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LITHOSTRATIGRAPHY AND PALEOGEOLOGY OF THE VIRGINIA COASTAL PLAIN

Cretaceous and Tertiary sediments of the Virginia Coastal Plain can be described in terms of six rock units—the Patuxent, "transitional beds," Mattaponi, Manjemo, Calvert, and Yorktown formations. Each unit can be mapped solely according to lithologic criteria derived from samples collected and processed by standard techniques. These selected criteria are regionally persistent and their consistent application yields reproducible results.

Formation composition and the geometry as expressed in various types of subsurface maps indicate a primary two-fold division of the section—a lower, relatively thick sequence of non-marine clastics and an upper sequence of predominantly marine strata.

The Patuxent Formation and "transitional beds," of Cretaceous age reflect a period of active tectonism and rapid non-marine deposition in which major structural features of the "basement" were obscured. A substantial pre-existing "basement" low and a degree of additional subsidence during Cretaceous time are inferred from the thickness of the Patuxent. The distribution, geometry, and lithologic properties of the "transitional beds" all indicate deposition during the waning stages of this tectonically active period.

Tertiary deposition, characteristically marine, occurred in a series of transgressive phases in which first the Mattaponi, and then the Manjemo, Calvert, and Yorktown formations were laid down. The Mattaponi basin was very extensive, but between Mattaponi and Manjemo times, rejuvenation of a regional arch resulted in restriction of the basin to the north of the James River. From Manjemo, through Calvert, to Yorktown time progressive regional tilting produced an expanding marine basin whose depocenter shifted progressively southward.

Relationships between basement evolution and sediment distribution during the Tertiary are relatively subtle but correlate well with observed facies distributions of the formations. These relationships constitute evidence of the continued mobility of the region throughout the Tertiary.

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DISCRIMINATION OF COASTAL EOLIAN AND BEACH SANDS, GULF COAST BARRIER ISLANDS

Eolian dune and beach sands of the Gulf Coast barrier-island chain are differentiated by discriminant analysis of 1/4-phi-sieve grain-size measurements. Trench traverses on Galveston, Matagorda, Mustang, and Padre Islands were made and 207 samples were collected and analyzed.

Differentiation of individual samples into three populations (A, B, C of Moss) yields 16 discriminating variables that give 100% separation between beach and eolian sands. It is assumed that processes such as saltation, rolling, and suspension can be used to describe the A, B, and C populations.

Of the 16 variables selected on the basis of discriminating ability, 14 were selected from a possible 30 variables based on the size distribution of an individual population. Only two of a possible 10 total-sample variables were selected. Ten variables assumed to be primarily provenance controlled were discarded prior to discriminant analysis.

The percentage of material in each population yields three of the discriminating variables. The skewness of the rolling and saltation populations, the sorting of the suspension population, and the kurtosis of the rolling and suspension populations are also among the most discriminating variables.

Classification of the transgressive-beach and eolian sands in the area of the destructive Mississippi River deltas can be accomplished by using the western Gulf barrier-island samples as reference groups.

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OOLITE-BAR PROGRADATION, SAN ANDRES FORMATION, MIDLAND BASIN, TEXAS

The Upper Permian San Andres Formation is a widespread carbonate unit which is highly oil-productive throughout much of the Permian basin, west