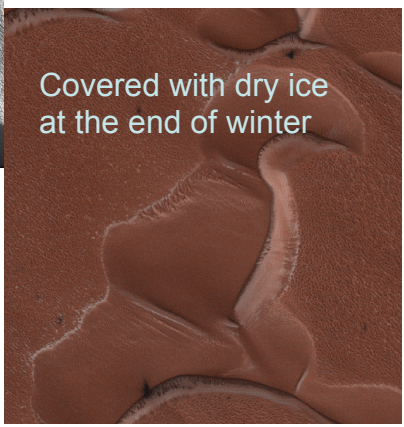




Sand dune in summer

A vast sea of sand dunes encircles Mars' permanent water ice polar cap

Spring on Mars: Dry Ice on Dunes

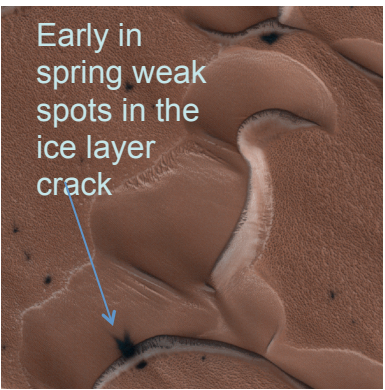


Covered with dry ice at the end of winter

The dunes are dark basalt sand, similar to Hawaiian sand

Early in the spring sunlight penetrates the ice layer and warms the dune below, causing the dry ice layer to begin to sublimate from the bottom. Gas is trapped and pressure builds until the ice cracks.

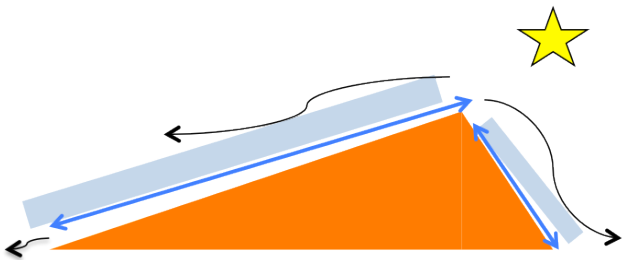
In the winter Mars' polar regions, including the northern dunes, are covered with a seasonal layer of frozen CO₂ (dry ice), condensed from Mars' CO₂ atmosphere.



Early in spring weak spots in the ice layer crack

Time-lapse data sets from HiRISE and CRISM on the Mars Reconnaissance Orbiter show that every spring a sequence of activity commences as the CO₂ ice sublimates (goes directly from ice to gas) back into the atmosphere.

Gas flows out the rupture in the dry ice, carrying along sand and dust from the dune and eroding shallow channels on the surface of the dune.



Polygonal cracks on shallow slopes, the dune crest, and the contact to the surface are weak spots in the seasonal dry ice layer.

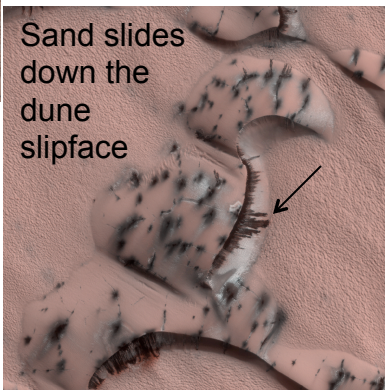
In this cartoon blue arrows show gas flow under the (light blue) dry ice layer. Black arrows represent sand propelled out from under the dry ice by the escaping gas.



Later in spring cracks allow sand to escape

This unearthly process repeats every spring and erodes martian dunes *in today's climate*

Three new papers in the journal Icarus by Candice Hansen, Ganna Portyankina, and Antoine Pommerol describe our latest understanding of this process



Sand slides down the dune slipface