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.

\(^1\)In transition to University of Texas at Dallas, USA  
\(^2\)In Transition to United States Naval Academy, USA  
\(^3\)In transition to University of Notre Dame

Gianluca Blois  
Univ of Illinois - Urbana

Date submitted: 01 Aug 2014  
Electronic form version 1.4