

Abstract Submitted
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Refractive index matched PIV measurements of flow around interacting barchan dunes. NATHANIEL BRISTOW, GIANLUCA BLOIS, TAEHOON KIM, University of Notre Dame, JAMES BEST, University of Illinois at Urbana-Champaign, KENNETH CHRISTENSEN, University of Notre Dame — Barchan dunes are crescent shaped bedforms found in both Aeolian and subaqueous environments, including deserts, river beds, continental shelves, and even the craters of Mars. The evolution of and dynamics associated with these mobile bedforms involve a strong degree of coupling between sediment transport, morphological change, and flow, the last of which represents the weakest link in our current understanding of barchan morphodynamics. Their three-dimensional geometry presents experimental challenges for measuring the full flow field, particularly around the horns and in the leeside of the dunes. In this study we present measurements of the turbulent flow surrounding fixed barchan dune models in various configurations using particle image velocimetry in a refractive index matching flume environment. The refractive index matching technique opens the door to making measurements in wall-parallel planes surrounding the models, as well as wall-normal plane measurements in the leeside region between the horns. While fixed bed experiments are unable to directly measure sediment transport, they allow us to focus solely on the flow physics and full resolution of the turbulent flow field in ways that are otherwise not possible in mobile bed experiments.

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