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# Aeolian Slipface Processes on Earth and Mars

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The surface of Mars is dominated by aeolian features and many locations show ripple and dune migration over the past decade with some sediment fluxes comparable to terrestrial dunes. One of the leading goals in investigating aeolian processes on Mars is to explore the boundary conditions of sediment transport, accumulation, and dune mor-phology in relation to wind regime as well as to quantify migration rates and sediment flux. We combine terrestrial field observations, 3D computational fluid dynamics (CFD) modeling and remote sensing data to investigate com-plex, small scale wind patterns and grainflow processes on terrestrial and martian dunes. We aim to constrain grain flow magnitudes and frequencies that occur on slipface slopes of dunes in order to improve estimates of martian dune field migration and sediment flux related to wind velocity and flow patterns.

A series of ground-based, high resolution laser scans have been collected in the Maspalomas dune field in Gran Canaria, Spain to investigate grainflow frequency, morphology and slipface advancement. Analysis of these laser scans and simultaneous video recordings have revealed a variety of slipface activity. We identify 6 different grain-flow morphologies including, hourglass shape (classic alcove formation with deposit fan below), superficial flow (thin lenses), narrow trough (vertical lines cm in width), sheet, column (vertical alcove walls), and complex (combi-nation of morphologies triggered simultaneously in the same location). Hourglass grainflow morphologies were the most common and occurred regularly. The superficial and narrow trough morphologies were the second most com-mon and frequently occurred in between large grain flows. Sheet grainflows were rare and unpredictable. These flows involved large portions of the slipface (metres across) and mobilized a substantial amount of sediment in one event.
We have compared these grainflow morphologies from Maspalomas to those in martian dune fields and have identified some similarities. Hourglass, column, complex, and potentially sheet grainflows were identified on mar-tian slipfaces and tended to be larger than the grainflows in Maspalomas. We also observed that the style of slipface modification on Mars was highly dependent on latitude with the north polar regions having the highest frequency of hourglass-shaped grainflows. Mid-latitudinal dune fields contained few alcoves but typically displayed dark slope streaks on the lee slopes. Dune fields in the south polar region showed little evidence of recent slipface modification and were often covered in dust devil tracks.

We plan to further this study by generating 3D dune surfaces from both the Maspalomas laser scan data and high resolution satellite images to examine wind flow patterns and quantify change on the slipface. We will use CFD modelling to investigate the interaction with wind velocity, flow patterns and sediment transport. This technique will also provide a way to investigate potential triggers for processes on slipface slopes of dunes including, grainflows, formation of alcoves and advancement of the slipface.