



Topset deposits of a >500-km-long shelf-margin clinoform in greenhouse time: Wilcox deltas, their feeder channels and importance for Gulf of Mexico margin growth

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The Paleocene-Eocene Wilcox group of Northern Gulf of Mexico provides an opportunity to document the growth of continental-scale clinoforms in a greenhouse passive-margin setting. The coastal plain to marine topset and uppermost slope succession, documented from a 3-Dimensional subsurface database (wireline logs and cores), exhibits unusual shoreline and shelf margin characteristics compared to existing models. Firstly, the greenhouse Wilcox shoreline shows repeated long-distance shoreline regression and retreat, in fact about 37 times within a ~10 My growth interval, a stratigraphic scenario at odds with previous hypotheses that shoreline movement in low-amplitude, low-frequency greenhouse conditions should be limited. We therefore suggest that the Wilcox shoreline was controlled by both greenhouse eustasy and variable sediment supply, the latter likely caused by periodic climate warming from Paleogene hyperthermals. Secondly, integrated analysis on the paleohydrology of feeder channels, shelf-edge trajectory, and published eustatic curve indicates that a decreasing sediment supply and increasing accommodation controlled the strongly progradational-to-aggradational-dominated shelf-edge trajectory of Lower Wilcox. A high Laramide sediment supply (rapid shelf-edge progradation and large rivers), combined with relative sea-level fall (flat shelf-edge trajectory, highly amalgamated channel belts, and correlated eustatic curve) in the initial period of Lower Wilcox group caused a dramatic basinward shift of the early shelf margin. The subsequent slow shelf-edge progradation and smaller rivers in the later period of Lower Wilcox group, together with a widening shelf and relative sea level rise (increasing shelf-edge rise rate), favored preferential aggradation of the margin.