SAND SEAS



Erg Chebbi in eastern Morocco with Algerian peaks in background. @ C.Michael Hogan

Sand seas, also called **ergs** after the Arabic name for dune fields, are regional accumulations of windblown sand that contain numerous, very large **dunes** of **compound** or **complex** form. Individual dunes in sand seas typically have widths, lengths, or both dimensions greater than 500 m. Both the regional extent of their sand cover and the complexity and great size of their dunes distinguish sand seas from dune fields. The latter features are of local extent and contain dunes that are smaller and simpler in form. The term sand sea is applied only to areas where sand covers more than 20 percent of the surface. In both sand seas and dune fields, ridges or mounds of sand are repeated in rows that give the surface a wavy appearance.

Dune fields occur even at high latitudes and in any locality where loose sand can be blown by wind, but sand seas are concentrated in two broad belts between 20° to 40° N and 20° to 40° S latitudes, which include regions crossed by the dry, subsiding air of the trade winds. Active sand seas are limited to regions that receive, on the average, no more than 150 mm of annual precipitation. The largest sand seas are in northern and southern Africa, central and western Asia, and central Australia. In South America, they are areally limited by the Andes Mountains, but they contain extremely large dunes in coastal Peru and northwestern Argentina. The only active sand sea in North America is in the Gran Desierto of northern Sonora, Mexico, which extends northward into the Yuma Desert of Arizona and the Algodones Dunes of southeastern California.

A sand sea that has been fixed by vegetation forms the Nebraska Sand Hills. Dune fields occur in the southwestern U.S. in intermontane basins such as Kelso and Death Valley, California. Sand seas and dune fields generally occur in regions downwind of copious sources of dry, loose sand, such as dry riverbeds and deltas, floodplains, glacial outwash plains, dry lakes, and beaches. Almost all major ergs are located downwind from abandoned river courses in areas that are too dry to support extensive vegetative cover and are thus subject to long-continued wind erosion. Sand from these abundant sources migrates downwind and builds up into very large dunes where its transport is halted or slowed by topographic barriers to windflow or by convergence of windflow. Entire ergs and dune fields tend to migrate downwind as far as hundreds of kilometers from their sources of sand. Such accumulation requires long periods of time. Wilson [1] estimated that at least 1 million years are required to build ergs with very large dunes, such as those on the Arabian Peninsula, in North Africa, and in central Asia. Sand seas that have accumulated in subsiding structural and topographic basins, such as the Murzuk Sand Sea of Libya, may attain great thicknesses (more than 1000 m according to Glennie[2]) but others, such as the ergs of linear dunes in the Simpson and Great Sandy Deserts of Australia, may be no thicker than the individual dunes superposed on the alluvial plain. Within sand seas or dune fields in a given area, the dunes tend to be of a single type. For example, there are ergs or fields of **linear dunes**, of **crescentic dunes**, of **star dunes**, and of **parabolic dunes**, and these dune arrays tend to have consistent orientations and sizes (Breed and Grow[3]; Breed, et al. [4]).

Origin

Variations in dune shape and size occur mostly along the margins of ergs or dune fields and near topographic barriers within them, such as mountains, hills, and river valleys. This overall consistency of shape and size reflects a long-term constancy of wind direction and intensity when the basic dune types were being built. New dunes now being built in many sand seas are much smaller than older ones in the same sea, and some are of a different type, indicating changes in the conditions for dune building since the basic pattern of larger and older dunes was established. Differences in dune shapes and sizes around erg margins or near topographic barriers reflect local variations in the regional wind directions and intensities.

Significance

Trafficability in ergs and dune fields depends on the type of dunes and their associated interdune areas. Interdune areas may consist of firm corridors between adjacent dune ridges, of open plains, or of enclosed basins between dune mounds (see Summarys for Dunes -

Linear/Seif, Crescentic, Star, and Parabolic, and for Interdune Areas).

Foreign Names and Synonyms

(common names are in bold) **Nafud**, nefud, medanos, alab, **akle, draa**, mer de sable, sandveld, qoz (fixed erg), sahra.

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