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Sediment Dispersal Patterns of the Outer Shelf to Upper Slope Paleocene-Eocene Wilcox Group, South-Central Texas Coast

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ABSTRACT

Applying wavelet-phase adjustment and attribute analysis to interpret lithology and stratal slices to deduce seismic geomorphology, we interpreted a 960 mi2 (2500 km2) 3D seismic volume, wireline log, and sparse-core data along the south-central Texas coast to investigate the sediment dispersal patterns in transition from on-shelf to the deepwater. The sequence-stratigraphic architecture of the Wilcox Group revealed four subbasins separated by major growth faults, which roughly correlated to a lower Wilcox subunit, a middle Wilcox subunit, and two upper Wilcox subunits. Each of the subbasins developed over an average 3.5 m.y. period. We prepared lithology-calibrated stratal slice maps to reveal high-resolution (33–130-ft [10–40 m]) sediment-dispersal patterns and associated systems tracts in subbasin C of the upper Wilcox. Recognized depositional systems include: (1) incised valley fills (IVFs) and relict on-shelf deltas on an exposed shelf; (2) off-shelf lowstand prograding deltaic systems composed of lobate deltaic sandstone bodies; and (3) off-shelf slope fans best characterized by point-source, fanlikechannel/levee systems. At least four episodes of shallow LST (lowstand system tract) incised valleys containing 33–130 ft (10–40 m) of gross sandstone inferred from wireline logs were identified. These thin, sandstone-rich IVFs on exposed shelf are coeval with thick, sand–shale mixed slope fans and LST deltaic systems along growth faults, suggesting that large amounts of sediment may have bypassed these channels and may have been trapped between the fault zones in multiple subbasins. In addition to deep-cut submarine canyons (e.g., Yoakum Canyon), these IVFs provided an alternative fairway that may have transported sandy LST deposits and associated reservoirs seaward of the Cretaceous shelf edge to the deepwater Gulf of Mexico.