

An estimation of seasonal wind variation on Mars based on the shape of isolated sand dunes

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Aeolian dunes on Mars have larger topographic variation than that on the Earth. The shape of dunes generally reflects the wind condition and available sand volume on the field. The shapes of dunes, therefore, are available for a clue for estimating the wind condition around the dunes. We conducted a series of flume experiments on isolated sand dunes under bidirectional flow conditions, and proposed a new phase diagram of estimating the bidirectional wind condition from the shape of isolated sand dunes.

In this study, the seasonal wind variation on Mars was estimated based on the new diagram. For example, the gull-wing barchan dune in Proctor Crater in Noachis Terra indicated the bidirectional wind condition with 180-degree-angular variation, and the teardrop-shaped dunes in Wirtz Crater in Argyre basin showed the angular variation of 75 degrees. And then, we attempted to compare the estimation with the previous meteorological studies on the seasonal wind on Mars.

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