

**Blount, H. G., II. 1988. Regional aeolian dynamics from remote sensing: Origin of the Gran Desierto, Sonora, Mexico. Ph.D. dissertation. Arizona State University. Phoenix, Arizona. 259 pp.**

A geologic history for a large Quaternary sand sea, the Gran Desierto of Sonora, Mexico, has been proposed. Field investigations have been coupled with laboratory analysis of sand samples and computer modeling of regional spectral variations to describe the origin of the sand sea and delineate the distribution of windblown sediments within it since the late Pleistocene. The volume of sand in the study area has been calculated as not less than  $59 \text{ km}^3$ . Evidence is presented that the Pleistocene Colorado River flowed through the study area  $\geq 120,000$  years before present. A majority of the sediments in the sand sea were delivered by fluvial processes prior to a proposed westward migration of the Colorado River delta. This migration occurred concomitant with strike-slip faulting and rifting associated with the opening of the Salton Trough and the Gulf of California. Marine sands from the adjacent Gulf have contributed an estimated  $7 \text{ km}^3$  to the sand sea but local sources have been shown to be minimal contributors. A linear mixing algorithm has been applied to Landsat thematic mapper data to deconvolve the composite spectra of individual ground points and to predict the fractional percentage of each geologic end-member contributing to the composition of a given sand. Predicted fractions have been correlated with point-count data on 188 sand samples and found to be accurate within 7% for high-albedo materials and within 24% for low-albedo materials. Synthetic fraction-images have been generated and utilized to identify small-scale superposed aeolian bedforms and to delineate sand populations of different ages. The oldest sands are associated with the ancestral Colorado River, sands of intermediate age have been transported into the area by overland saltation in active sand corridors and the youngest sands have been supplied by marine sources. Mixed sand samples containing juvenile grains show a strong correlation between grain-size and mineralogy with locally-derived grains concentrated in the coarser size-fractions.