Sandblasting winds shift Mars' landscape

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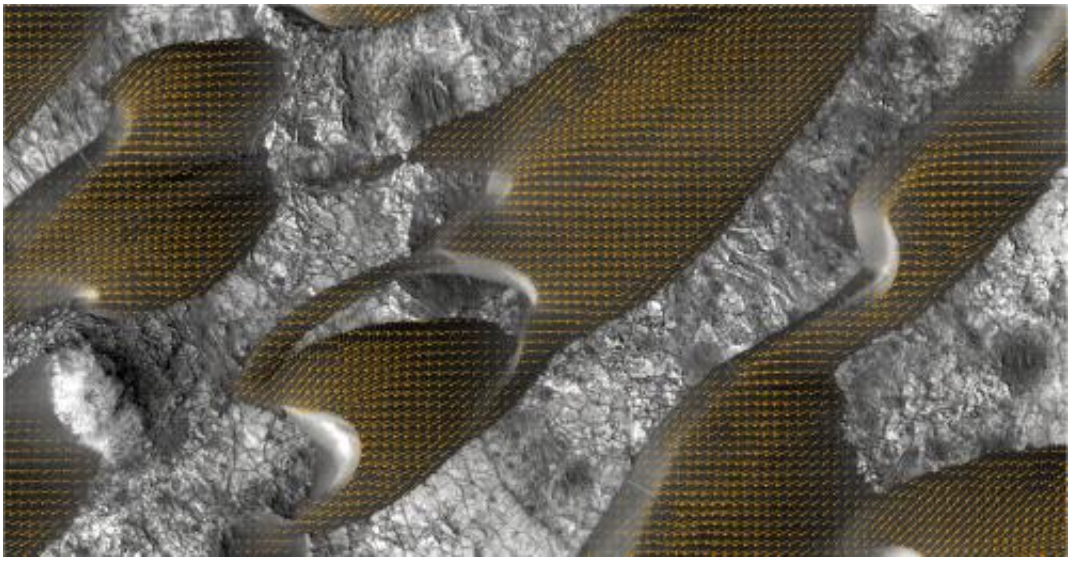

Migration orientation of sand ripples laying on top of Martian dunes in the Nili Patera area. Sand ripple migration is tracked from the comparison of satellite images of the dune field acquired at different time. Credit: Francois Ayoub, Caltech

High winds are a near-daily force on the surface of Mars, carving out a landscape of shifting dunes and posing a challenge to exploration, scientists said Tuesday.

Wind has long been known to be a factor in the Red Planet's topography and climate, creating dust storms that can be visible to astronomers on Earth.

But data about the strength, frequency and origin of winds has been sketchy, and many specialists had expected that gusts strong enough to move sand would be rare on a planet with such a thin atmosphere.

"We observed that martian sand dunes are currently migrating and that their migration speed varies with the season, which is at odds with the common view of a static martian landscape and very rare sand-moving winds," study co-author Francois Ayoub of the California Institute of Technology's planetary sciences division told AFP.

Ayoub and a joint US-British team of scientists measured the displacement of sand ripples on a dozen satellite images taken of a 40-square-kilometre (15-square-mile) area in the Nili Patera dune field over one Mars Year.

"From these measurements, we estimated the sand flux and its seasonal variability," said Ayoub. Next, they calculated the wind speed and strength required to move the sand, and the frequency.

"Winds on Mars can be strong and can reach hurricane speed (more than 120 kilometres per hour or 75 miles per hour)," Ayoub said.

"In our study area, sand-moving wind occurs almost daily" throughout much of the year, he added.

Understanding the characteristics of Mars' winds would allow scientists to make predictions about the rate of erosion of the landscape and about the martian climate, which is heavily influenced by dust in the atmosphere.

And the data may aid future rover missions from Earth.

"An accurate prediction of the wind and sand load is important to avoid

the rover to be 'sandblasted' without being prepared for it," explained Ayoub.

"The (NASA) rover Curiosity, which is about to cross an active dune field in Gale crater will most probably have to sustain sand blows. From a scientific point of view, these findings could indicate areas on Mars deserving more attention from observation orbiters for their peculiar wind/sand/erosion behaviours."

The findings have no direct implications for orbiters like the unmanned Mangalyaan scout which arrived off Mars last week after being launched by India 10 months earlier, said Ayoub.

The study was published in the journal *Nature Communications*.

More information: Threshold for sand mobility on Mars calibrated from seasonal variations of sand flux, *Nature Communications* 5, Article number: 5096, dx.doi.org/10.1038/ncomms6096