



## **Understanding early-stage dune development: morphodynamics of aeolian protodunes**

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For such a fundamental aspect of bedform development, the initiation and early-stage growth of sand dunes remain poorly understood. Protodunes are bedforms within the continuum of early-stage depositional aeolian features that exist between flat sand patches and small dunes. As transitory bedforms with the potential to develop into dunes, the detailed study of protodune morphodynamics can provide significant insights into nascent dune development. As part of a multi-annual study investigating bedform change through repeat morphological surveys of bedforms with differing maturity, measurements of near-surface airflow and sand transport were conducted over a protodune in a small Namibian barchan dune field. The protodune was approximately 85 m in length and 1 m high, and was without a slipface. Data show that over the course of a week, patterns of airflow and transport flux variation were linked with accretion at the crest, and erosion of the leeside edge showing an increase in protodune height, and providing evidence of the dune's vertical development. Surveys reveal the longer term evolution of the protodune, in the context of changes exhibited by nearby, fully developed barchan dunes, and long term monitoring of wind regime at the site.