

Indirect interaction dynamics of a barchan dune and the application.

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Barchan dune appears in area of sparse sand and unidirectional wind flow. Barchan dunes tend to form chain pattern, the horn of one barchan pointing to the center of leeward barchan. The pattern has been observed in desert and Mars. However, it is difficult to investigate dune dynamics with field measurement because of large time scales such as several decades or more.

Therefore dune dynamics has been investigated using numerical simulations, for example dune morphology and pattern. Also recently, interaction between barchan dunes has been studied. However, their studies focused only on collision, not but inter-dune sand flow between barchan dunes, the sand releasing from the horns of a barchan dunes. We investigate how the inter-dune sand flow work (or not) on the dune dynamics. A simulation is performed by a simple model taking into account saltation and avalanche which eliminate complex turbulent wind profile. As an initial condition two barchans are situated, a smaller one is set behind larger one. The result indicates that the leeward barchan dune move towards the back of the horn of a windward one and form the chain pattern naturally. This lateral movement by sand indicates that we can manipulate movement of a barchan laterally by shifting the position of sand source. When there are structure such as roads and pipeline in the downwind of barchan dunes, shifting of the barchan dune is effectively way to protect their structure from danger of the barchan dune.