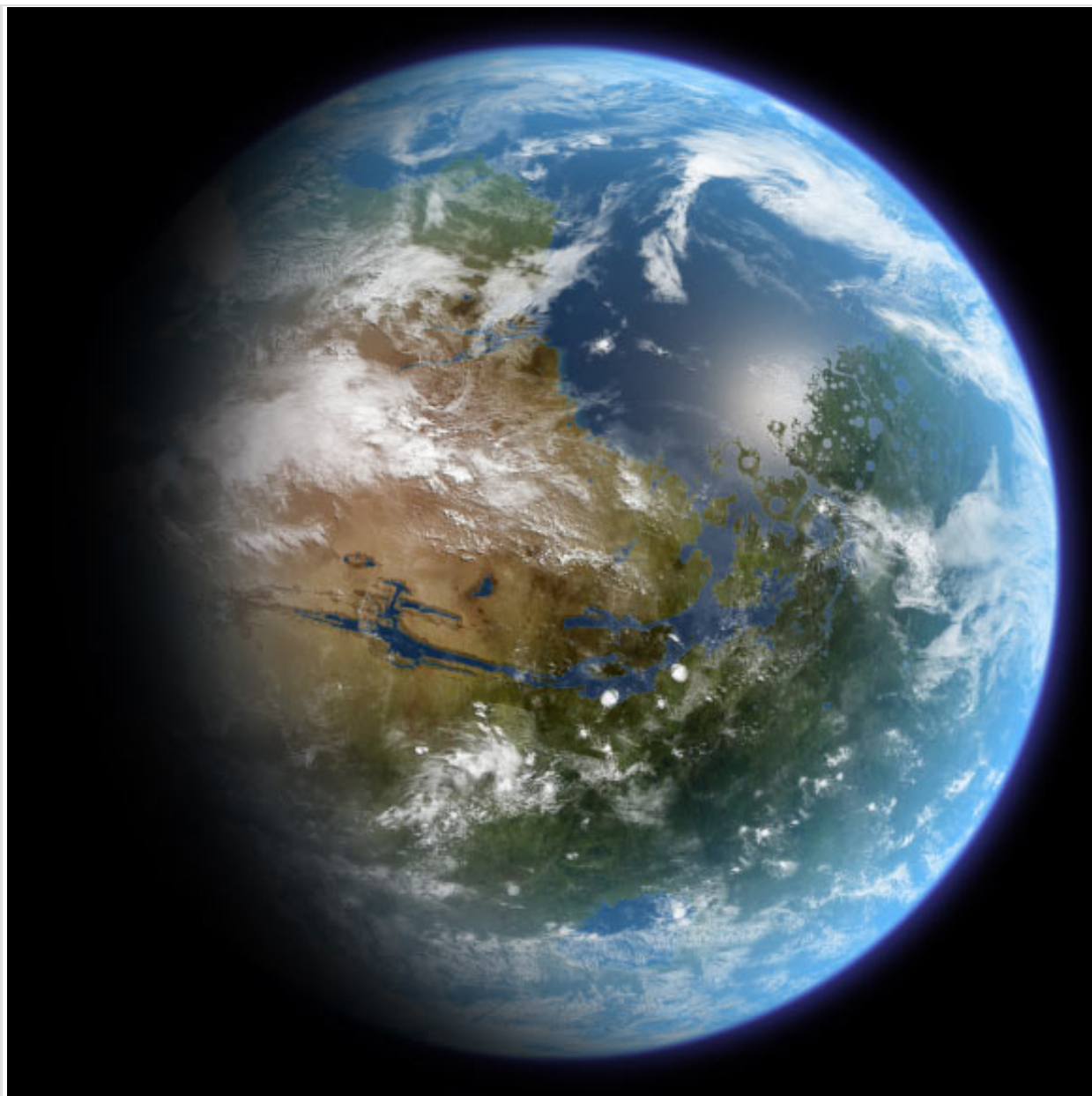
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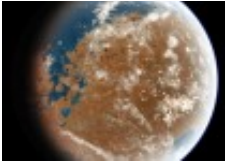


This is an artist's impression of habitable Mars (Daein Ballard / CC BY-SA 3.0)

Isotopes are variations of the same chemical element that contain different numbers of neutrons, such as the most common carbon isotope, carbon-12, and a heavier stable isotope, carbon-13, which contains an additional neutron.

“The beauty of these measurements lies in the fact that these are the first really high-precision measurements of the composition of Mars’ atmosphere,” said Prof Sushil Atreya from the University of Michigan, who is a co-author of a pair of papers published in the journal *Science* ([paper 1](#) & [paper 2](#)).

Curiosity’s SAM analyzed the ratios of heavier to lighter isotopes of carbon and oxygen in the carbon dioxide that makes up most of Mars’ atmosphere today.



Mars Had
Oxygen-Rich
Atmosphere 4
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Shows New
Study

Measurements showed that heavy isotopes of carbon and oxygen were more abundant in today's thin atmosphere compared with the proportions in the raw material that formed the planet.

This provides not only supportive evidence for the loss of much of Mars' original atmosphere, but also gives clues to how the loss occurred. It suggests that the planet's atmosphere escaped from the top, rather than due to the lower atmosphere interacting with the ground.

Prof Atreya said that the isotope data are unambiguous and robust, having been independently confirmed by the quadrupole mass spectrometer and the tunable laser spectrometer, two of the SAM suite instruments.

"These data are clear evidence of a substantially more massive atmosphere, hence a warmer, wetter Mars in the past than the cold, arid planet we find today."

Bibliographic information: Chris R. Webster et al. 2013. Isotope Ratios of H, C, and O in CO₂ and H₂O of the Martian Atmosphere. *Science*, vol. 341, no. 6143, pp. 260-263; doi: 10.1126/science.1237961

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