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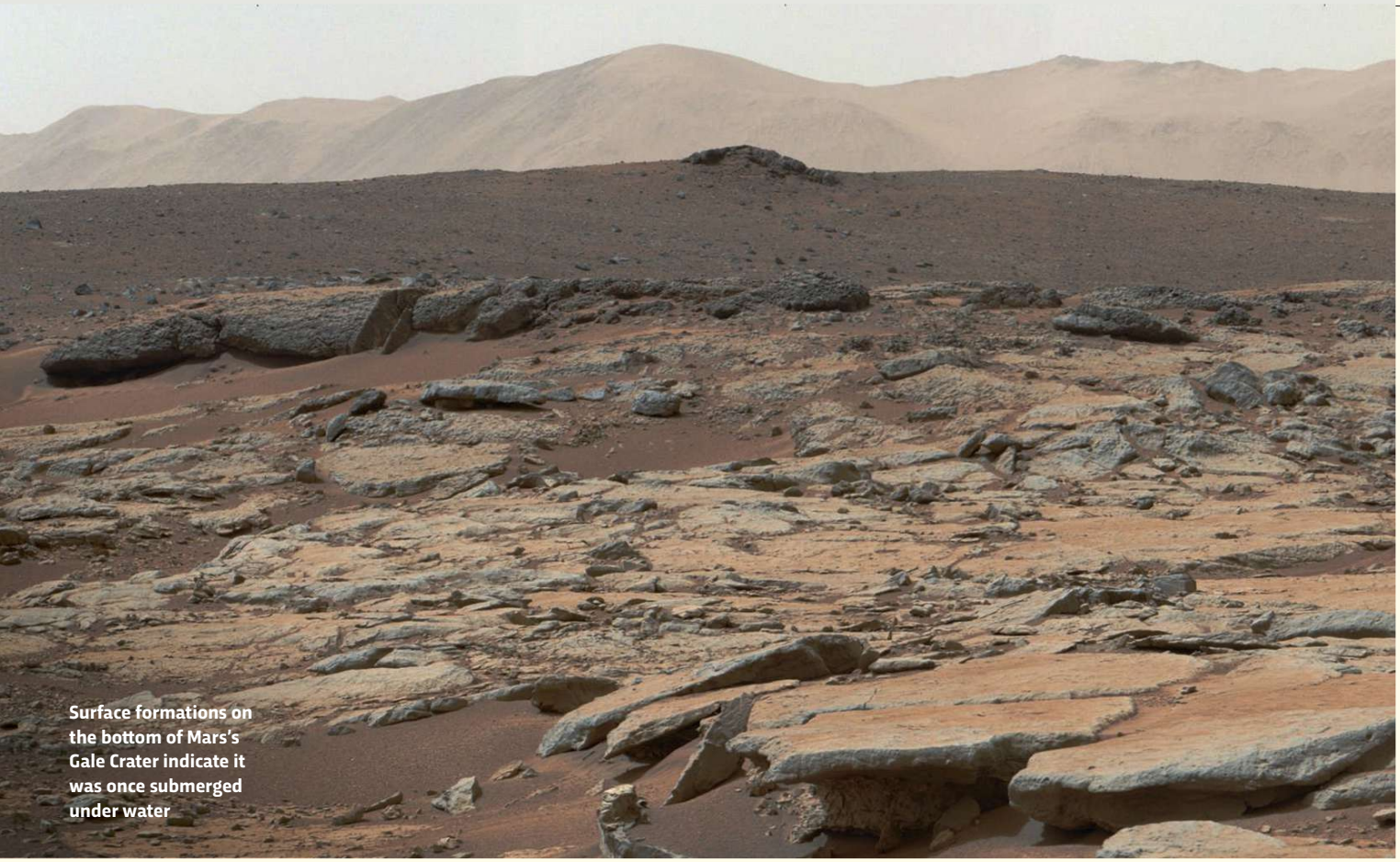
DISCOVERIES

ANCIENT MEGAFLOOD HINTS AT POSSIBILITY OF LIFE ON MARS

Data beamed back by NASA's Curiosity rover tells of floods raging across the planet's surface four billion years ago

GETTY IMAGES



Surface formations on the bottom of Mars's Gale Crater indicate it was once submerged under water

If you were to travel back in time four billion years and headed to the surface of Mars, chances are you'd be greeted with scenes of flooding of biblical proportions, and maybe even some form of life.

According to data collected by NASA's Curiosity rover and analysed by scientists from Jackson State University, Cornell University, the Jet Propulsion Laboratory and the University of Hawaii, a raging megaflood was triggered by a massive meteoritic impact that created Mars's Gale Crater. Heat from the impact caused the mass melting of ice stored on the Martian surface around four billion years ago.

The flooding was so severe that it caused significant changes to the geological structure of the Red Planet's surface, carving out great ripples and waves in the sedimentary rock, the researchers say.

"We identified megafloods for the first time using detailed sedimentological data observed by the rover Curiosity," said Dr Alberto G Fairén, a visiting astrobiologist at Cornell University. "Deposits left behind by megafloods had not been previously identified with orbiter data."

"Early Mars was an extremely active planet from a geological point of view"

The data includes evidence of giant wave-shaped features in sedimentary layers of Gale Crater, often called 'megaripples' or 'antidunes', that stand about 10 metres high and are spaced approximately 130 metres apart.

The antidunes are indicative of floodwater flowing across the crater about four billion years ago. They are identical to the features formed by melting ice on Earth about two million years ago, the researchers say.

The flooding was most likely caused by the heat generated by the impact of a large meteorite, which melted the planet's frozen reservoirs and released the carbon dioxide and methane stored in them. The water vapour and gases probably combined to produce a short period of warm and wet conditions on the Red Planet.

Condensation that formed from the water vapour clouds in turn created torrential rainfall, possibly across the entire planet. That water entered Gale Crater, then combined with water coming down from Mount Sharp, a rock formation, to produce gigantic flash floods that deposited sediment, forming vast gravel ridges.

It has previously been established that Gale Crater had persistent lakes and streams in the ancient past. And these long-lived bodies of water are good indicators that the crater was capable of supporting microbial life, according to the researchers.

"Early Mars was an extremely active planet from a geological point of view. The planet had the conditions needed to support the presence of liquid water on the surface – and on Earth, where there's water, there's life," Fairén said. "So early Mars was a habitable planet. Was it inhabited? That's a question that the next rover Perseverance [which is scheduled to reach Mars in February 2021] will help to answer."