

Correlation of high-resolution seismic profiles from the Georgia continental shelf with available core data reveals a stratigraphic interval of Miocene to recent age. The sedimentary components consist of relatively thin, aerially extensive units which grade from primarily shallow-water carbonates and clastics nearshore, to predominantly open-marine, fine-grained clastics offshore.

A prominent erosional scarp, developed in the middle Miocene adjacent to and beneath the present coastal area, extends from Ossabaw Sound, Georgia, to Daytona Beach, Florida. Prograding seaward over this scarp are large-scale clinoforms of Pliocene age.

Although the regional tectonic framework of the Georgia coast and continental shelf is considered to be that of a stable, passive margin, several large-scale, low-relief, north-south trending undulations within Miocene and Oligocene sediments are present: a high beneath the coastline and inner shelf of Georgia which follows the trend of the Beaufort arch; the Inner-Shelf low, into which Pliocene clinoforms have prograded; and the Outer-Shelf high, which broadens and rises to the north. These features probably resulted from gentle folding and subsequent erosion. The latter two features significantly influenced sedimentation on the shelf during late Miocene and Pliocene time.

The Neogene stratigraphic section consists of a sequence of deposits, separated by unconformities that appear to be related to glacio-eustatic fluctuations in sea level. With the notable exception of the Pliocene section, the sequences are comparable with the third-order global cycles of sea level changes proposed by Vail et al.

Irregular bottom topography, shallow, large subbottom channels, and smaller cut-and-fill structures similar to sedimentary structures in present-day barrier island inlet and back-barrier complexes are evidence of a midshelf Quaternary stillstand event at or about the 30-m isobath.

FORDE, EVAN B., and TERRY A. NELSEN, NOAA, Miami, FL

Variability of Sedimentary Textures and Processes on Continental Margin North of Wilmington Canyon

Sedimentary properties and processes of a 7,500-km² corridor seaward of the Baltimore Canyon Trough off New Jersey were studied in detail using over 100 bottom samples consisting of grab samples and box, hydroplastic, and piston cores.

The sediments in both canyon and intercanion areas are primarily bioturbated, olive-gray, sandy silts with local features indicative of gravity-induced mass sediment movements (i.e., graded sequences and load structures). C¹⁴-based sediment accumulation rates vary by a factor of three in cores separated by as little as 6 km. These variations seem to be a function of shelf-edge spillover rates.

Detailed analyses of the sand grain-size distribution throughout the corridor reveal that the sand component of the slope and rise sediments contains a high percentage of material currently present on the adjacent shelf. The relatively large percentage of sandy sediment in the upper parts of cores from Spencer Canyon suggests its recent role in transporting shelf sediments seaward. Sandy intervals in other slope cores are commonly obscured by intense bioturbation. Cores from the continental rise show an upward decrease in the number of sand layers and lenses.

Active transport of sediment to the slope and rise occurred during the late Pleistocene and, although the intensity has declined, the slope is presently the site of deposition for both fine and coarse sediment.

GIBSON, THOMAS G., U.S. Geol. Survey, Washington, D.C.

Stratigraphy and Depositional Environments of Miocene Strata of Central Atlantic Coastal Plain

Transgressive pulses of relatively short duration inundated the middle Atlantic Coastal Plain during Miocene time, resulting in a discontinuous depositional pattern. The spottiness of the strata is more pronounced in the Albemarle Embayment of North Carolina than in the Salisbury Embayment which extended from New Jersey to Maryland. The locus of deposition also changed, which further fragmented the continuity of the record. In the Salisbury Embayment, the depocenter generally moved southward during the Miocene, but a northward movement of the locus is indicated for the Albemarle Embayment.

Biogenic deposition of highly diatomaceous clay took place in two pulses in the Salisbury Embayment during the early and early middle Miocene; three pulses of phosphatic clay and sand and intercalated diatomaceous clay characterize the Albemarle Embayment during the early and middle Miocene. Depositional environments are interpreted largely on the basis of faunal data combined with sedimentologic characteristics. Miocene strata preserved onshore generally range from marginal-marine to shallow open-marine environments; environments approaching middle-shelf water depths are present in the Albemarle Embayment.

The southward building of deltas from southern New Jersey into the northern part of the eastern shore of Maryland brought significant amounts of clastic sediment into the Salisbury Embayment during the early middle Miocene, and deltaic sedimentation continued throughout the rest of the Miocene. Uplift of the Appalachian source area, beginning in the northern part of this area in the middle Miocene, brought widespread clastic sedimentation to both embayments during the late Miocene.

GRADSTEIN, FELIX, Geol. Survey of Canada, Dartmouth, Nova Scotia, JOHN EXTON, Petro Canada Exploration Inc., Calgary, Alberta, and JIM OGG, Scripps Inst. Oceanography, La Jolla, CA

Jurassic Chronology and History of Atlantic Basins

Stratigraphic backbone for the eleven stages of the Jurassic period, 200 to 135 m.y. ago, are ammonite zonations with local resolution close to 1 m.y. Micropaleontologic zonations largely have stage-level resolution. Facies-dependence and provincialism limit universal application, and calibration to ammonite and (at the Jurassic-Cretaceous boundary) to calpionellid zonations is limited. The geomagnetic reversal scale (with few events only), stage designations, and linear time scale are not well integrated either. Uncertainty may be on the order of a stage.

Two examples of recent progress in Jurassic stratigraphy are: (1) calibration of the Early Jurassic foraminifer and ostracod zonation for Portugal and Grand Banks to a standard ammonite scheme; it shows that the post-evaporite-dolomite marine transgression occurred at the Sinemurian-Pliensbachian boundary as in east Greenland and northwestern Europe; (2) acquisition of a continuously cored, fossiliferous Middle and Late Jurassic record in Deep Sea Drilling Site 534, Blake Bahama Basin, in the Jurassic magnetic quiet zone. Oceanic pillow basalt (31.5 m) occurs below a strong basement seismic reflector, which proves normal ocean crust exists under the Jurassic magnetic quiet zone.

The overlying dark shales are early-middle Callovian, which revises upward with 10 to 20 m.y., the age of the Blake Spur and M-28 anomalies, and the time of early spreading of the central North Atlantic. Widespread Callovian transgression may be an expression of rapid, early spreading.

The new bio- and magneto-stratigraphic data are being integrated with local zonal schemes for Atlantic basins to provide an improved Jurassic time scale of events.

HABIB, DANIEL, Queens College, New York, and WARREN S. DRUGG, Chevron Oil Field Research Co., LaHabra, CA

Cretaceous-Jurassic Dinoflagellate Stratigraphy in Blake-Bahama Basin

A stratigraphically conformable dinoflagellate zonation ranging in age from Vraconian Albian to earliest Oxfordian-middle Callovian is distributed through 875 m of section recovered at Deep Sea Drilling Project Site 534A. The Cretaceous interval is the most fossiliferous studied to date in the paleobathymetrically deep western North Atlantic, and correlates well with five other sites. The Cretaceous-Jurassic boundary, considered to be conformable, is in nannofossil ooze just below the first red intercalated layers but above the major lithology of the Jurassic Cat Gap Formation. Jurassic assemblages are not as well preserved, but provide stratigraphically useful species.

Blackish sediment is present intermittently throughout the investigated section at Site 534A; its origin is considered to be related to sedimentation rates.

HENRY, VERNON J., and FRANCIS D. FOLEY, Univ. Georgia, Skidaway Inst. Oceanography, Savannah, GA

Bottom Morphology and Shallow Subbottom Sedimentary Structures on U.S. Continental Shelf Between Cape Hatteras, North Carolina, and Jacksonville, Florida

During the period July 1978 to 1980, a survey of the U.S. South Atlantic shelf was made to determine the occurrence and distribution of biologically productive bottom areas and bottom and shallow subbottom geologic features of potential hazard to petroleum exploration and production. Methods of data acquisition included the use of high-resolution seismic systems, sidescan sonar, towed television, and minisub.

Shelf sediments are largely composed of 2 to 5 m of Quaternary sands and silty clays with mixtures of shell that were deposited in fluvial, paralic, and shallow-marine environments. Greater sediment thicknesses (up to 40 m) are present in buried river channels, tidal inlets, and cut-and-fill structures associated with meandering tidal streams.

Surficial sediments exhibit a wide range of bed-form type and maturity. Ripples of less than 0.5 m wavelength and megaripples of 0.5 to 1 m wavelength are common across the shelf. Crest orientation is generally north-south. Algal growth along the crests of many of the smaller bed forms as well as abundant bioturbation and tracks indicate bottom stability except during storms. Sand waves up to 100 m long are common, particularly within the 25-m isobath and are present in discrete fields 3 km or more wide with north-south crest orientation. They are less common, less sharply defined offshore and usually underlie smaller bed forms of different orientation. These features may have resulted from infrequent major storms and, because of rising sea level, may now be below the effect of most storm-generated waves. Although the mobility

of these large bed forms is inferred by the presence of buried reefs within some of the sand bodies, the time and rate of movement are unknown. Many areas of the shelf exhibit irregular, low-relief bed forms that appear to be in advance stages of deterioration from intense bioturbation.

Several distinct, acoustically hard reflectors present in the shallow subbottom over much of the shelf represent indurated strata which on outcrop provide substrate for the development of reef and hardground communities. These temperate bioherms are primarily populated by sponges and octocorals and, on the basis of topographic expression, are classified as low-relief hardgrounds (> 0.5 m), moderate-relief reefs (up to 2 m), and high-relief reefs (up to 15 m). Low-relief hardgrounds are the most widely distributed of the three types but are the least productive in terms of biomass. Moderate- and high-relief reefs occur most commonly off North and South Carolina and along most of the shelf break. Substrate ranges from Pleistocene to Miocene in age and locally contains significant percentages of phosphate grains. The total area of shelf occupied by reefs and hardgrounds is estimated to be less than 10%. Outcrop patterns reflect both local bottom processes and regional structural framework.

In the middle to outer shelf off the Georgia coast, a relatively narrow zone of large channels and numerous cut-and-fill structures occur in Quaternary deposits just landward of a shallow buried Miocene high. These features are very similar to sedimentary structures associated with present-day barrier islands, tidal inlets, and estuaries and strongly suggest a sea-level stillstand near the end of the last Pleistocene regression or early in the present transgression.

HEWITT, JEANNE L., Energy Systems Group, TRW Inc., McLean, VA

Methane from Coal Beds: Unconventional Energy Source in Warrior Basin

One of the largest potential gas resources of the Atlantic Coast margin may lie in coal beds and adjacent strata of the Warrior basin in Alabama and Mississippi. The resource assessment phase of the Department of Energy's Methane Recovery from Coalbeds Project (DOW/MRCP) conservatively estimates gas content of Warrior basin coals to be 10 Tcf.

The Warrior basin is a triangular area in northern Mississippi and Alabama containing extensive gaseous bituminous coal reserves. The major coal seams, in the upper Pottsville Formation, formed as clastic material filled in the channel-lake-swamp environments of a Late Pennsylvanian upper delta plain. Of the seven major coal groups in the upper Pottsville, the Mary Lee Group and Black Creek Group have been identified as likely candidates to be coal-bed gas reservoirs. Direct measurement of coal core samples indicates that gas content ranges from 2 cc/g (64 cu ft/ton) from 700 ft (213 m) of overburden to 18 cc/g (576 cu ft/ton) at a depth of 2,000 ft (610 m).

Coal operators in the basin are keenly interested in developing coal bed methane both to increase safety of underground mines through degasification in advance of mining and as a marketable product to be pipelined or used on site. After 2 years of operation, the U.S. Steel mines near Oak Grove, Alabama, have produced 750 MMcf of gas from a 17-well field, with an average gas flow per well of 70,000 cf/day. The Jim Walters Resource Co. has an in-mine system which collects the gas for local use. One horizontal well produced 40 MMcf of methane over its lifetime of 10 months. These and other examples support the conclusion that the Warrior basin contains an economically recoverable resource for meeting local and national energy needs.