Formation MicroImager™ for Calibration and Complete Utilization of 3-D Seismic in Exploitation

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The Formation MicroImager™ is a very affordable and easily interpreted open hole logging tool that enhances and completes 3-D seismic interpretation. Applications and utilizations incorporate geological, geophysical, and petrophysical parameters.

Geological utilizations are: dip data, orientation of sand bodies, current direction at time of deposition, and a 'whole core' view of the borehole. Geophysical applications are: interpretation of faults below the seismic data resolution and calibration of the interpreted time-mapped structure. Petrophysical interpretation uses are: thin bed resolution, sidewall core to open hole log calibration, geologic view of the 'rock' to the petrophysical interpreter, more accurate net pay counts, ability to recognize grain size changes, and corrected resistivity. Examples of the many applications of the Formation MicroImager™ in conjunction with 3-D seismic in field exploitation are used to illustrate the aforementioned areas of utilization.

A Late Quaternary Model for the Evolution of the Mississippi River Delta and Incised Valley

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Classic studies of the Mississippi River by Fisk (1944) emphasized the concepts of a single Holocene delta and Substratum/Topstratum deposits infilling the incised valley. Subsequently, work by Kolb and Van Lopik (1958) and Frazier (1967) continued to emphasize the single Holocene delta concept and further refine delta complex chronology. Over the last decade, an extensive new geologic database of high resolution seismic profiles, deep borings, vibracores, and radiocarbon samples has lead to the recognition of multiple deltas that can be organized into a new late Quaternary model subdivided into lowstand, transgressive, and highstand systems tracts.

The last Wisconsian Mississippi River incised a deep alluvial valley across the continental shelf floored by coarse-grained substratum deposits which represent a lowstand systems tract shelf-margin delta. The Topstratum deposits can be subdivided into a transgressive systems tract and a highstand systems tract. As the Wisconsian glaciers melted and the Holocene transgression ensued, the Mississippi River filled its incised valley with a series of retrogradationally stacked shelf-phase deltas (Outer Shoal and Ship Shoal deltas). The highstand systems tract was recognized when the delta stacking pattern changed from retrogradational to progradational (Modern delta). This new late Quaternary model emphasizes the importance of autocyclicitic and allocyclicitic processes with infilling the incised Mississippi River valley with a shelf-margin delta and a series of shelf-phase deltas.

Coastal Geomorphology and Landscape Changes in the Pontchartrain Basin

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Lakes Maurepas and Pontchartrain have served as a historical natural, economic, and recreational resource to New Orleans and the communities surrounding this basin. Natural and human processes are causing an environmental decline of this basin. In order to better manage this natural resource, the U.S. Geological Survey in cooperation with Louisiana State University, are conducting a 5-year study of this valuable ecosystem. This paper presents new information on coastal geomorphology and landscape changes in the basin.

Four basic coastal types have been mapped. These include swamp (34.2% or 46.64 miles), marsh (28.5% or 38.74 miles), beach (4.2% or 5.67 miles), and armored shorelines (33.1% or 45.10 miles). In terms of coastal erosion, 45.10 miles of shoreline are stabilized by armored structures and the remaining 53.55 miles of shoreline are experiencing erosion. The highest erosion rates occur between Frenier Beach and the Bonnet Carre Spillway where erosion rates exceed 14 feet per year. Overall, the lowest rates of erosion are found in Lake Maurepas, where rates are less than 7 feet per year. Erosion rates in Lake Pontchartrain average 7 to 14 feet per year where the shoreline is not armored.

The major landscape changes occurring over the last 100 years include freshwater marshes changing to higher salinity marshes, cypress swamps changing to freshwater marshes, and the loss of wetlands due to urbanization.