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Moving away from simplistic reservoir models; mixed process marginal-marine analogues from Trinidad

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Marginal-marine deposits constitute a significant fraction of hydrocarbon reservoirs. Deltaic deposits alone account for ~ 30% of the world's oil, gas, and coal accumulations. Reservoirs are a product of their depositional history. Deposition models are an interpretation of process controls on sedimentation. Deposition in the marginal-marine environment is controlled by the interaction of basinal (wave, tide, storm, and littoral currents) and fluvial processes. This process interaction determines the size, geometry, and heterogeneity of reservoirs. Until recently, much of our depositional models have been built from traditional, descriptive classification schemes that focus on end-member classifications (e.g., river, wave or tide dominated).

Modern, semi-quantitative and quantitative classification methods have recognized that the application of traditional classification schemes lends to an oversimplification of depositional processes. Quantitative classification schemes focus on the spatio-temporal interaction of basinal processes and their impact on complex sedimentations patterns distribution and stacking.

This paper applies qualitative, semi-quantitative and quantitative classification methods on Trinidad's modern marginal-marine depositional systems. It documents the variety of Trinidad's previously undocumented coastal systems, and the impact of mixed processes on their morphology, distribution, and internal sedimentary architecture. Sixteen modern marginal-marine depositional systems were classified along Trinidad's east, south, and west coasts and comprises deltas, estuaries, coastal lagoons, barrier island complexes, beaches, strandplains, and tidal flats.

Two quantitative classification methods were compared when applied to geomorphological and stratigraphic data. Trinidad's modern coastal depositional systems, here characterized as naturally occurring flume experiments, are considered as modern analogues to ancient deposits based on the concept of fractals in Geology. Trinidad's marginal-marine systems demonstrate the geomorphological and stratigraphic complexity imparted by mixed processes on a "micro" scale, and provides a framework for better understanding their ancient counterparts. This Trinidad dataset provides an excellent opportunity to assess larger-scale reservoir models at various scales of observation.