



Seasonal Microscale Modelling of Namib Dune, Mars

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With the use of a high-resolution digital terrain model and Curiosity rover wind data, microscale airflow modelling was conducted for the Namib dune, Mars and surrounding area. At a horizontal resolution of one meter, microscale airflow modelling provides the necessary resolution to investigate how local topography affects complex, local wind patterns at the bedform scale, enabling the study of potential bedform response throughout the Mars year. A variety of seasonal wind directions and magnitudes were investigated for the Namib dune and seasonal constraints on grainfall and grainflow activity are presented, along with seasonal times throughout the year when ripple migration occurs on the stoss and lee slopes as well as around the dune. Based on satellite images, airflow patterns and surface shear stress, the most probable time of consistent slipface activity for the Namib dune is early Spring. The Autumn and Winter winds are also favourable to grainfall and slipface activity and overall southerly dune migration but very little movement was detected in satellite imagery during these seasons, indicating that some mechanism is hindering aeolian activity, such as seasonal frost deposition. Other times throughout the martian year, when winds change from northerly to southerly or westerly, are more favorable to ripple formation and migration, as well as reworking of the slipface and rounding of the dune brink. These alternative wind directions are also examined along with surface shear stress to determine the bedform response of the Namib dune for each seasonal shift in wind magnitude and direction.