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A Comparison of Two Late Pleistocene Shelf-Edge Deltas (Indonesia and Gulf of Mexico)—Stratigraphic Architecture, Systems Tracts, Bounding Surfaces, and Reservoir Potential

Abstract

Thousands of kilometers of high-resolution seismic data have been collected over two late Pleistocene shelf-edge deltas in very different settings, the northern Gulf of Mexico and the eastern shelf of Borneo in Indonesia. Both deltas have been constructed by falling-to-lowstand deposition associated with the latest Pleistocene glacial maximum, the former sourced by the temperate Mobile River, the latter by the equatorial Mahakam River. Four cores provide detailed stratigraphic control for the Mobile River delta while one long boring and numerous piston and vibracores provide stratigraphic control on the Mahakam Delta. Systems tracts and key bounding surfaces have been related to the eustatic sea level curve in both settings. Sequence architectures differ significantly, an important consequence of different depositional settings.

The tropical Mahakam shelf is tectonically active and has low wave energy, strong oceanic currents, upwelling, and a mixed siliclastic-carbonate depositional system. The resulting falling-to-lowstand clinoforms downlap a highly irregular surface of isolated carbonate bioherms built above a transgressive surface that formed during the preceding sea level rise.

The northeastern Gulf of Mexico shelf is relatively stable, also has low wave energy, but is dominated by siliclastic sedimentation. Falling-to-lowstand progradation of the Mobile River delta (Lagniappe Delta) has occurred in numerous overlapping and spatially offset lobes incised by a complex channel network. Clinoforms downlap an isotope stage 5 interglacial condensed section. The Lagniappe Delta depocenter has migrated from southeast to west; southeastern lobes show evidence of variable wave influence while the western flank is fluvially dominated. Both the Mahakam and Lagniappe deltas are composed of sand-rich clinoforms and channel deposits that possess excellent potential reservoir properties.

Biographical Sketch

JOHN MARSHALL ROBALIN is currently a geologist in the Deepwater Lease Acquisition Group, Gulf of Mexico, at Marathon Oil Company. He earned a BS degree in geology from the University of Texas at San Antonio in 1995 and has recently completed his MS in geology at Louisiana State University. □