SOUTH TEXAS EOLIAN SYSTEM - A MODEL OF COASTAL EOLIAN PROCESSES

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ABSTRACT

Few oil and gas reservoirs have been interpreted as sands deposited within eolian depositional systems. Eolian facies may, however, be more common in ancient basins than heretofore recognized. Continued documentation of Holocene eolian systems, such as the South Texas system, provides a model for reevaluating the genesis of many unfossiliferous, well-sorted blanket sand bodies, many of which are associated with ancient, paralic depositional systems.

Pleistocene paralic depositional systems along the South Texas coast dictate the nature and distribution of facies patterns, environments and processes exhibited by the overlying Holocene South Texas eolian system. A dominant southeast wind, high summer temperatures, and high rainfall deficiency combine with an abundant supply of Pleistocene sand to provide the proper framework within which extensive eolian deflation and dune migration can occur.

Eolian lobes are supplied with sand from Pleistocene barrier-strandplain facies and fluvial meanderbelt deposits. Loess sheets are derived from distant lobes, as well as from deflation of local Pleistocene deltaic and fluvial facies. Deflation of thick Pleistocene fluvial-deltaic sand facies is commonly stabilized when erosion reaches the shallow groundwater table. Maximum deflation occurs on the upwind, coastward margin of the system, especially where only thin Pleistocene paralic sands are available to supply dune trains; mud deflated by strong offshore winds is moved into clay dune complexes and eventually carried downwind to develop loess sheets. This extensive upwind deflation of the system is accompanied by windward accreting claysand ridges with nuclei composed of either beach-ridge remnants of a Pleistocene barrier-strandplain system or remnants of inter-blowout areas developed during early phases of the deflation of the coastward margin of the system.

Principal source of sand and loess is, therefore, local, representing reworking of underlying, older sands. A sand source resulting from longshore convergence and inland transport from Padre Island accounts for only the minor, local in-filling of Laguna Madre in the land-cut area, and is not the principal source of eolian sand throughout the system. Facies fabric within Pleistocene depositional systems provides principal control of environments, sedimentary processes, and resulting facies within the subsequent eolian system.

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