

Velocity fields of bed load during a barchan-barchan interaction

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Crescent-shaped dunes, called barchans, are formed under one-directional fluid flow and limited amount of granular material. They are found in different environments, such as, deserts, rivers and oil pipelines. Barchans belong to dune fields and the interaction between them within a field can be responsible for regulating its entire dynamics of it. In a previous study, Assis and Franklin (2020) experimentally investigated the short-range interactions occurring between two subaqueous barchans and five different patterns were identified. The goal of the present study is to analyze the velocity fields over the dunes during a barchan-barchan interaction. In particular, we are investigating the exchange pattern during two stages of the interaction for both aligned and off-centered configurations. The experimental device is the same presented in Assis and Franklin (2020), and we used the PIVLab software, based on Thielicke and Stamhuis (2014), to treat the acquired images. As results, the velocity fields over the dune were computed (as shown in figure 1), showing accelerations and decelerations of the particles during the birth of new barchan.

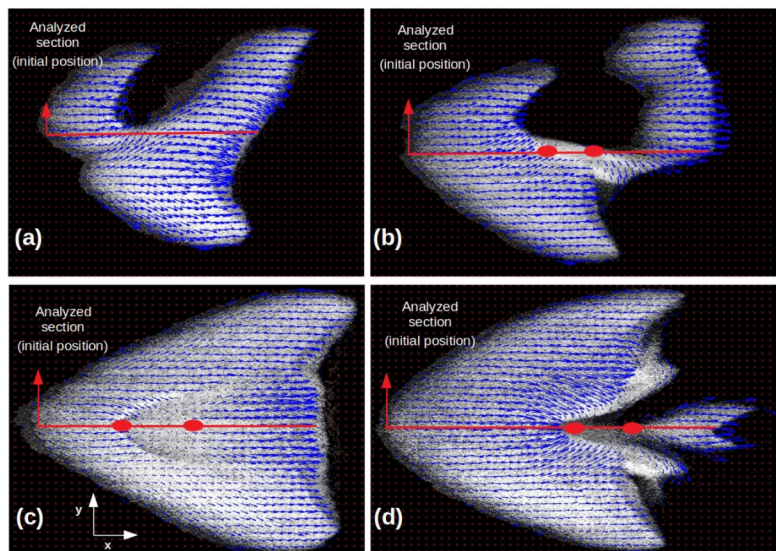


Figure 1: Figures 1(a), 1(c) and 1(b), 1(d) represent velocity fields during barchan-barchan interaction for the first (initial) and second (final) stages for off-centered and aligned position, respectively.

References

- W.R. Assis and E.M. Franklin. *A comprehensive picture for binary interactions of subaqueous barchans*. Geophysical Research Letters 47.18 (2020): e2020GL089464.
- W. Thielicke and E. Stamhuis. *PIVlab-towards user-friendly, affordable and accurate digital particle image velocimetry in MATLAB*. Journal of open research software 2.1 (2014).