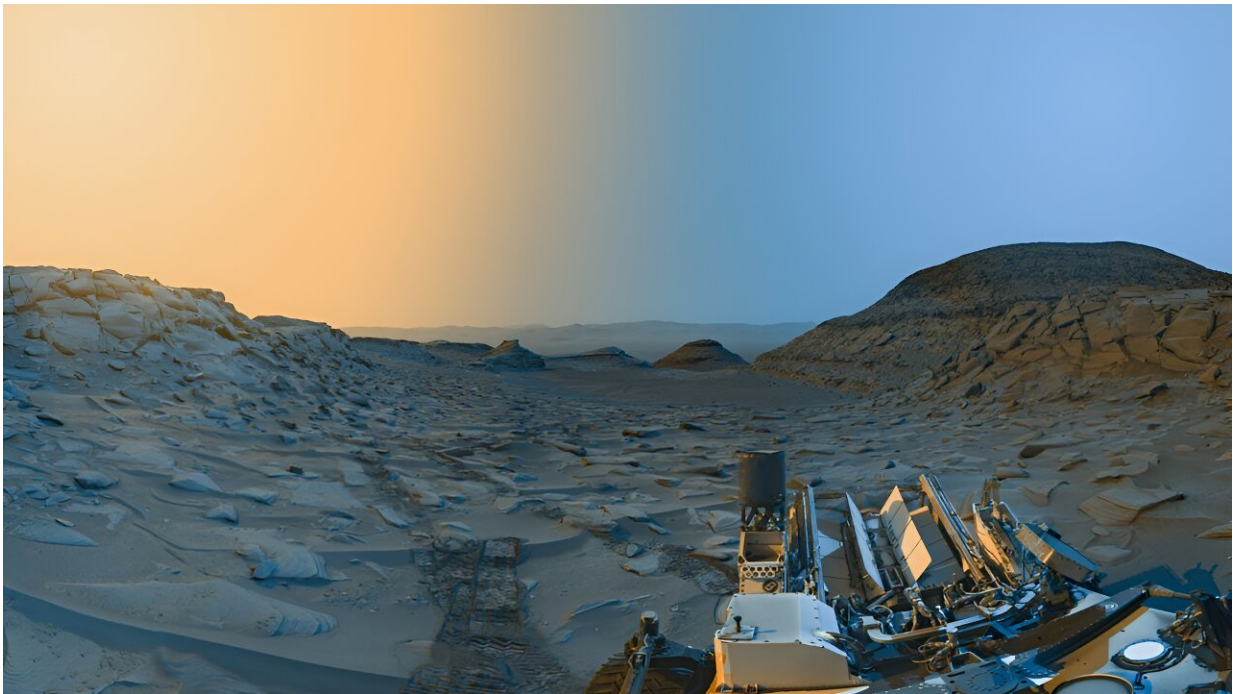


Research suggests Mars has far fewer minerals than Earth

September 7 2023, by Rachel Fritts



This panorama was merged from two images of “Marker Band Valley” in Mars’s Gale crater taken by Curiosity on 8 April 2023, one in the morning and one in the afternoon local time. The original images were taken in black and white and then colorized, with the right portion (under blue sky) representing the scene in the morning and the left portion (under yellow sky) representing the afternoon. Credit: NASA/JPL-Caltech

Nearly 6,000 different minerals are known to exist on Earth, but after

more than 50 years of investigations, only 161 minerals have been recorded on Mars—a dramatically lower number for a planet that shares much in common with our own.

The difference, according to a new study, has arisen because minerals on Mars have had fewer pathways to form compared with those on Earth, even though both planets began on very similar trajectories for mineral evolution.

Following on [research](#) to catalog [mineral formation](#) and [evolution](#) on Earth, [Hazen et al](#) conducted a systematic study of all 161 Martian minerals revealed through the past half century of Mars missions and analyses of Martian meteorites.

Whereas earlier work identified 57 primary and secondary mineral-forming mechanisms on Earth, the new study identified just 20 modes of mineral formation on Mars.

Early in the planets' histories, minerals on Earth and Mars formed in similar ways. For instance, the first minerals on both [planets](#) likely crystallized directly from cooling magma.

Hydrothermal activity likely also led to many new minerals on each planet. However, Earth's array of minerals went through extensive stages of diversification billions of years ago with the onset of plate tectonics and the proliferation of life—processes not known to have occurred on Mars.

Although there are undoubtedly many mineral phases on and below Mars's surface that have yet to be observed, the researchers note that the total count of Martian minerals is still likely an order of magnitude smaller than Earth's.

Their study is published in the *Journal of Geophysical Research: Planets*.

More information: Robert M. Hazen et al, On the Diversity and Formation Modes of Martian Minerals, *Journal of Geophysical Research: Planets* (2023). [DOI: 10.1029/2023JE007865](https://doi.org/10.1029/2023JE007865)

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