

Aeolian Landscapes

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More Details

Winds transport more mass than all rivers on earth and transfer more sand and soil than the currents in the oceans. Presumably, a quarter of our planet's landscapes have been shaped by winds. To what extent and in which way a landscape is transformed depends on many factors: the wind direction, its speed and how steadily it blows, but also ground conditions, whether soil or sand, hard or soft rock, whether dry or moist, whether overgrown with plants or not. In the desert, winds have an easy job of transforming the desert sand into a wide variety of structures (Fig. 1 and 2).

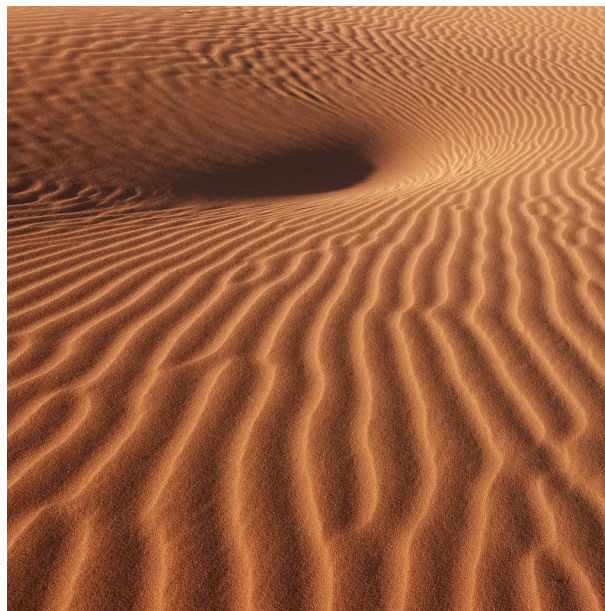


Fig. 1: The most common dune shape: transverse dunes, elongated ripples that run across the direction of the wind.



Fig. 2: Bizarre mushroom rocks arise when the wind hits isolated rocks in the sand: heavier and larger grains of sand tend to move closer to the ground and therefore grind the rock more heavily towards the bottom.

Dune, dune you must migrate...

The crescent-shaped barchans (Fig. 3) are among the most beautiful but also the most dangerous dunes.



Fig. 3: A crescent-shaped barchan.

Due to the steady wind from one side, the sand is blown up on the flat side and trickles down on the other side (Fig. 4): the shifting dunes push themselves further bit by bit and bury everything on their way until it is revealed again years or decades later – this is how the ancient Egyptians used to hide things! The dunes can migrate up to 20 meters per year and the sand piles reach heights of up to 100 meters.

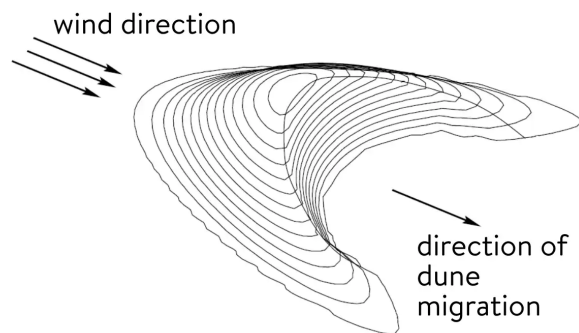


Fig. 4: Barchans migrate by sand steadily being blown up by the wind on the flat side and trickling down on the other side.

Scientists have observed and measured dunes and found out a lot about their formation, shapes, and migration speeds. But only since 2002, when researchers from Stuttgart developed a computer model, have we been able to calculate and thus predict the properties of a dune. A lot is still unclear: why does a large dune for example behave differently from a small one?

Singing dunes

Singing sand dunes are a very special phenomenon: when sand slides down the side of the dune, causing a sand avalanche, a deep hum can arise, which is reminiscent of thunder, foghorns, or low-flying propeller planes. Even the great Orient traveler Marco Polo reported in the 13th century from the Gobi Desert of evil desert spirits who “at times fill the air with the sounds of musical instruments, and also of drums and the

clash of arms”. But not all dunes are musical: a French research group found that only a thin coating of the sand grains made of iron, silicon and manganese can make dunes sing.