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John B. Anderson, Rice University, Houston, TX

Linked Falling Stage-Lowstand Valley/Delta/Fan Complexes of the Late Quaternary Northern Gulf of Mexico: The Exception Rather than the Rule

During the Late Quaternary, the rivers of the northern Gulf of Mexico responded in very different ways to falling sea level. The ancestral Brazos and western Louisiana rivers, which flowed across low gradient coastal plains and shelves, constructed large fluvial-dominated deltas that extend to the shelf margin. These rivers avulsed during the lowstand, resulting in highstand deltas that have no associated lowstand deltas or fans. Likewise, the central Texas shelf and west Florida shelves, which have ramp-like profiles, lack lowstand deltas and slope fans. The Trinity, Colorado and Rio Grande rivers remained fixed in their locations throughout the eustatic fall, resulting in linked valley/delta/fan complexes.

Thus, most of the rivers of the northern Gulf of Mexico did not nourish lowstand deltas and fans during the previous lowstand. Stated differently, not every incised fluvial channel is a lowstand valley and not every shelf margin delta is a lowstand delta. Factors that influenced the shifting of rivers include long-term sediment supply, bedload versus suspended load content of the river, and the physiography of the shelf over which these rivers flowed.