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Waveland Field, Unique Structural and Stratigraphic Trap

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Early Tertiary Lithostratigraphic Interpretation of Southwest Georgia

In southwest Georgia, relatively little detailed mapping has previously been conducted in the Midway and Wilcox Group equivalents even though there has been mining activity and numerous outcrops are available. Part of the problem has been the poor accessibility of many outcrops, apparent abrupt facies changes, and minimal subsurface data. During 1975-78, new surface and subsurface data were collected through detailed quadrangle mapping, government and commercial well-drilling activities, and data acquired from U.S. Corps of Engineers projects.

These new data provide the basis for a reevaluation of early Tertiary lithostratigraphic relations in four counties in southwest Georgia and one county in Alabama. The research area was chosen to include (1) areas which have previously presented correlation problems owing to apparent abrupt facies changes, (2) regional mining districts, and (3) the classic outcrops along the Chattahoochee River. The local early Tertiary (Paleocene) stratigraphic units included in the research were the Clayton, Nanafalia, and Tuscahoma Formations.

The primary conclusions and resulting lithostratigraphic interpretation of southwest Georgia's Tertiary geologic history are: (1) the selected research area provides an excellent opportunity to analyze the pre-Tuscahoma erosional degradation surface and the subsequent transgressive onlap of the Tuscahoma over the truncated Nanafalia, Clayton, and Providence (Late Cretaceous); (2) the presence of a basal Tuscahoma deltaic sequence which includes an interval of quartz pebble conglomerates and kyanite-bearing sands, petrified wood, and silicified clasts of chalk; and (3) the interpretation of lithologic associations which correlates the economic zones in the Springvale, Andersonville, and Eufaula mining districts with the Tuscahoma which may provide an exploration aid for analysis of other regional bauxite and kaolin deposits.

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Origin of Porosity in Deep Woodbine-Tuscaloosa Trend, Louisiana

Cores of the Woodbine and Tuscaloosa Formations from False River field, Pointe Coupee Parish, Louisiana, contain sandstones from 20,000 ft (6,000 m) with anomalously high porosities and permeabilities. Porosities greater than 25% and permeabilities of hundreds of millidarcys are common. Scanning-electron microscopy shows that individual grains of these olive-green, semifriable sandstones are coated with chlorite. The chlorite is present as 7 to 10 μ-wide hexagonal plates which are arranged edgewise, one crystal thick, on grain surfaces. Sandstones with more or less continuous chlorite coatings around quartz grains display little framework compaction and minor development of secondary quartz overgrowths; however, many interbedded sandstones with little or no chlorite are completely cemented by secondary quartz. Intermediate between these extremes are sandstones with incomplete or poorly developed chlorite coatings; these display outgrowths of secondary quartz rather than overgrowths of an envelope nature.

Petrographic and SEM data indicate an early diagenetic origin for the chlorite, which apparently ceased to form once detrital grains were coated with a single layer of crystals. This layer was sufficient to mask nucleation sites for silica overgrowths and, in addition, may have prevented compaction by pressure solution, thereby allowing the sandstones to be buried to great depths without appreciably reducing porosity.

The chlorite was probably derived from ultrabasic volcanic detritus which is present in the sandstones to varying degree. The source of this detritus can be traced to the peridotite belt of southern Arkansas.

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Wave-Dominated Deltaic Systems of Upper Cretaceous San Miguel Formation, Maverick Basin, South Texas

Sandstone units of the Upper Cretaceous San Miguel Formation in south Texas are wave-dominated delta sequences deposited during a major marine transgression. San Miguel sediments were deposited in the Maverick basin within the Rio Grande embayment. Cross sections and sandstone maps reveal that during deposition of the San Miguel, the Maverick basin consisted of two subbasins. A western subbasin received sediments from the northwest; the eastern subbasin received sediments from the north.

Net-sandstone patterns show that the thickest parts of the sandstone bodies are generally strike oriented. Where not eroded, sand-feeder (fluvial) systems are indicated by dip-aligned components on the updip sides of the sandstone units. According to these net-sandstone patterns, the San Miguel deltas vary considerably and make up a wide spectrum of wave-dominated delta types.

The most common vertical sequences in the San Miguel coarsen upward from silt and clay to fine sand. Burrows dominate, and the few primary structures are of small scale. Large-scale cross-beds are observed only in outcrop. Strand-plain or barrier-island facies sequences, which prevail in most wave-dominated delta deposits, are incomplete in the San Miguel. In most places, only the lower shoreface is preserved. The upper parts of the sequences, which normally bear large-scale primary structures, were lost by marine reworking during subsequent transgression. Intense burrowing destroyed any primary structures at the tops of the truncated sequences.

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Late Pleistocene Fluvial-Deltaic Deposition, Texas Coastal Plain and Shelf