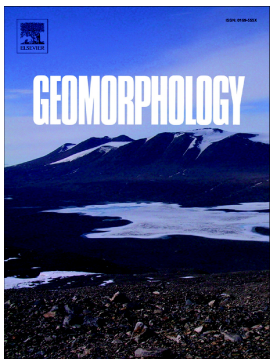

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PII: S0169-555X(17)30048-X
DOI: doi:10.1016/j.geomorph.2018.05.024
Reference: GEOMOR 6411

To appear in: *Geomorphology*

Received date: 11 January 2017
Revised date: 5 December 2017
Accepted date: 26 May 2018

Please cite this article as: Wenhai Sun, Ning Huang , A study on velocity of aeolian sand particles over leeward slope by particle image velocimetry. Geomor (2017), doi:10.1016/j.geomorph.2018.05.024

A Study on Velocity of Aeolian Sand Particles over Leeward Slope by Particle Image Velocimetry

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Abstract

Current studies on the movement of saltation sand grains in aeolian flow over a complex surface are not satisfactory. This is mainly because the landform conditions of most aeolian sand transport models are based on flat sand beds without considering the effect of complex surface and slope on the structure of aeolian sand flow. In this paper, we used particle image velocimetry (PIV) to measure the state of motion of aeolian sand particles over the leeward slope area, analyzed the characteristics of these sands particles with height H above the surface on the leeward slope, including the relationship of their mean speed to the slope height and the incoming wind speed, and the relationship of particle size with height. Finally, we proposed a formula to describe the linear relationship of the dust emission rate to the incoming wind speed on the bed surface in the leeward slope area. Our conclusions are of significance for the study of wind-driven sand flow in the leeward slope.

Keywords: Barchans, Leeward slope, grain velocity, grain size, PIV, wind tunnel.

1. Introduction

Since the 1980 Aarhus International Conference on Aeolian Physics was held, how to use the microscopic motion characteristics of single sand grain to analyze and explain large-scale aeolian sand flow characteristics has become the focus of research on near-surface aeolian sand grains (Wu et al., 2013). However, due to the random nature of a single grain in