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Blowing in the wind: aeolian dunes in modulated gravity WILLEM VAN DE WATER, DANIEL SNOUCK, Physics Department, Eindhoven University of Technology, PO Box 513, 5600 MB, Eindhoven, the Netherlands — Barchan dunes can be found in the desert under steady wind conditions. They translate in the direction of the wind while their shape remains unchanged. These remarkable natural patterns are the result of the interaction between sand and wind where the wind deposits the sand in heaps, which, in turn, change the properties of the turbulent wind. These crescent-shaped dunes have a minimal length in the order of ten meters, which renders laboratory experiments almost impossible. Their length scale is set by the details of the sand-wind interaction. In nature, smaller dunes do not evolve into the typical barchan shape. Our experimental approach produces dramatically scaled down dunes. The idea is to modulate gravity by vertical oscillation of the sand bed. Our tiny dunes travel in the turbulent boundary layer of an open wind-tunnel. Particle image velocimetry on their surface reveals the flux of creeping sand, while measurement of sand grains flying through the air using a high speed camera quantifies the key mechanism that moves sand by wind: saltation. We will contrast our findings with several theories that predict the shape of dunes on earth and other planets of our solar system.

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