

Flume experiments on collision of two barchans

Noritaka Endo[1]; Keisuke Taniguchi[2]; Atsunari Katsuki[3]

[1] Earth and Space Sci., Osaka Univ.; [2] Earth and Space Sci., Osaka Univ; [3] Phys. sci., Osaka University & Cyber media center, Osaka University

Barchan is a crescentic-shaped sand dune formed not only on Earth but also on Mars, and it moves downwind pointing its horn-tips to the direction of migration. The migration speed of barchans is in inverse proportion to their size. An upstream small barchan necessarily overtakes a downstream large one if they exist on the same path. The purpose of this study is to observe, through flume experiments, the whole process of the interaction between two barchans that may take several decades in the field. Experiments were conducted using a recirculating water flume of 11 m long, 20 cm wide and 50 cm deep, which can generate steady unidirectional flows. The bottom of the flume was smooth and horizontal. Water depth and flow velocity were kept constant in all runs. The sand used was well-sorted and the mean diameter was 0.1 mm. Results showed three types of process: (1) merging of two barchans into one, (2) process apparently similar to solitary wave behaviour, and (3) split of a downstream larger barchan into two before an upstream smaller barchan touches the larger. The type of interactions depended on the initial difference in size between two barchans. When the difference was large, type (1) happened. In the case of small difference, type (3) occurred. Type (2) took place, as the difference was medium. Finding in the present study can be useful for understating time development of the size and space distribution of dunes, because the interaction of two barchans is an important elementary process of dune dynamics.