

# SOURCES AND DISTRIBUTION OF SILT, SOUTH TEXAS SHELF

Jim Mazzullo(\*) and Jeffrey Crisp

## ABSTRACT

Fourier grain shape and mineralogical analyses were conducted on the coarse silt fraction of the surficial sediments on the South Texas continental shelf in order to determine the sources of the silt and the distribution of silt from different sources on the shelf. The distribution patterns were then evaluated in light of the late Pleistocene paleogeography of the shelf and modern hydrodynamic conditions prevailing on the shelf to determine whether the coarse silt fraction was relict, palimpsest, or modern in origin.

Two coarse silt-grain shape types are present in varying proportions in the samples from the South Texas shelf. One shape type is associated with quartzose coarse silt and is considered to represent multicyclic coarse silt-sized detritus derived from the Texas coastal plain and High Plains. The second shape type is associated with more feldspathic coarse silt and is considered to represent first-cycle coarse silt-sized detritus derived from igneous and metamorphic rocks of Texas, New Mexico and Mexico.

Each of the major river systems that has supplied sediment to the South Texas shelf during the late Pleistocene and Holocene is characterized by distinctive proportions of first- and multicyclic coarse silt. The Brazos-Colorado and Rio Grande river systems, which drain igneous, sedimentary and metamorphic rock terranes, deposited sediment on the shelf during the late Pleistocene low sea level stand that was enriched in first-cycle coarse silt. The Guadalupe and the Copano-Nueces-Baffin coastal plain river systems, which drain sedimentary rock terranes only, deposited sediment on the shelf during the late Pleistocene that was enriched in multicyclic coarse silt.

In the southern part of the outer South Texas shelf, the distribution patterns of first-cycle and multicyclic coarse silt define the late Pleistocene alluvial plains of the Rio Grande and the South Texas coastal plain rivers. The locations of the alluvial valleys as defined by grain shape analysis coincide precisely with the locations of these valleys as defined by shallow seismic studies; therefore, the coarse silt in this area are considered to be relict in origin, unmodified by the weak (0-10 cm/sec) semipermanent bottom currents that prevail in the southern part of the outer South Texas shelf. The preservation of paleogeographic features in the surficial sediments of this area of the shelf indicates that no modern coarse silt, which might bury this relict surface, has been deposited in this area during modern times.

In the northern part of the South Texas outer shelf, first-cycle coarse silt originally deposited on the ancestral Brazos-Colorado delta is found not only in the delta area, but also overlying most of the alluvial valley of the Guadalupe system that lies to the west of the delta; therefore, the coarse silt on the northern outer shelf in the vicinity of the Brazos-Colorado delta and the ancestral Guadalupe valley is palimpsest in origin and apparently is being reworked by the strong semi-permanent bottom currents that prevail in this region.

In the southern part of the South Texas inner shelf, the patterns of distribution of first-cycle and multicyclic coarse silt indicate that the inner shelf coarse silt is also relict in origin. The apparent absence of modern coarse silt on this part of the inner shelf is thought to reflect the paucity of this size fraction in the major sediment sources of the southern inner shelf; the Rio Grande and Padre Island. In the northern part of the South Texas inner shelf, the evidence indicates that the inner shelf coarse silt is a mixture of palimpsest silt reworked from the late Pleistocene substrate and modern silt provided by the Colorado River.

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\*Department of Geology, Texas A&M University, College Station, Texas 77843.