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News
Features

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Lava-like Structures On The Martian Surface

https://www.dailymail.co.uk/sciencetech/article-8331171/Mudflows-Mars-clues-finding-signs-Martian-life.html

Mysterious lava-like structures on the Martian surface were created by MUD erupting from the frozen crust and 'could be a potential habitat for life

Daily Mail 18th May 2020 >

- **Astronomers spotted the lava-like structures in images taken by NASA satellites**
- **It was thought the structures were created by ancient volcanic activity on Mars**
- **Researchers now say they may have be mudflows pushed from under the planet**
- **They originated in subsurface chambers that could be the perfect spot for life**

ens of thousands of Lava-like structures on the surface of Mars may actually be mudflows and could hold the key to finding signs of Martian life, study shows.

While these structures look like pahoehoes - lava flows seen in Hawaii and Iceland - scientists believe they are actually a result of sedimentary volcanism.

Researchers from the Open University recreated this geological phenomenon that causes mud to erupt from underground in their 'Mars Chamber' in Milton Keynes.

The chamber is designed to simulate conditions on the surface of the Red Planet and they found the subsurface sedimentary material could be the perfect spot for life.

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The hills made by the mudflows will be sites of future interest for Mars robots exploring the Red Planet, says study co-author Dr Manish Patel.

'The implication of this type of sedimentary volcanism is that there is or was a reservoir of mud in the subsurface - which implies a liquid water reservoir at some point,' he said.

'Such an environment - water-rich sedimentary material, below the surface and thus protected from the low temperature, low pressure atmosphere and sterilising UV radiation - could be a potential habitat for life.'

The findings, reported in the journal Nature Geoscience, have been described as 'unexpected' and 'very exciting' by lead author Dr Petr Broz, from the Institute of Geophysics of the Czech Academy of Sciences.

'We have a tendency to expect that geological processes, like mud movement, would be operating elsewhere in the Solar System in a similar fashion as on Earth. This is based on our everyday experiences.

'However, our experiments clearly show that in reality, this simple process which we all know from our childhood would be very different on Mars,' said Broz.

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The Martian landscape is dotted with tens of thousands of these flow-like structures, some of which are hundreds of miles long and dozens of miles wide.

These channels were thought to have been a result of huge ancient floods but very little is known about these Martian landforms.

Tests in the Mars Chamber were carried out in low temperatures of around -4F, and low atmospheric pressure of around 7 millibars, to mimic the Martian environment.

They found that free flowing mud under Martian conditions would behave differently from on Earth because of 'rapid freezing and the formation of an icy crust'.

According to the researchers, this is because the atmosphere in Mars is very thin, about 150 times thinner than Earth's and its atmospheric pressure is less than 1 per cent of the sea level pressure on Earth.

They said experiments under Martian conditions showed liquid mud 'spilling from ruptures in the frozen crust, and then refreezing to form a new flow lobe', resembling 'mini versions' of pahoehoes.

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Dr Patel, a senior lecturer in planetary sciences at The Open University, said the findings present a 'potentially different geological history for Mars in terms of assumed volcanic activity'.

Dr Susan Conway, a research scientist at CNRS in France, added: 'Mars is always surprising us, I was amazed to see the experimental results with the mud forming lobes like mini-versions of the lava flows in Hawaii.

'These observations revolutionise the interpretation of many surface features mapped on the Martian surface.'

NASA's Perseverance rover due for launch this summer is to dig for alien fossils at an ancient river delta next year.

'If we could pick a place for a future mission free of engineering constraints, then sedimentary volcanic features could be an interesting target to look for signs of ancient microbial life,' said Patel.

'You could almost think of then as a window into what was happening below the surface of Mars millions of years ago.'

He added: 'Even if Mars never had life on it, these sedimentary features would be a fascinating insight into the subsurface composition of Mars from a long long time ago.'

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This image was captured by the NASA MArs Reconnaissance Orbiter and shows a hill with a central crater that has been suggested could be a mud volcano

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How important is the presence of liquid water?

It is now widely believed that Mars holds a reasonably large volume of water.

However, the surface of the planet is so cold, this water exists only as ice.

In order for life to exist on a planet, many scientists believe it is essential for the world to possess liquid water.

Ever since technology has enabled mankind to gaze at Mars in detail, humans have been looking for indications that there was water on the red planet.

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Did water used to flow on the surface of Mars?

The Mariner 9 mission revealed clues of water erosion in river beds and canyons, as well as evidence of weather fronts and fogs on Mars in 1971.

Later missions from the Viking orbiters, which first launched in 1975, revealed yet more details about how water flowed on the surface and carved valleys.

Several studies investigated the presence of liquid water for decades. In 2000, the first proof of liquid water on Mars was discovered.

It was claimed the gullies seen on the surface of the planet had to have been formed by flowing water.

Scientists cited the debris and mud deposits left behind as evidence for moving water existing at some point in the history of the red planet.

However, the formation of these gullies has been hotly debated throughout the ensuing years.

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Proof of ice in geological samples from Mars

Spirit and Opportunity, the twin rovers, found evidence of the presence of water enclosed in rock in 2007, when one of Spirit's wheels broke and gorged a piece of stone.

Analysis of the silica-rich layer discovered in the scratch suggested it formed in the presence of liquid water.

In 2008, the Phoenix lander was gathering geological samples, and they disappeared after a few days.

Scientists thought these were pieces of ice. This assessment was confirmed when the lander later detected water vapour in a sample.

In 2012, Curiosity was meandering over an ancient martian seabed when it examined a number of rocks that were exposed to liquid water billions of years ago.

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Recurring slope lineae and debate causes it

Features known as recurring slope lineae (RSL) were first identified in 2011.

These dark streaks populate the areas of Mars with a sharp incline.

Researchers speculated that these may have been caused by the intermittent flow of liquid water down steep banks on the planet.

In June 2013, Curiosity found powerful evidence that water good enough to drink once flowed on Mars. In September of the same year, the first scoop of soil analysed by Curiosity revealed that fine materials on the surface of the planet contain two per cent water by weight.

In 2015, Nasa claimed to have discovered the first evidence of liquid water on Mars in the present day.

The space agency said that its Mars Reconnaissance Orbiter (MRO) provided the strongest evidence yet that liquid water flows intermittently on present-day Mars.

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It said the dark features that run down steep inclines on the red planet were actually granular flows, where grains of sand and dust slip downhill to make dark streaks, rather than the ground being darkened by seeping water.

Images from the MRO revealed the streaks only exist on slopes steep enough for dry grains to descend the way they do on faces of active dunes.

Also in 2017, scientists provided the best estimates for water on Mars, claiming it once had more liquid H2O than the Arctic Ocean - and the planet kept these oceans for more than 1.5 billion years.

The findings suggest there was ample time and water for life on Mars to thrive, but over the last 3.7 billion years the red planet has lost 87 per cent of its water - leaving the surface barren and dry.

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A subterranean lake

In a study published in the journal Science, ESO researchers have now discovered the first concrete evidence for liquid water on Mars.

Using radar imagery from the Mars Express probe, the ESO team have found a 12-mile long underground lake filled with liquid water.

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