What Carved Martian Gullies?

- ‘Gullies’ are channels carved when material moves downhill. They are seen in a variety of locations on Mars, including crater walls, cliffs, and dunes.

- Proposed formation mechanisms: water seeping from the subsurface, melting ice or snow, water frost, carbon dioxide (CO$_2$) frost, and dry flows - but there’s no direct evidence for any of these.

- Scientists must use indirect evidence: melting water would form gullies at the warmest times and locations, but subliming or condensing CO$_2$ would form gullies at the coldest times and places.

Testing the CO$_2$ Hypothesis

- Spacecraft images taken months apart show that gullies on Martian sand dunes change. The changes occur:
  - during winter months
  - in gullies closer to the south pole
  - in the southern hemisphere, where winter is more intense

- Each of these conditions suggest that the changes are related to CO$_2$ frost on the surface, and not liquid water.

- The evidence favors CO$_2$, but the mechanism is uncertain: avalanches of accumulated frost? flows triggered by sublimation?

For More Information…

- MSNBC.com - 10/30/10 - “Mysterious Mars gullies likely carved by carbon dioxide”
  http://www.msnbc.msn.com/id/39928960/ns/technology_and_science-space/

- NASA MRO Mission Site - 10/29/10 - “Study Links Fresh Mars Gullies to Carbon Dioxide”

Images

- Slide 1 image courtesy NASA / Caltech / U. Arizona

- Slide 2 image courtesy NASA / Caltech / U. Arizona

- Slide 3 image courtesy NASA / JPL / Malin Space Science Systems

Source Articles (on-campus login may be required to access journals)

  http://geology.gsapubs.org/content/38/11/1047.full

  http://www.sciencemag.org/content/331/6017/675

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