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#### LATE QUATERNARY SEA LEVELS IN GULF OF MEXICO

Definitive data for late Quaternary sea levels in the Gulf of Mexico largely were gathered more than 15 years ago, and primarily were based on the presence of submerged shoreline depositional features. During the last 3 years new evidence has been gathered from wave-cut terraces and erosional unconformities present on submerged banks near the edge of the northern Gulf continental shelf. At least 9 distinct levels can be recognized between 20 and 200 m, and there are many additional minor ones.

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#### PALEOTEMPERATURES IN GULF COAST USING ESR-KEROGEN METHOD

Concentrations of liquid hydrocarbons in modern sediments are only a few parts per million, but hydrocarbons in subsurface shales reach several thousand parts per million. The increase in hydrocarbons is the result of the alteration of insoluble organics called kerogens. The primary energy for this reaction is heat associated with burial. Significant hydrocarbon generation begins at 150°F, but liquid hydrocarbon destruction dominates at temperatures greater than 300°F. Thus, there is a liquid window between 150 and 300°F which encompasses the zone of oil occurrence.

Present geothermal gradients can be used only to predict organic maturity in young downwarping basins. Paleotemperatures can be estimated from kerogen. Electron spin resonance (ESR) of kerogen has been used to estimate paleotemperatures in the Mesozoic-Tertiary trends of the Gulf Coast. The data indicate that some rocks have been 50–100° F hotter than their present temperatures and that some present geothermally cool areas were "hot spots" in the past.

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#### GEOLOGY OF WEST FLOWER GARDENS BANK

The West Flower Gardens Bank has been the subject of study by the Department of Oceanography at Texas A&M University during the past several years. These studies, conducted from surface oceanographic vessels, have included bathymetric surveys, high-resolution sub-bottom profiling, analyses of sediment producing organisms, and delineation of sediment facies surrounding the prominence.

Geologic data obtained during EFORC Mission 72-0605-X, using the Nekton Gamma submersible, include: (1) verification of the accuracy of sediment distribution patterns as delineated by surface sampling; (2) the occurrence of dead barrier reefs at depths of 180–190, 290–315, and 420–430 ft; and (3) the occurrence of dead patch reefs on terraces behind the barrier reefs.

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#### NANNOPLANKTON BIOSTRATIGRAPHY OF UPPER BLUFFPORT MARL-LOWER PRAIRIE BLUFF CHALK INTERVAL (UPPER CRETACEOUS) IN MISSISSIPPI

Upper Cretaceous strata of Mississippi contain diverse nannofossil floras. Samples taken from the upper Bluffport Marl, Ripley Formation, and lower Prairie Bluff Chalk of Kemper and Oktibbeha Counties, Mississippi, were examined to determine nannoplankton abundances and occurrences.

In the strata examined, 117 nannofossil species were recognized and 9 biostratigraphic zones were delimited of which 6 are new. The intervals of 3 previously described zones, the *Tetralithus aculeus*, *Chiastocyclus initialis*, and *Lithraphidites quadratus* zones have been modified.

In these sections, the Bluffport-Ripley contact could not be delineated using nannofossils but the unconformable nature of the Ripley-Prairie Bluff contact could be recognized by significant nannoplankton changes.

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#### GEOLOGIC CONTROLS ON HYDROCARBON SOURCE POTENTIAL OF YOUNG SEDIMENTS

This study was carried out as part of a broad study of the continental-slope environment in the northern Gulf of Mexico. The primary objectives of this geochemical study of young sediment sequences was to obtain fundamental knowledge of the composition of the organic matter and of the processes involved in the origin and accumulation of petroleum, and to relate these to their geologic controls.

Organic matter incorporated in these slope sediments differs from the organic matter in nearshore sediments in several respects which suggest that the organic matter had been reworked by marine bacteria before it was incorporated in the slope sediments. The presence of slope basins is important in the accumulation and preservation of this organic matter.

The geochemical-source characterization of the slope sediments was based primarily on the amounts of organic matter, total heavy ( $C_{15}^{+}$ ) extractables (bitumen), and total heavy ( $C_{15}^{+}$ ) hydrocarbons and gasoline-range ( $C_6$ - $C_7$ ) hydrocarbons. These organic-richness parameters are similar on the slope throughout the Gulf. There is a single gross organic facies. A few Pleistocene sequences presently contain enough  $C_{15}^{+}$  hydrocarbons and organic matter to be considered source sediments by the criteria currently being applied to older sediments. Many more of these young sediment sequences contain significant amounts of heavy ( $C_{15}^{+}$ ) bitumens which could generate petroleum if sufficiently matured, that is, if exposed to greater depths and temperatures. These sequences are considered to have "source potential."

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#### LATE PLIOCENE-EARLY PLEISTOCENE NANNOFOSSIL STRATIGRAPHY IN NORTH-CENTRAL GULF COAST

The early Pleistocene deposits of southeastern Louisiana consist of basal regressive sandstones overlain by a thick marine transgressive shale unit to which various informal names have been applied. This early Pleistocene shale has an areal extent of more than 20,000 sq mi and ranges in thickness from 100 ft in updip areas to several thousand feet in the continental shelf. This study was based on sidewall cores from 4 wells drilled more than 60 mi offshore from the coastline in the southern part of the Ship Shoal area, Terrebonne Parish, Louisiana. Samples also were examined from piston cores taken in the Atlantic and Pacific Oceans and the distribution of pertinent calcareous nannofossils in these samples was compared with distributions in the Louisiana sections.