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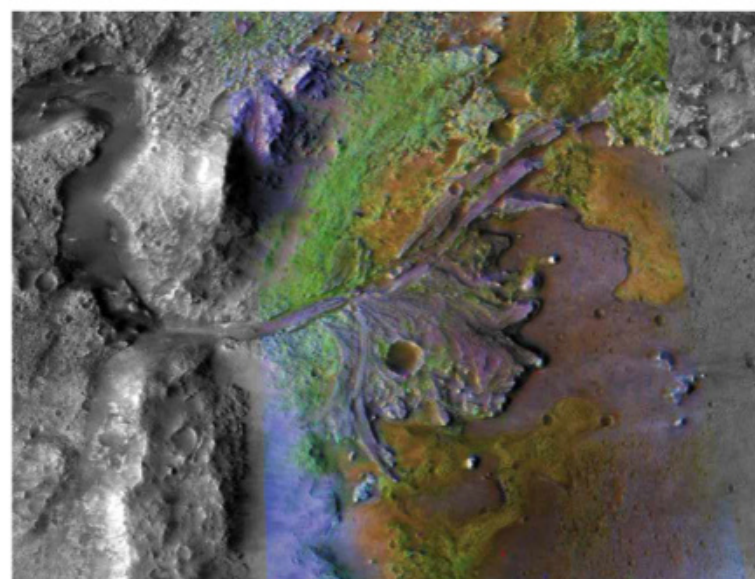
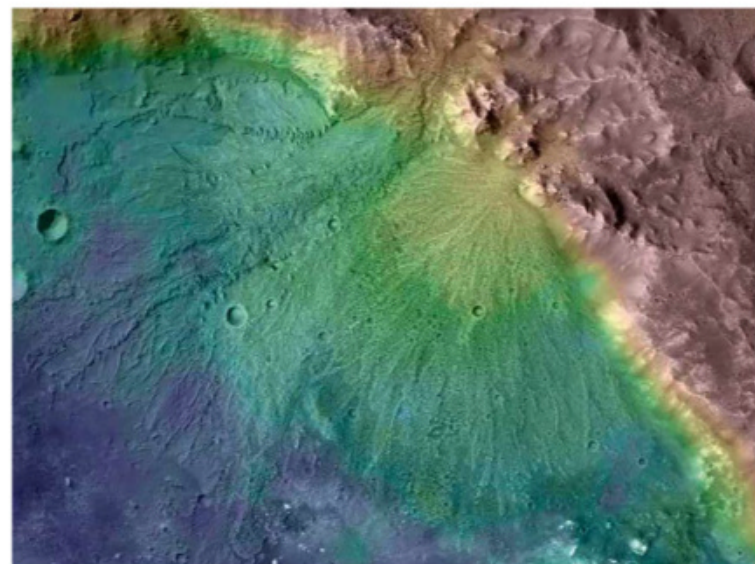
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◀ An alluvial fan in Tian Shan, China. Similar fans (top) and river deltas (above) have been imaged on Mars

Fans help reveal Mars's watery past

Water may have flowed across Mars for millions more years than previously thought

A new study shows water could have been flowing across the surface of Mars as recently as 2.5 billion years ago. Although Mars is now an arid planet, its surface is covered with geological evidence that it was once host to liquid water. What's not so clear, however, is when this water disappeared.

"We've known for decades that Mars had rivers and lakes around 3.5 billion years ago, but in the past few years there has been a growing body of evidence that substantial amounts of liquid water continued to erode the Martian surface for hundreds of millions of years," says Alexander Morgan from the Planetary Science Institute.

To further investigate, Morgan has led a new study surveying fan-shaped features seen across Mars. These are a mixture of

the remains of river deltas and alluvial fans, which are created by sediment building up at the mouth of a narrow channel. Both require vast amounts of flowing liquid water to form, so are a clear indicator of its presence. By analysing these, Morgan's team found that as Mars cooled and dried, liquid water was increasingly restricted to the lower, warmer regions of Mars.

In a second paper, the team compared the alluvial fans to previous work on the planet's valley networks, which have already been studied as indicators of past water. While the valleys were largely formed around 3.6 billion years ago, the alluvial fans formed more recently, 2.5 to 3 billion years ago, giving the researchers an insight into how the environment had changed between those dates.

"We found that even though Mars cooled over time, from global average temperatures of -3°C to about -15°C , liquid water continued to be stable in select areas," says Morgan. "Together, these papers describe how Mars had liquid water in the form of rivers for a prolonged period, from about 3.6 to at least about 2.5 billion years ago."

However, what the studies don't show was whether the planet's climate stayed consistent during that time.

"We don't believe Mars was wet for this entire period," says Morgan. "Conditions that permitted liquid water may have been episodic, perhaps driven by changes in Mars's movements – such as axial tilt, orbital eccentricity or precession – or volcanic activity."

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