Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Experimental and numerical study of turbulent flow associated with interacting barchan dunes GIANLUCA BLOIS, Univ of Illinois - Urbana, USA, WILLIAM ANDERSON[1], Baylor University, USA, ZHANQI TANG, JULIO BARROS[2], JAMES BEST, KENNETH CHRISTENSEN[3], Univ of Illinois - Urbana, USA — Barchan dunes are naturally occurring three-dimensional topographic features that have been observed on the surface of several planets. They occur both in aeolian and in subaqueous environments. Barchans typically form in fields having a broad distribution in dune size and migration rates. This results in variable bedform spacing and eventually dynamic bedform−bedform interactions that involve morphodynamic processes (e.g. collision, merging, splitting). These processes are controlled by complex feedback mechanisms mutually linking three key elements: fluid flow, sediment transport and bed morphology. The aim of this work is to contribute to the understanding of the fluid-flow mechanisms responsible for the formation, migration and interaction of these dunes. To this end, we study the three-dimensional flow generated by the interactions between fixed barchan-dune models arranged in tandem in collision and ejection scenarios via experiments in an optically-accessible flow environment using planar particle-image velocimetry (PIV) measurements of the flow field. These measurements are complemented by targeted large-eddy simulations (LES) meant to provide a three-dimensional view of the flow processes for these fixed dune arrangements.

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Date submitted: 01 Aug 2014 Electronic form version 1.4