Encyclopedia of Planetary Landforms
DOI 10.1007/978-1-4614-9213-9_302-1

Rectilinear Dune

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Definition

Straight to curvilinear longitudinal dune formed downwind of domes or barchans (Schatz et al. 2006).
A type of ► linear dune.

Description

Linear dunes showing sharp crest intermingling with barchan dunes (Tsoar 2008).

Formation

Adjacent barchans indicate unidirectional wind regime. Their sharp crest suggests that their formation is related to terrestrial seif dunes and not linear dunes whose crest is rounded. However, terrestrial seif dunes are sinuous whereas Martian's are rectilinear. Differences may stem from the induration of Martian dunes (Herrmann et al. 2008) either by geochemical processes or by ice. Indurated Martian barchans may function as obstacle dunes. Consequently, sand transported from upwind direction will be accumulated on the lee side as a short, linear, sharp-crested lee dune. This initial dune stabilizes in time but continues to lengthen parallel to the wind. As induration crust is removed, it disintegrates into a ► dune convoy (Tsoar 2008). Numerical simulations of dune morphodynamics showed that if the sand of a barchan dune is indurated, then the barchan transforms into a dome-shaped dune due to deposition at the dune lee (Schatz et al. 2006). However, such simulations could not reproduce the shape of rectilinear dunes resulting from accumulation downwind of obstacle dunes. Three-dimensional flow patterns around the obstacle dunes (Tsoar 2001), not included in these numerical simulations (Schatz et al. 2006), might be necessary ingredient in future modeling in order to reproduce the shape of rectilinear dunes due to sand induration.

Studied Location

Chasma Boreale, Mars (Fig. 1)

Terrestrial Analog

Martian rectilinear dunes have been compared to terrestrial seif and lee dunes, and not linear ridges.

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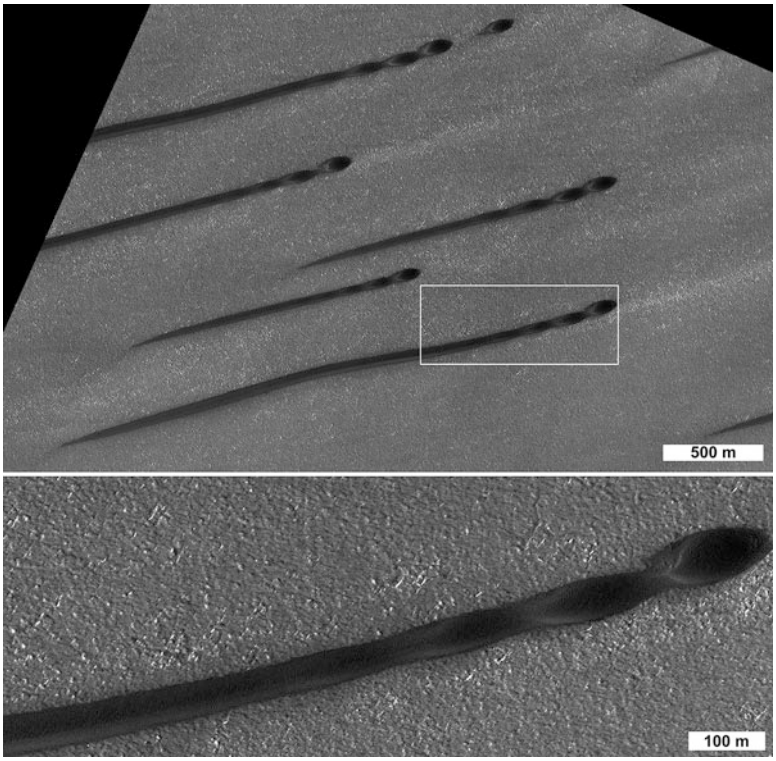

Fig. 1 Rippled rectilinear dunes formed downwind of domical wedge dunes, in Chasma Boreale, near 83.9°N, 321.9°E. Sand transport has been from the *upper right* toward the *lower left* (Schatz et al. 2006), HiRISE ESP_017818_2640. (NASA/JPL/UA)

See Also

- Barchan
- Drop Dune
- Dune Convoy
- Lee Dune
- Obstacle Dune
- Ridge in Current Shadow
- Seif
- Wedge Dune

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DOI 10.1007/978-1-4614-9213-9_302-1

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