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NATIONAL PRESS RELEASE I PARIS I 18 DECEMBER 2015

EMBARGOED UNTIL December 21st, 5pm Central European Time.

Gullies on Mars sculpted by dry ice rather than liquid water.

Mars's gullies may be formed by dry ice processes rather than flowing liquid water, as previously thought. This is the conclusion of a study conducted by two French scientists published online on December 21st in Nature Geoscience. They show that, during late winter and spring, underneath the seasonal CO2 ice layer heated by the sun, intense gas fluxes can destabilize the regolith material and induce gas-lubricated debris flows which look like water-sculpted gullies on Earth.

[1] Cedric Pilorget was a post-doctoral scientist at the California Institute of Technology (Caltech, Pasadena, USA) when this study was conducted, and is now a CNES postdoctoral fellow at IAS

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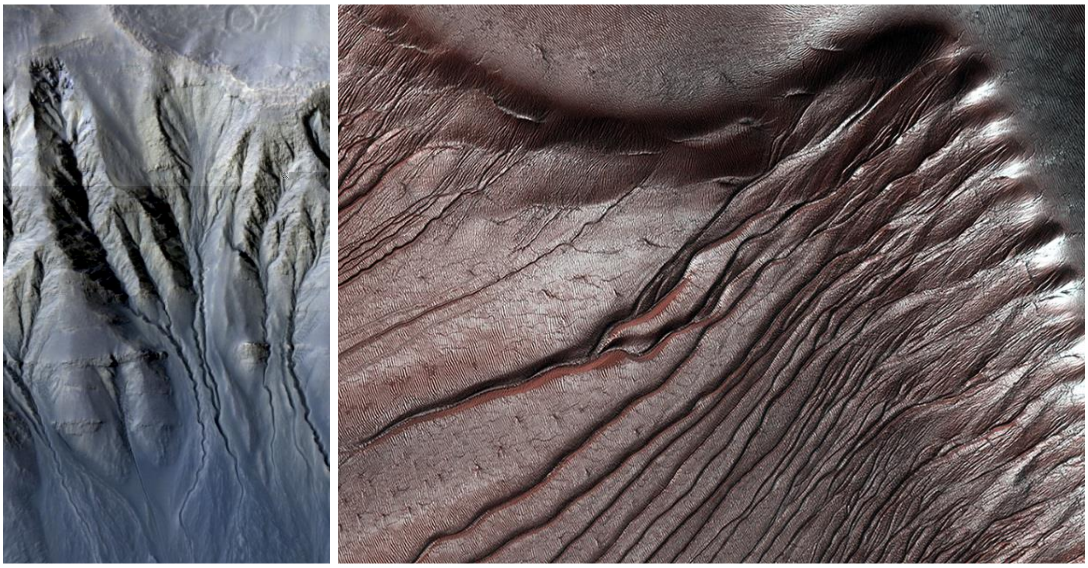

Figure 1: Examples of Martian Gullies. Until recently they were thought to have been sculpted by flowing liquid water, but they may result from defrosting dry ice processes at the end of winter. On the right, gullies on dunes in Russel Crater (54.3°S-12.9°E) are partially covered by CO2 ice. On the left, sinous gullies in a Crater in Newton Basin (41°S-202°E)

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High resolution images:

http://static.uahirise.org/images/wallpaper/2880/ESP_034234_1255.jpg

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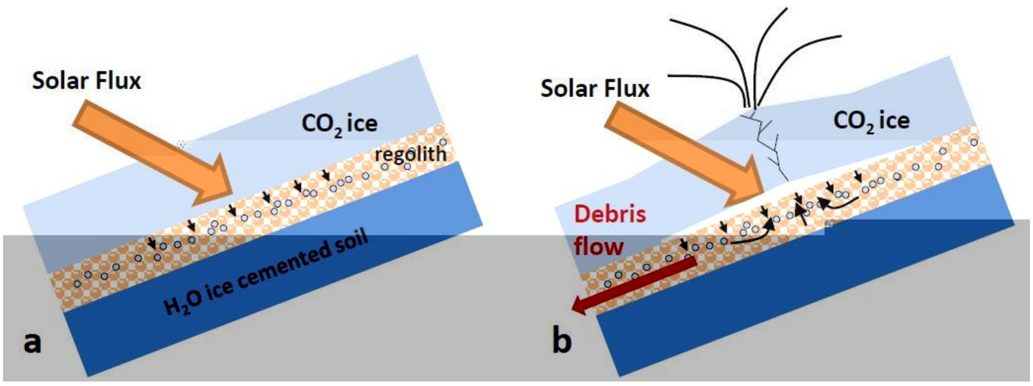

Figure 2: How debris-flows looking like water-sculpted gullies can be triggered by dry ice processes on Martian slopes (see text)

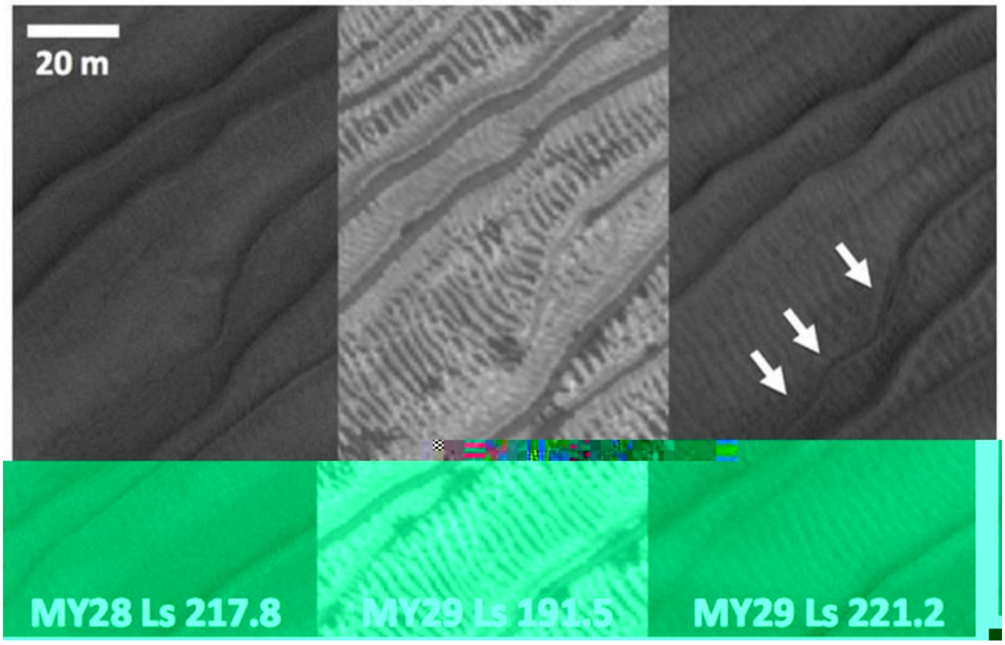

Figure 3: The evolution of the Russel crater dune gullies over a year. ***Left****: unfrosted gullies during spring in Martian year 28 ("MY28").* ***Middle****: at the end of the following winter ("MY29") dunes are covered by CO2 ice. CO2 jets formed by sublimation beneath translucent CO2 ice have deposited sand grains on the ice where they form dark spots, confirming the intense subsurface activity predicted by the model* ***Right****: In the spring of the following year, a new channel has formed.*
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Bibliography

"Formation of gullies on Mars by debris flows triggered by CO_2 sublimation". *Nature Geoscience*

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