

ria associated with pectinacids (*Halobia* sp.) of Late Triassic age. In addition, samples of sediments interbedded with pillow lavas at the top of the ophiolite yielded well-preserved Late Cretaceous (Cenomanian to Turonian) Radiolaria.

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Paleoenvironment and Petroleum Potential of Mid-Cretaceous Black Shales in Atlantic Basins

Cores from the Deep Sea Drilling Project in the Atlantic Ocean have permitted recognition of widespread organic-rich black shales in the mid-Cretaceous. However, geochemical studies have proved that the origin and petroleum potential of this organic matter is highly variable. Three main types of organic material can be recognized in these sediments from kerogen studies: (a) marine planktonic, deposited in a reducing environment; (b) terrestrial higher plants, moderately degraded; and (c) residual organic matter, either oxidized in subaerial environments and/or recycled from older sediments.

Vertical and horizontal variations of these three types of organic matter are illustrated by geochemical logs in each main basin of deposition. Paleogeography and environment of deposition of organic deposits are deduced from these data. The petroleum potential of the sediments is therefore a consequence of the paleogeographic setting. Thus, the zones favorable for oil and gas (given adequate maturation), or those devoid of any potential, can be delineated. Complementary studies of wells on the continental shelf of the North American continent tend to show that the organic characters in the deep basins can be correlated with those recognized in nearshore locations.

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Paleoenvironments of Middle Devonian Sandstones of Upper Mississippi Valley

The Dutch Creek, Beauvais, Lupus, and Hoing Sandstones are supermature quartzarenites associated with transgressive carbonate sequences. They generally have gradational upper and lower contacts. Fossils are mostly fragmentary crinoids, brachiopods, and trilobites. Complete fossils are mostly corals that settled during periods of temporary bottom stability and slow sedimentation.

Unidirectional, planar cross-bedding dominates part of the Dutch Creek, Beauvais, and Lupus Sandstones, indicating paleocurrent movement to the northwest. Local herringbone cross-stratification with associated reactivation surfaces indicates tidal action. Lenticular bodies of Hoing and Lupus sandstone enclosed in calcilutite contain graded sequences and basal conglomerates, suggesting tidal-channeling of banks and shoals.

Parallel lamination and cylindrical structures in the Hoing Sandstone indicate high intertidal environments.

These sandstones all consist of bimodally distributed fine- and medium-sized quartz grains. Medium-sized grains are well rounded to rounded, contrasting with angular fine-grained quartz. Cementation is mostly by sparite and microcrystalline calcite. Locally, secondary silica replaces carbonate. Near faults, quartzitic texture probably results from pressure solution. Interlocking secondary overgrowth locally provides cementation.

Bimodal grain-size distribution, seaward thickening of the sandstone, and an apparently inadequate source suggest eolian transport to the sea across a carbonate terrane prior to marine deposition. This does not require a sabkha, but depends on aridity and sparse plant cover. Subsequent tidal, wave, and current action is believed responsible for ultimate transport and deposition of the sand.

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Shallow-Submarine Seismic Stratigraphy, Mississippi River Delta Front

High-resolution seismic, and engineering borehole data were integrated to interpret the shallow seismic stratigraphy of the Mississippi River delta front. Three seismic stratigraphic units have revealed the transgressive-regressive depositional sequences associated with late Pleistocene glacio-eustatic changes in sea level. Each of the stratigraphic groups was found to consist of a lower clayey unit and an upper fine-sand and shell unit. Paleotopographic maps of the stratigraphic units reveal the morphology of the former continental shelves. Structural features observed within the delta front area include shelf-edge growth faults, a salt diapir, and an extensive erosional unconformity which is believed to be the result of a large slide mass of early Holocene age.

The modern, prodeltaic sedimentary wedge includes up to 100 m of soft, underconsolidated, gas-bearing silty clays, deposited during the past 500 years. The thickness of this unit within the delta-front area has been mapped.

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Computer Applications of Petroleum Data System

The Petroleum Data System, a collection of general field and reservoir information, has been available for public use for approximately 3 years. Data have been used in a variety of studies by oil companies, consultants, and government agencies. In particular, many studies have been done in an effort to determine the potential of specific basins for future exploration and drilling, the feasibility of certain types of enhanced recovery techniques, and future reserves from existing fields. The different types of output are histograms, scatterplots, bargraphs, correlations, simple listings, and summary reports obtained by manipulation of the data in the file. These examples illustrate problems that have to be faced in working with large data bases, such as