Sedimentary Structures in Dunes of the Namib Desert, South West Africa

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Abstract

The sand sea that composes a large part of the Namib Desert in South West Africa covers approximately 34,000 km^2 and extends from the Great Escarpment on the east to the Atlantic Ocean on the west, south of the Kuiseb River. This sand sea, or erg, contains most of the principal dune types that have been recognized throughout the world, many of them of great height and separated by broad, flat interdunes. The dominant type and by far the most common form is the linear (seif, longitudinal) dune that extends as a series of long, nearly parallel ridges with north-south orientation across the length of the dune field.

Studies of dune structure were made largely by trenching the various dune types to expose sections of cross-strata in selected parts. The trenches showed that those dunes attributed to unidirectional winds—barchan, barchanoid ridge, and transverse—with low-angle foresets on the windward sides and high angles on the lee sides, are mostly located along a narrow belt on the Atlantic Coast.

The large interior dunes of linear type showed high-angle dips on both sides of the ridges and are believed to result from alternating two-directional winds. Because the genesis of these dunes has long been controversial, a review is given of the other principal hypotheses—deflation, helical roll, modification of simple dune forms, and outcrop-controlled lee-side accumulation—and evidence is presented for and against each.

The most complex of dune types, in which arms radiate from a central point, is referred to as a star dune and is fairly numerous in various parts of the sand sea, especially near the vleis and along the northern dune margin. Such dunes are considered, both on the basis of data from trenching and from records of measured winds, to be the product of wind from three or more directions. Star dunes form along the ridges of linear dunes and also as isolated mounds on the desert floor, and they attain considerable heights.

Minor dune types that are described and briefly discussed are those controlled by vegetation and referred to as coppice dunes. Also the small types known as dome dunes and blowouts, both of which were structurally analyzed, are discussed.