



## **Why do sand furrow distributions vary in the North Polar latitudes on Mars?**

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Sand dunes on Mars display geomorphic evidence of an active and dynamic sediment flux. Barchan dunes migrate, ripples move and the slipface morphology changes annually. Aeolian sediment transport is seasonally constrained and linked to cryogenic processes. Sand furrows are geomorphic features that are eroded into the surface of dunes. They form during sublimation of the seasonal carbon dioxide deposit which moves gas and sand through vents in the ice (cryo-venting) (Bourke, 2013). They are visible on the surface of dunes using the highest resolution images available for Mars.

Previous work has noted that the distribution of furrows varies spatially both on individual dunes and at different Polar locations. Here we report on the preliminary findings of a mapping project that seeks to confirm this previous qualitative observation. In addition, we aim to explain the observed spatial and temporal variation in sand furrows on North Polar dunes.

Ten polar sites that reflect a latitudinal range of 9.5° are being analysed. The HiRISE images were acquired between 16/2/2012 and 31/05/2012, over a period of 105 Earth days or 102 Sols. We have completed mapping of 1711 sand furrows in an 84 km<sup>2</sup> area of sand dunes, i.e. at four of the ten sites.

The data confirm that there is variability in the distribution of sand furrows in the Polar Region. While data from all ten sites will be required to fully test the assertion of a latitudinal control, it is worth noting that the two most northerly sites have a significantly higher density of furrows compared to the two lower latitude sites. As the seasonal ice thickness is known to increase pole-ward on Mars, our data suggest that effective furrow formation may be linked to ice deposit thickness. In particular, it suggests that a threshold in ice thickness must be crossed in order for effective cryo-venting to occur.

Bourke, M.C., 2013. Sand Furrows: A new surface feature on Martian dunes, EGU, EGU2013-11859, Vienna.