Scilight

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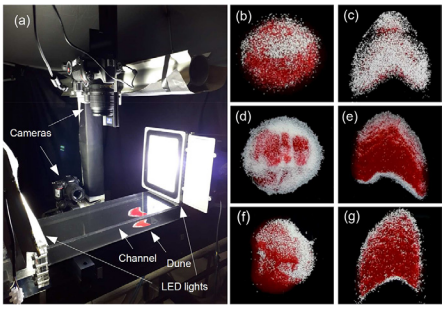
Barchan dune shapes almost always the same

Matthew Ishimaru

In crescent shaped dunes known as barchans, different grain properties lead to changes in particle distribution within dunes without affecting overall morphology.



Crescent dunes form in many kinds of granular beds, from deserts and riverbeds to dust on the surfaces of other planets. These dunes, known as barchans, are shaped by water or wind flowing over the surface of the bed. The dynamics shaping them are consistent across systems and depend mainly on the characteristics of underlying grains and fluid flow.

Alvarez et al. studied the growth of barchans in underwater beds with two different types of grains. They found using different grains changes the distribution of particles within the barchan without affecting the overall shape of the dune.

While the dynamics of barchan growth are well studied in beds of uniform particles, natural barchans are usually composed of mixtures of different grains.

“We questioned whether a dispersed bed would give rise to different kinds of barchans. So, we mixed different kinds of particles,” author Erick Franklin said. “We found that the morphology is almost always the same. We finished with the crescent shape, but we had different patterns concerning the distribution of grains within the dunes.”

They found surprising patterns on the surface of the dunes.

“We had a transient stripe, transverse to the flow direction, which appeared and migrated toward the leading edge of the dune, then disappeared,” Franklin said.

The experimental setup consisted of a 5-meter-long rectangular channel filled with water. As water was pumped through the channel, turbulent flow shaped mounds of grains into barchans.

The group hopes their research might help interpret the structure of dunes found on Earth and illuminate the history of ancient barchans near the Martian north pole.

Source: “Growth of barchan dunes of bidispersed granular mixtures,” by Carlos A. Alvarez, Fernando David Cúñez, and Erick M. Franklin, and Filippo Cardano, *Physics of Fluids* (2021). The article can be accessed at https://doi.org/10.1063/5.0048696.