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Richard H. Fillon<sup>1</sup> (1) Earth Studies Associates, New Orleans, LA

## **Deep Water Benthic Foraminiferal Faunas: Depositional Systems and Reservoir Quality**

Approximately 4000 living species of benthic foraminifera are recognized as compared with only about 40 species of planktonic foraminifera. This very great diversity of benthic vs. planktonic taxa reflects the greater richness and diversity of seafloor habitats. Because of their dependence on the heterogeneous sediment/water interface for food, metabolic-chemical micro-environments, and physical properties, benthic foraminiferal species assemblages observed in the sedimentary record offer insights into a broad range of depositional environments and sedimentary systems. Of the possible relationships between fossil assemblages and paleoenvironments, only observed first-order relationships between benthic foraminifera and water depth and between benthic foraminifera and temperature-salinity defined water masses have been consistently exploited in geological studies. While useful for paleoceanographic reconstructions, neither the foraminiferal paleobathymetric indices, nor the paleo-hydrographic water mass indices provide information that directly bears on sedimentary properties related to reservoir quality in the deep-water settings that are increasingly the primary targets of hydrocarbon exploration. The present study addresses this problem by focusing on deep-water slope and abyssal plain in situ and 'bypass' benthic foraminiferal assemblages that have demonstrable relationships with specific deep-water depositional environments and sub-environments of the Gulf of Mexico. Characteristic benthic assemblages based on standard micropaleontological analyses are identified within: 1) basinal submarine fans; 2) progradational slope systems of siliciclastic and mixed siliciclastic-carbonate margins; and, 3) slope minibasins, including ponded and spillover slope-fan sub-systems. Benthic foraminiferal assemblages related to this series of deep-water depositional systems provide indices that appear to correlate directly to reservoir quality in exploration wells.