# ORGANIC DIAGENESIS—ITS RELATIONSHIP TO GULF COAST OIL

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## ABSTRACT

In coastal Louisiana sediments of the Barataria Bay area provide a modern analogue for future petroleum source-reservoir lithologies. Beach and barrier-island sands have excellent potential for reservoirs. Sediments in areas of restricted circulation and high biogenic productivity have characteristics that suggest precursor hydrocarbon source rocks. Examination of the diagenesis of organic matter that occurs in these potential source rocks allows an assessment of basic parameters that influence the origin and distribution of Gulf Coast oil.

Petroleum hydrocarbons that have their origin in rock sequences similar to those of coastal Louisiana are the result of several processes. Biogenic hydrocarbons, mainly C 15-C 32 paraffins, are produced by metabolic activity of organisms indigenous to the region. These hydrocarbons are relatively unreactive and become concentrated with respect to other biochemical components. Secondly, biochemicals may be converted directly to hydrocarbons by degradational processes. These degradational processes have been qualitatively examined for specific characteristics—i.e., the chlorophyll to isoprenoid hydrocarbon degradation—but have not been quantitatively assessed. A third process that yields hydrocarbons concerns the thermally controlled reactions of kerogen (organic material in sediments that is not affected by organic solvents). Thermal maturation of kerogen generates a broad spectrum of products that begin with liquid oils, rich in hetero-compounds, and progress to a point where methane is the dominant product.

Laboratory experiments indicate that biochemical-to-hydrocarbon degradational processes may be important reactions during early diagenesis. Conditions conducive to such reactions occur in several offshore Tertiary basins of the world. As basins continue to subside, temperature increases resulting from geothermal gradients become important, and kerogen-derived hydrocarbon products dominate. At higher maturity levels, preservation of hydrocarbons becomes a function of thermal stability, and concentrations of gaseous products are selectively enhanced.

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