

## ***INTERNSHIP PROPOSAL: How does a dune field adapt to a change in wind forcing and boundary conditions***

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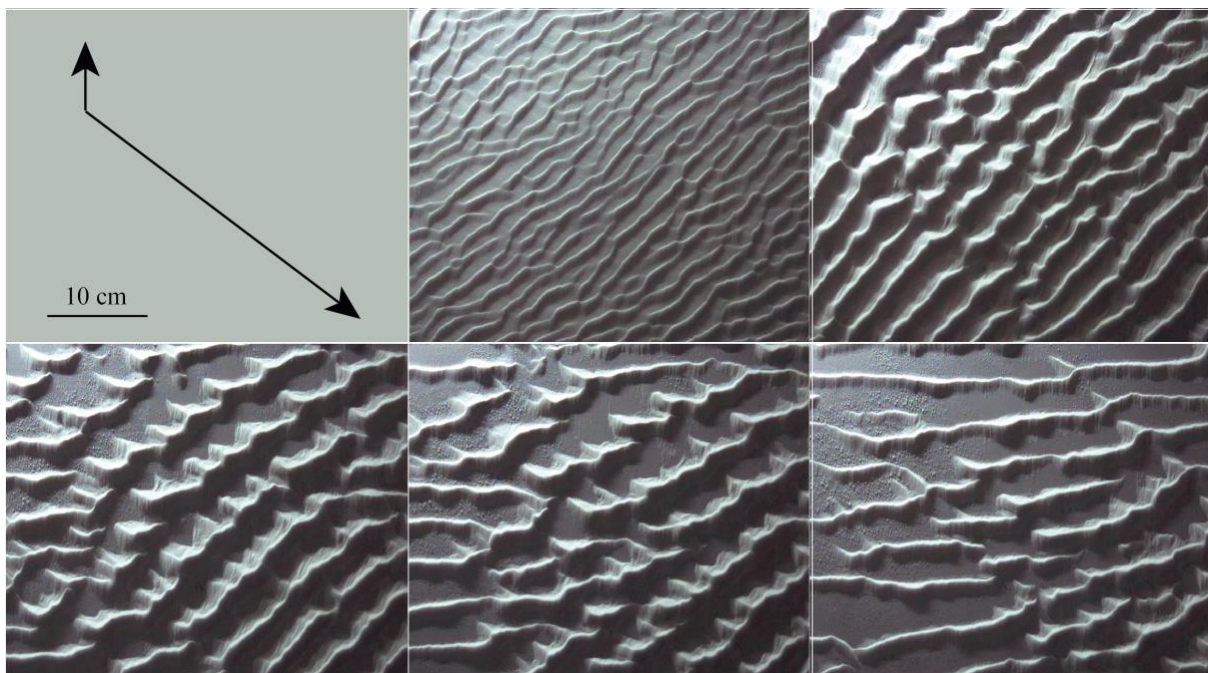
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Thesis possibility after internship: YES

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### ***How does a dune field adapt to a change in wind forcing and boundary conditions***

Wind-blown sand dunes are ubiquitous on Earth and other planetary bodies with an atmosphere (Mars, Titan) and play a significant role in the sediment and dust budgets. Many studies have investigated the shape of isolated dunes as a function of wind regime and sand supply, generally focusing on the equilibrium shape. However, dunes are not isolated within a field, they are numerous and interact. This interaction can lead to a self-organised pattern, even though individual dunes and the field are out of equilibrium. Here, we propose to experimentally study the field pattern, its stability and reorganisation dynamics when subjected to changes in wind forcing and/or of boundary conditions. Experiments will be carried out underwater (where the dunes are downscaled) in an already developed setup.



*Sand bed of limited thickness subjected to a periodic bidirectional flow. The field pattern responds to a change in sand availability. First panel shows the flow regime.*

#### **Selected bibliography:**

- Pattern analysis of dune-field parameters, R. C. Ewing, G. Kocurek, L. W. Lake, *Earth Surf. Process. Landforms* 31, 1176–1191, 2006
- Modelling controls on aeolian dune-field pattern evolution, E. Eastwood, J. Nield, A. Baas and G. Kocurek, *Sedimentology*, 58, 1391–1406, 2011
- *Two modes for dune orientation*, S. Courrech du Pont, C. Narteau, and X. Gao, *Geology*, 42(9):743–746, 2014.
- Formation and reorganization time scales of aeolian landscapes, A. Gunn, *Geology*, 51 (4), 351-355, 2023.
- Complementary classifications of aeolian dunes based on morphology, dynamics, and fluid mechanics, S. Courrech du Pont, D. Rubin, C. Narteau, M. Lapôtre, M. Day, P. Claudin, I. Livingstone, M. Telfer, J. Radebaugh, C. Gada, A. Gunn, P. Hesp, S. Carpy, C. Bristow, A. C.W. Baas, R. C. Ewing, G. F.S. Wiggs, *Earth-Science Reviews* 255, 2024