

DIMENSIONAL GRAIN ORIENTATION STUDIES
OF RECENT COASTAL SANDS (1)

Joseph R. Curray

Abstract by
Thomas J. Wintermute

Sand-grain orientation studies were made on 110 undisturbed samples taken from Recent coastal sands along the Gulf Coast, California and North Carolina. This study was undertaken to determine if individual sand grains exhibited a preferred orientation with respect to the directions of movement of the agents of deposition (water and wind). The results of the study indicate that sand grains tend to have their long dimensions or axes oriented parallel with the prevailing direction of movement of the water or wind currents. Sand grains from oriented samples of beach sands align their long axes parallel to both the incoming and out-going (back wash) movements of water on the beach, and approximately perpendicular to the beach trend, although some deviation may result from the influence of long shore currents. Wind deposited sand grains also show a preferred orientation in that their long axes becomes aligned with the prevailing direction of wind.

Nearly 2500 grains were measured from several wind deposited samples taken on Mustang and Padre Island on the South Texas Gulf Coast. Samples from Mustang Island east of Corpus Christi Bay indicated a long axis grain orientation average direction of S 58° E, prevailing winds coming from S 29° E. On Padre Island immediately east of Baffin Bay and about 40 miles south southeast of Corpus Christi samples indicated a grain orientation of S 36° E. where prevailing winds come from S 31° E. Samples were collected from the dry, back parts of the beaches and from the dunes behind the beaches.

Possible applications of grain orientation resulting from this study are:

1. Grain orientation should allow prediction of the direction of transport and hence implicate the direction of the source area.
2. When the origin of the environment of a shoestring sand is known along with the preferred grain orientation the trend or long axis of the sand body may be predicted. Preferred grain orientation in strand line type stratigraphic traps should be aligned perpendicular to the producing trend. Grain orientation in channel sand type of stratigraphic traps should be aligned in a direction parallel to the producing trend.
3. An apparent correlation between preferred grain orientation and other mass properties of sediments indicates that grain orientation is related to the electric, magnetic, sound velocity and directional permeability properties of sands.

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