LATE PLEISTOCENE FLUVIAL-DELTAIC DEPOSITION, TEXAS COASTAL PLAIN AND SHELF

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ABSTRACT

In order to develop a regional depositional model for the Texas Pleistocene, deposits of the Sangamon-Wisconsin glacio-eustatic cycle were interpreted from topography, bathymetry, soils, engineering-test borings, drillers logs, offshore sparker profiles, and by shallow drilling in Brazoria County. The stratigraphic unit corresponding to that cycle is bounded above by a topographic surface (Beaumont Terrace) on the coastal plain, and by a strong seismic reflector offshore. It is bounded below by a marker bed of stiff gray clay, interpreted as a paleosol, and by another seismic reflector, which is offlapped by progradational clinoforms.

The lower coastal plain is essentially a mud-rich alluvial plain, made up of coalescing low-gradient fans. An older alluvial plain (Lissie Formation) has been tilted and overlapped by a younger one (Beaumont Formation). Each major river enters the lower coastal plain through a gap in the Willis-Goliad cuesta, and has deposited a fan-shaped surface below the gap. By repeated avulsions, each river formed a branching, distributary network of paleochannels and meanderbelt sand bodies.

Detailed drilling of one such meanderbelt of the ancestral Brazos River showed that the paleochannel was 5-7 m deep. However, substantially greater thicknesses of sand accumulated, presumably as stacked point-bar sequences resulting from abandonment and reoccupation of the same trend during fluvial aggradation. Crevasse-splay sand is rare or absent, and fluvial sand bodies can terminate laterally against overbank clay without interfingering. Clay of the Brazos and Colorado alluvial plains is predominantly brick red (2.5 YR 5/4), probably derived from Permian and Triassic redbeds in west Texas.

Transition downdip into deltaic and paralic deposits is marked by brackish-water and marine fauna, by strike-oriented sand bodies, by changes in clay color, and by clinoform reflectors on sparker profiles. Strike sands (Ingleside Formation) were deposited as barrier islands and strandplains contemporaneous with Beaumont fluvial aggradation. Sand thicknesses up to 25 m developed by stacking of barrier sequences. Behind the barriers were a series of low-salinity bays, indicated by a *Crassostrea-Rangia* faunal assemblage. Ingleside strike sands are characterized by a mixture of open-marine and bay fauna.

In response to the decline of sea level caused by the onset of Wisconsin glaciation, deltas prograded from near the present shoreline out to the shelf edge. Deltaic thicknesses increased from less than 30 m at the present shoreline to as much as 150 m at the shelf break. Near the shelf edge, individual deltaic sequences were stacked or imbricated. The thickest and most extensive deltaic sequences were deposited by the Brazos and Colorado Rivers and Rio Grande. Between the lobes of the Colorado and Rio Grande deltas, patch reefs grew along the shelf edge late in the episode of lowered sea level.

Fluctuations of sea level resulted in three phases of deposition: an *aggradational phase* (*ca* 120,000 B.P.) during late rise and stillstand, dominated by fluvial and barrier systems; a *progradational phase* (120,000 to 20,000 B.P.) during the slow and erratic fall of sea level, dominated by deltaic systems; and a *transgressive phase* (20,000 to 4000 B.P.). During the rapid transgressive phase, interdeltaic low areas were partially filled and shelf-edge reefs were partially or completely buried, while the large delta lobes became areas of nondeposition or reworking of sediment. The Texas coast is now in an early aggradational phase.

Late Pleistocene sedimentary volumes and deltaic depocenters were controlled largely by the area and climate of the drainage basins feeding the Gulf coast. Volumetric calculations indicate that average denudation rates required to produce the late Pleistocene sediments were between 2 and 10 m in 10^5 years, larger for the more humid drainage basins to the northeast and smaller for the more arid basins to the southwest. These rates are compatible, within an order of magnitude, with sediment transport rates calculated for the modern coastal plain rivers.

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