WEINER, STEPHEN PAUL, Exxon Co., U.S.A., Houston, TX

Deposition and Stratification of Oblique Dunes, South Padre Island, Texas

Oblique dunes have orientations that are intermediate between those of transverse and longitudinal dunes. The oblique dunes studied are reversing dunes which undergo no net annual migration when associated with normal meteorologic patterns. From April through September, the dunes migrate northwestward under the influence of prevailing onshore winds. High-velocity northerly winds associated with the passage of winter frontal systems (November through February), cause the dunes to rapidly migrate southward, despite accompanying rainfall. In October and March, frequent changes in wind direction cause many of the dunes to become flattened.

Hurricane Allen struck South Padre Island in August 1980. Examination of trenches, profiles, and aerial photographs suggested that this catastrophic event caused only minor modification of the dune morphology and stratigraphic make-up.

Three major stratification types were observed in trenches and on etched surfaces: (1) translational strata were deposited by wind ripples; (2) grainfall deposits accumulated when saltating grains settled on leeward slopes of the dunes; and (3) grainflow cross-strata were developed by avalanching on leeward slopes. Preservation of these stratification types occurred in zones of net deposition, predominantly leeward of the dune crests.

Strata deposited during the summer wind regime dip northwest, whereas the winter strata dip in a southerly direction. The winter deposits are best preserved in the central cores of the dunes. This indicates that either the high-velocity winds of the initial winter frontal systems destroy large volumes of the summer deposits, or that there is a net migration southward during the dry northerly winds of droughts.

Oblique dune deposits should be difficult to discern in the rock record, because they may contain aspects of both transverse and longitudinal dunes. It is likely that some of the eolian stratification packages observed here are also present in ancient dunes.

WIGLEY, CYNTHIA R., Rice Univ., Houston, TX

Comparison of Radiolarian Thanatocoenosis and Biocoenosis from Oligotrophic Gulf of Mexico and Caribbean, and Eutrophic Southern California Sea

Radiolarian assemblages in Holocene sediments from the Gulf of Mexico and Caribbean, and the Southern California borderland reflect overlying oceanographic conditions, such as general productivity, upwelling, and preservational parameters. A reconnaissance investigation of the lateral variations in the radiolarian assemblage with increasing water depth indicates that the changes are not consistent enough in either region for the establishment of a definite depth zonation; however, many radiolarian species and higher taxa show some general trends with depth.

Symbiotic taxa, and spumellaria in general, are more abundant in the thanatocoenosis of the Gulf of Mexico region than off California and are indicative of oligotrophic conditions. Low oxygen content and high dissolved silica concentration in the bottom water of the Orca basin in the Gulf of Mexico contributed to good specimen preservation in this locality. Diversity, to the family level, is greater in the California assemblages owing to a mixing of radiolarian faunas and better preservation. Deep-water radiolarian taxa are more abundant in the California assemblages than in the Gulf populations, owing to more dynamic upwelling conditions which enhance the species both in the biocoenosis and thanatocoenosis.

WINKER, CHARLES D., Univ. Texas at Austin, Austin, TX (now with Univ. Arizona, Tucson, AZ)

Cenozoic Shelf Margins, Northwestern Gulf of Mexico

Syndepositional gravity tectonics in the northwestern Gulf of Mexico basin have obscured the geometry of Tertiary shelf-slope stratification and thereby inhibited the recognition of relict shelf edges. However, examination of the modern shelf margin, formed primarily by deltaic deposition during the late Pleistocene lowstand of sea level, can lead to alternative criteria for recognizing Tertiary shelf margins. Late Pleistocene shelf-margin deltas, in contrast to inner-shelf deltas, are characterized by rapid subsidence and growth faulting, thick progradational cycles, and steep clinoform stratification. High subsidence rates result from deep-seated gravity sliding of the continental slope, which creates a strongly extensional regime along the shelf margin. Many downdip Tertiary formations are similarly characterized by large growth faults with high expansion ratios in deltaic sequences; hydraulic isolation of shallow-water sandstones by large fault offsets leads to overpressuring. These structurally-complex downdip trends, typically with geopressured gas reservoirs, represent the shelf-margin megafacies.

Mapping of these shelf-margin trends provides a concise summary of the Cenozoic depositional and structural history of the basin. Major influxes of sand to the shelf margin correspond to episodes of rapid progradation and are interpreted as large shelf-margin deltas. Pre-Pleistocene shelf-margin deltas do not appear to be synchronous across the basin, and therefore are probably a function of sediment supply rather than sea-level fluctuations. The three largest such Tertiary delta complexes can be correlated with major tectonic episodes in likely source areas in western North America: (1) the late Paleocene (lower Wilcox) Rockdale delta system in east Texas coincides with the major pulse of Laramide uplift in the southern Rockies; (2) the mid-Oligocene (Frio) Norias delta system in south Texas coincides with extensive ash-flow volcanism in the Sierra Madre Oriental; and (3) the Neogene ancestral Mississippi delta system in Louisiana coincides with reactivation of the southern Rockies and regional uplift.