

SIGNIFICANCE OF PLIOCENE STRATIGRAPHIC PALEONTOLOGY, GULF COAST

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A B S T R A C T

Major oil reserves of South Louisiana are found in Oligocene, Miocene and Pliocene sandstone reservoir rocks. Increasing rate of sediment concentration in depocenters explains the hydrocarbon richness of the Upper Miocene and Pliocene strata. This same factor led to increasing provincialism of faunas in post Oligocene time. The paleontologists' problems in younger Tertiary strata are compounded by an apparent slowing of foraminiferal evolution. Whereas the Oligocene paleontologist can employ some 20 regional marker zones to divide roughly 10,000 feet of section, the Pliocene worker must contend with no more than five or six zones to divide twice as thick a section. Recognition of temporal clines is vital to the stratigrapher who would subdivide an interval so nearly devoid of index species. Stratigraphic subdivision is not an end in itself, but is an indispensable step in the delineation of depocenters and depositional trends.

MEGAFUNAL FACIES, ESTUARY TO SHELF EDGE, SURROUNDING THE GULF OF MEXICO

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A B S T R A C T

Nearly 20 years of marine benthic studies along the rim of the Gulf of Mexico permits recognition of areal (environmental) facies, most of which have exact counterparts in the Gulf Coast Tertiary. These facies have been recognized on the basis of invertebrate faunal diversity, benthic community size and structure, geomorphology of sea bottom and sedimentary characteristics.

Ultimate facies control is exhibited by prevailing climates around the Gulf coast, ranging from tropical moist in the southeast and southwest to almost xerophytic (dry) in the west. Northern regions are cool-temperate in winter and sub-tropical in summer with average moisture conditions ranging from very wet for several years to prolonged droughts in following years—the most variable climate in the world.

Megafaunal assemblages in shallow waters consist of those found in salt and fresh marshes; river estuaries; low to medium salinity, enclosed bays (inter-reef); low and high salinity oyster or mollusk reefs; high salinity, open bay centers; open bay sandy margins; inlets and sand or clay open beaches. Open Gulf or deeper water assemblages are characteristic of shallow shelf (1-20 m), intermediate shelf (21-72 m), outer shelf (73-132 m) and upper slope (132-700 m). Detrital lime muds provide slight variations to these facies in carbonate areas to the south. Reef-forming organisms create micro-epifaunal habitats, modified by wave energy and depth.

Faunal composition within each of these habitats is controlled both by sediment type and stability of other environmental factors. Unstable environments with wide ranges of ecological variables and clay sediments produce low species diversity within small populations. Stable environments on sand-clay mixed bottoms produce high diversity within large populations. Principles used to define these habitats can be applied to Tertiary formations in mapping ancient environments.