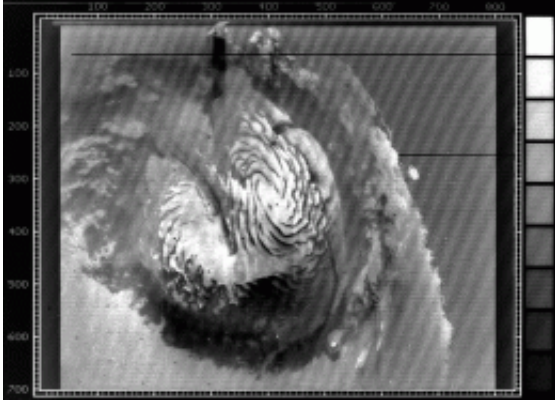


Strange Martian Spirals Explained

June 16 2010, by Dauna Coulter



A 1972-era TV image of Mars' north polar cap.

Almost 40 years ago, NASA's Mariner 9 spacecraft relayed to Earth the first video images of Mars' northern polar ice cap, revealing a strange pattern of spiral swirls that has puzzled scientists ever since. Using new data from the Mars Reconnaissance Orbiter (MRO), researchers have finally uncovered the secrets of the troughs that snake through the ice cap like a spiraled maze.

Jack Holt of the University of Texas and his graduate student Isaac Smith used radar data from MRO's Shallow Subsurface Radar to crack the case. Examining the details of this new data set has laid open the [ice](#) cap's internal structure, revealing clues to the massive ice troughs' formation.

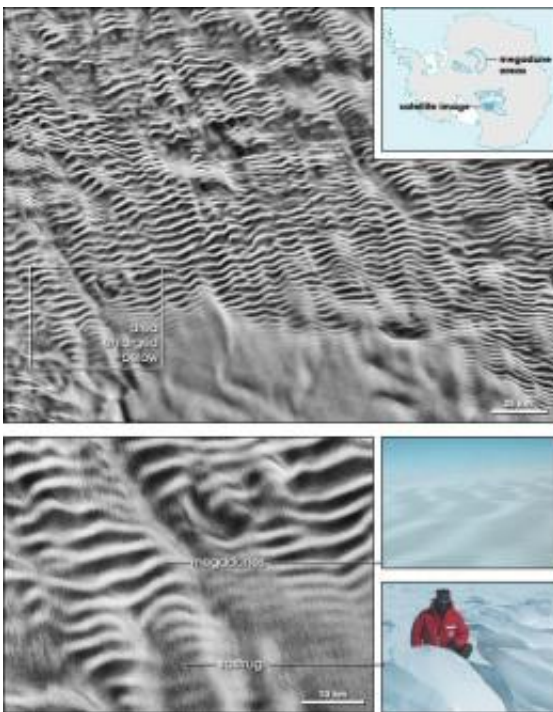
Apparently, the wind did it.

"That explains the troughs' spiral design," says Smith.

Similar formations can be found in Antarctic regions of Earth, but without the spiral shape.

"You don't see spirals in Earth's [Antarctic ice sheet](#) because local topography there prevents the winds from being steered by the Coriolis force."

The radar data have solved another icy mystery, too--the origin of Chasma Boreale.



Icy megadunes in Antarctica do not spiral like the ice troughs of Mars.

Chasma Boreale is a Grand Canyon-sized chasm that slashes through the midst of the spiraled troughs. Theories to date suggested that either wind

erosion or a single melt event excavated Chasma Boreale within the past 5 to 10 million years.

"Not so," says Holt. "The MRO data clearly show the chasm formed [long before the spirals did] in a much older ice sheet dating back billions of years. Due to the shape of that ancient sheet, the chasm grew deeper as newer ice deposits built up around it. Winds sweeping across the ice cap likely prevented new ice from building up inside the chasm [so it never filled up]."

The radar data also revealed a second chasm matching Boreale in size.

"This chasm's never been seen before -- unlike Boreale, it did fill up with ice, probably because it's in a different location. Boreale is closer to the highest points of the ancient ice cap, where the winds are stronger and more consistent."

By discovering that both Chasma Boreale and the ice troughs were shaped by similar processes over different timescales, Holt and Smith answer some questions about Martian climate history. But they're also sparking new ones.

"For a long stretch of Martian history the ice layers were regular and uniform, then there was a distinct period when the spiral ice troughs got started," says Smith. "Something changed. There must have been a very fast (relatively speaking) and powerful change in climate. We still don't know what that change was."

"To figure that out, we need to look at the rest of Mars for evidence of other changes at that same time," says Holt. "This is just the tip of the ice berg."

Provided by Science@NASA

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