

Abstract Submitted  
for the DFD20 Meeting of  
The American Physical Society

**Motion of grains within a barchan dune**<sup>1</sup> CARLOS A. ALVAREZ, ERICK M. FRANKLIN, University of Campinas - UNICAMP — A one-directional fluid flow acting over a granular bed with a low sediment supply can produce crescent-shaped dunes. These bedforms, called barchans, are characterized by their tips pointing downstream and are frequently found in nature and industrial applications. Though they have been studied over decades, many aspects related to their dynamics are still under debate, so that a crucial aspect to understand these dunes is to obtain data at the grain scale. Numerical simulations can provide information of this type, which is difficult to measure through experiments. In this work, by employing the computational fluid dynamics - discrete element method, we present measurements at the grain scale of barchan dunes formed by the action of a water flow in turbulent regime over a granular pile with an initial conical shape. The simulations captured well the particle's trajectories, displaying remarkable agreement with experiments and allowing quantification of the local granular flux and the resultant force acting on each grain. Our numerical results shed light on the particle motion leading to barchan dunes and raise several questions, such as the possibility of applying this methodology to dunes consisting of non-spherical grains as occur in nature.

<sup>1</sup>Carlos A. Alvarez is grateful to SENESCYT (Grant No. 2013-AR2Q2850) and to CNPq (Grant No. 140773/2016-9). Erick M. Franklin is grateful to FAPESP (Grant No. 2018/14981-7) and to CNPq (Grant No. 400284/2016-2) for the financial support provided.

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Date submitted: 24 Jul 2020

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