MUMME, S. T., and R. E. FERRELL, JR., Louisiana State Univ., Baton Rouge, La.

Geopressure in Houma and Hollywood Fields, Louisiana

The Houma and Hollywood fields comprise one of the largest gas and gas-condensate producing areas in Louisiana. Three zones, the hydropressured *Bigenerina humblei* and Krumbhaar sands and the geopressured Southdown-Hollywood sands, are responsible for estimated ultimate recoveries of 30 million bbl of condensate and 2.5 Tcf of nonassociated gas.

The Hollywood shale forms a geopressure seal 1,200 to 2,000 ft (360 to 600 m) thick over most of the area. Pressure differentials between the Krumbhaar and Southdown-Hollywood sands range from 3,700 to 7,200 psi (25,512 to 49,644 kPa).

The Houma-Hollywood field area is characterized by apparently large volumes of fluid escape from the geopressured zone. The higher than normal temperatures and low salinities at the base of the hydropressured zone provide evidence for this proposed leakage. The routes of fluid escape are numerous and are associated with the large growth faults of the area. The fluid-escape paths are identified by the use of structure, temperature, and salinity maps.

The absence of deep wells in parts of the study area and the uncertainties of the log-derived temperatures and salinities may produce some uncertainties in the interpretations. However, our observations are consistent with predictions based on the present theories concerning geopressure processes.

PECK, DOUGLAS M., Chevron Oil Co., New Orleans, La., DAVID H. SLATER, Mobil Oil Corp., New Orleans, La., and SHERWOOD W. WISE, JR., Florida State Univ., Tallahassee, Fla.

Stratigraphy and Paleoecology of Tamiami Formation in Lee and Hendry Counties, Florida

The Tamiami Formation in southwest Florida is a complex succession of shallow-water, predominantly marine sands, clays, and limestones of late Miocene to Pliocene age. This succession has been studied in 26 wells in Lee and Hendry Counties, Florida, where lithologic and micropaleontologic analyses indicate deposition under rapidly shifting nearshore environments, perhaps the result of eustatic sea-level fluctuations correlative with Southern Hemisphere glaciation. Despite the relatively sharp facies changes within the sedimentary complex, geologic cross sections show the persistence of some sharply contrasting limestone and clay units which can serve as a basis for correlation. Other aids to correlation include a distinctive diatom bed within the latest Miocene clay unit and the establishment and use of local benthic foraminiferal assemblage zones.

PENLAND, P. S., and W. RITCHIE, Louisiana State Univ., Baton Rouge, La.

Variations in Littoral Sand Features with Special Reference to Washover Forms on Caminada-Moreau Coast, Louisiana

Much documentary evidence (maps, aerial photographs, special surveys) exists by which the historical retreat of the Caminada-Moreau, Louisiana, beach coastline can be measured. Retreat is constantly producing new beach and related landforms. The two main processes are washover and eolian sand movements. Repeated surveys along fixed lines have identified appreciable differences by which sand encroaches on different types of landward surfaces such as marshes, old distributary channels, lakes, tidal lagoons, and man-made features (pipeline canals). Tidal change, wave action, wind strength and direction, and vegetation are the main factors that produce variations in the sand features, but the forms of the preexisting reception surface are also important. Some estimate of the effect of severe storms or hurricane activity can also be made by correlating climatic records, aerial photographs, and older landforms. Small-scale surface characteristics are produced by rain wash, and lake- and bayou-margin wave effects.

Several physiographic situations are repeated along the 19-km-long coastline: wide flat washover beaches, concentrated washover splays, microcliffs in old dunes, active dunes, and stabilized dunes. Some of these differences can be related to the presence or absence of an organic silt (old marsh) platform in the intertidal zone, whereas other features seem to be related to systematic longshore changes operating between Caminada Pass and the Fourchon outlet of Bayou Lafourche.

POAG, C. WYLIE, U.S. Geol. Survey, Woods Hole, Mass., and R. CHRISTOPHER TRESSLAR, Vincennes, Ind.

Living Foraminifers of West Flower Garden Bank, Northernmost Coral Reef in Gulf of Mexico

At West Flower Garden Bank, on the outer Texas-Louisiana continental shelf, 104 species of living benthic foraminifers representing 73 genera were found in sediments and on hard substrates collected from the submerged coral reef and biostrome. Three habitat associations can be recognized. (1) An association of abundant sediment-dwelling species is formed by *Cassidulina* sp., *Loxostromum limbatum* forma *costulatum, Peneroplis proteus, Pseudomassilina* (?) sp., *Quinqueloculina* sp. A, *Q.* sp. B, *Rosalina* sp. B, and *Rotaliammina trumbulli.* (2) An association of abundant hard-substrate-dwelling species is formed by *Carpenteria utricularis, Carterina spiculotesta, Gypsina plana, Homotrema rubra, Planogypsina squamiformis, Planorbulina acervalis, Planorbulina mediterranensis, Planorbulinoides retinaculata, Rotaliammina squamiformis,* and *Sporadotrema cylindrica.* (3) An association dwelling in abundance both in the sediments and on hard substrates is formed by *Amphistegina gibbosa, Eponides repandus, Miliolinella circularis, Neoconorbina orbicularis, Spirillina vivipara,* and *Tretomphalus atlanticus.*

Only 17 (16%) of the West Flower Garden Bank species are endemic to the Gulf of Mexico; 83 (80%) occur elsewhere in the Caribbean; and 53 (51%) also occur in the tropical Indo-Pacific. Thirty-two species (31%) are reported for the first time from the Gulf of Mexico, and 12 species (12%) are newly reported from the north-

western Gulf; 18 species (17%) appear to be undescribed in previous literature. Many of the newly reported species are abundant at West Flower Garden Bank and several other species, known only sparsely from other Gulf and Caribbean reefs, are important constituents of the West Flower Garden Bank foraminiferal community. These results emphasize the value of direct sampling techniques that recover hard reef substrates.

PRICE, LEIGH C., JERRY L. CLAYTON, and LINDA L. RUMEN, U.S. Geol. Survey, Denver, Colo.

Organic Geochemistry of Deep Well in Hinds County, Mississippi

Detailed organic geochemical analyses of the fine-grained rocks from the 6.9-km-deep McNair 1 well in Hinds County, Mississippi, include organic carbon, extraction and elution chromatography, gas chromatography and mass spectrometry of $C_{15}+$ saturated and aromatic hydrocarbon fractions, rock pyrolysis, and kerogen analysis. Rocks range in age from Paleocene to Early Jurassic. The well had an estimated bottom-hole temperature of 225°C, although paleotemperatures were probably higher.

Some data from this well are inconsistent with currently accepted organic geochemical hypotheses concerning the generation and thermal destruction of hydrocarbons. For example, appreciable (up to 1,550 ppm) $C_{15}+$ hydrocarbons are present in Jurassic rocks at temperatures of 200 to 225° C. Substantial amounts (80 to 180 mg/g) of pyrolyzable hydrocarbons remain on the kerogen in these same rocks. Temperatures and/or duration of heating appear to have been inadequate for complete peak generation and thermal destruction of hydrocarbons to have occurred in these rocks. In addition, unexpected trends (versus depth) are present in the $C_{15}+$ saturated hydrocarbons as well as in the kerogen composition. Mass spectrometric analyses show that the n-paraffins and iso-paraffins decrease with an increase in depth and that the three-ring to five-ring naphthenes increase with increase in depth; both trends occur over the depth range from 1.8 to 5.2 km. Further, elemental analyses of kerogen show that the H/C, O/C, and N/C atomic ratios of kerogen increase over the depth range from 5.3 to 7.0 km.

Significant changes in the organic geochemical characteristics of this well bore correlate with changes in lithology.

The data from this and other wells studied, suggest that some of the accepted concepts regarding generation and maturation of petroleum hydrocarbons may need further refinement.

PRICE, W. ARMSTRONG, Independent, Corpus Christi, Tex., and ROBERT H. PARKER, Coastal Ecosystems Management, Inc., Fort Worth, Tex.

Origins of Permanent Inlets Separating Barrier Islands and Influence of Drowned Valleys on Tidal Records Along Texas Gulf Coast

Sedimentary and hydrographic patterns of western Gulf of Mexico barriers and barrier lagoons have been influenced by dominant southwestward longshore drift. This influence has been both direct and indirect as the drift deflected rivers southwest from their mouths.

The entrenched, drowned, filled, and undrained late Pleistocene river valleys pass diagonally under the Holocene lagoons and barrier chains at depths of 100 ft (30 m) or more. These drowned river valleys invariably follow deeply entrenched fault systems of Mesozoic origin.

Of the 40 or more historic storm washovers per 100 mi (160 km) of barrier chain, only seven natural passes have remained well established during the past 150 years. Five of the seven barrier breaks cut diagonally over broad submerged or subsurface valleys of present-day rivers. Two are located at downdrift bay ends.

Cyclic migrations and abnormally high relative sea-level-rise rates, indicated by tide gauges located at barrier inlets, suggest vertical instability. A recorded example of such instability is subsidence of 1.2 ft (0.4 m) during the past 47 years of the east end of the Galveston seawall, overlying the subsurface valley of the Trinity River. Tide-gauge records for the same period at Pensacola, Florida, presumed tectonically stable, reveal slight eustatic changes, but not the 1.2 ft (0.4 m) higher levels found at Galveston. The Galveston seawall subsidence antedates the onset of subsurface fluid extraction in the Houston-Galveston area.

The counterclockwise spiraling of hurricanes crossing the barrier chains produces surges through barrier gaps and topographic lows. Inlet migrations over unstable valley fill have been halted at the south against the large fans characteristically formed at inlets. These fans help segment lagoons into a series of bay basins. The inlet-fan morphology forms a funnel mouth for the ebb-tide jet flowing out of the inlet, dominating flow patterns of bays.

ROPER, PAUL J., Superior Oil Co., Lafayette, La.

Evidence for Post-Jurassic Tectonism in Eastern North America

The Gulf Coastal Plain province extends eastward along the North American continental margin, and makes up a large part of the terrain of eastern North America. Both the Gulf Coast and eastern North America have been regarded as regions quiescent since the Jurassic Period because there appears to have been no obvious tectonic activity there, or any reason for it to occur. However, recent investigations, especially in eastern North America, suggest that this view may be too conservative.

Post-Jurassic tectonic activity in eastern North America is indicated by widespread faulting, extensive subsidence and uplift which continue to the present, igneous activity, and a regional horizontal compressive stress. Much of this activity seems to be associated with compressional deformation, and vertical uplift and subsidence. The regional extent of these events is very large, though the magnitude of the diastrophism is less spectacular than in other regions generally associated with orogenic activity. Any model that attempts to explain post-Jurassic tectonism in eastern North America must account for these types of activity.

SANNESS, TORSTEIN, Saga Petroleum U.S., Inc., Houston, Tex., and E. D. MINIHAN, Marshall R.