Geophysical Research Abstracts
Vol. 19, EGU2017-19443, 2017
EGU General Assembly 2017

Avalanche dynamics on a barchan dune

Joanna Nield (1), Matthew Baddock (2), and Giles Wiggs (3)

(1) Geography and Environment, University of Southampton, Southampton, UK (J.Nield@soton.ac.uk), (2) Department of Geography, Loughborough University, Loughborough, UK (M.C.Baddock@lboro.ac.uk), (3) School of Geography and the Environment, University of Oxford, Oxford, UK (giles.wiggs@ouce.ox.ac.uk)

Avalanching (or grainflow) on the lee side of barchan dunes, is the main mechanism by which these aeolian bedforms migrate. However, we know very little about how the size, shape and location of these sediment deposits change under variable wind and grainfall conditions. Avalanches are initiated when sediment deposited close to the dune brink as a 'bulge', exceeds an angle of repose and is transported down the lee slope. The placement of the bulge depends on the distribution of grainfall on the lee slope, which in turn, is related to wind speed. Here we use terrestrial laser scanning (TLS) to measure avalanche dynamics on a 5 m high barchan dune under variable wind speeds, on the Skeleton Coast, Namibia. We find that as the wind speed and grainfall zone increase, avalanches are initiated further downslope. Under wind speeds above 6 m/s, we also observe secondary avalanches which are initiated partway down the lee slope. This increase in sand transport conditions produces wider, longer and thicker avalanche lobe deposits. It also erodes more sediment within the erosion scarp that propagates upslope from the point of avalanche initiation. Along with the increased avalanche size, stronger winds produce steeper slopes, greater avalanche initiation angles and an increase in avalanche frequency. This study provides a valuable dataset of avalanche morphodynamics which offers insight into the influence of wind speed and grainfall on barchan dune mobility.