gas. Thickness of the Pensacola Clay increases southwestward. The Miocene coarse clastics are micaceous, locally carbonaceous and fossiliferous, and contain numerous beds of small mollusk shells.

Within the Pensacola Clay and the overlying Miocene coarse clastics, three separate progradational marine sequences may be recognized. Generally, sediments within each sequence coarsen upward. The lowermost sequence, the Amos, contains the gas-productive Amos sand. The middle sequence, the Escambia, has the Escambia Sand at its top. The uppermost sequence includes the upper member of the Pensacola Clay, which contains the gas-producing Meyer sand, and the interfingering Miocene coarse clastics.

Foraminifera found in the Pensacola Clay are indicative of outer to inner-neritic environments. Foraminiferal species number and diversity, as well as number of planktonic species, generally decrease upward within each depositional sequence, indicating an increasingly restrictive marine environment and shallowing of the seas.

The presence of *Globorotalia fohsi fohsi, G. fohsi robusta, G. fohsi lobata*, and *G. praemenardi* in the Amos depositional sequence indicates a middle Miocene age for the sequence. A late Miocene age is indicated for the Miocene coarse clastics by *Rangia (Miorangia) microjohnsoni*. The three depositional sequences appear to correlate with the TM 2.2, TM 2.3, and TM 3.1 third-order cycles of sea-level change as proposed by Vail et al in 1977.

Isopach and net sand maps of the different depositional sequences are useful for petroleum exploration. Comparison of such maps for the Amos depositional sequence indicates that in Baldwin County, Amos sands (the most productive of the Miocene sands) occur where the depositional sequence is locally thicker, probably as a result of postdepositional compaction of clays surrounding sand bodies. Sands found at the top of the Amos depositional sequence are often productive because these sands have been transgressively reworked and are overlain by marine source beds.

RITCHIE, WILLIAM, Univ. Aberdeen, Aberdeen, Scotland, SHEA PENLAND,* Louisiana Geol. Survey and Louisiana State Univ., Baton Rouge, LA, and RON BOYD, Dalhousie Univ., Halifax, Nova Scotia, Canada

Landform Dynamics of Bayou Lafourche Barrier Shoreline

A three-dimensional morphodynamic model depicting temporal and spatial changes in barrier morphology is presented for the Bayou Lafourche barrier shoreline. Variations in overwash intensity generate a predictable sequence of barrier morphologies, with overwash intensity defined as the frequency and magnitude at which overwash events impact the shoreline. This model depicts continuous change in barrier morphology, with decreasing overwash intensity leading to onshore sediment transport, barrier accretion, and dune development. Increasing overwash intensity leads to barrier erosion, offshore sediment transport, and washover sheet formation.

The erosional sequence begins with stage 1, when a continuous foredune barrier is formed under low intensity overwash and fair weather conditions. Increasing overwash intensity erodes the stage 1 foredune and creates an offshore movement of sand. Increasing overwash intensity leads to foredune breaching, overwash, and the development of an eolian terrace, stage 2. During stage 3, the foredune is eventually destroyed, forming a washover terrace. Continued intense overwash activity finally results in the destruction of stage 3, and the formation of a washover sheet, stage 4.

The accretionary sequence begins with a stage 4 washover sheet generated by intense high-energy overwash conditions. With decreasing overwash intensity, an onshore movement of sediment is produced and the barrier begins to accrete, leading to stage 3. Continuing low overwash intensities lead to discontinuous foredune development and the formation of an eolian terrace, stage 2. Stage 1 is reached when the discontinuous foredunes coalesce to form a linear continuous foredune.

Spatially, longshore variation in sediment availability results in different barrier-beach stages occurring simultaneously along the Bayou Lafourche barrier shoreline. Position within the barrier island system determines sediment supply. Coastal tracts on the central headland and updrift, and of flanking barrier islands, are characterized by a negative sediment budget and the persistence of barrier stages 3 and 4. The downdrift flanks of the erosional headland and flanking barrier islands and spits have abundant sediment, with barrier stages 1 and 2 persisting. An intense overwash event associated with a major tropical cyclone impact would transform the entire Bayou Lafourche barrier shoreline into a stage 4 barrier and initiate a new accretionary sequence.

ROSS, JAMES E., Univ. Houston and Gulf Oil Corp., Houston, TX, and ROSALIE F. MADDOCKS, Univ. Houston, Houston, TX

Recurrent Species Associations and Species Diversity of Cytheracean Ostracodes in Upper Austin and Lower Taylor Groups (Campanian, Upper Cretaceous), Travis County, Texas

Assemblages of cytheracean ostracodes from the Dessau, Burditt, and Sprinkle formations of the upper Austin and lower Taylor Groups of Travis County, Texas, were examined in order to identify recurring species associations and the paleoenvironmental factors that control their stratigraphic distribution. From Q-mode cluster analysis, six sample groups were identified, all of which correspond closely to observable lithofacies. Four recurrent species associations were identified from the R-mode cluster analysis and were found to correspond to four of the six sample groups. Indices of species diversity and of its components, species richness and species equitability, show noticeable changes from one lithofacies to another, with the greatest changes occurring at the disconformable Dessau-Burditt and Burditt-Sprinkle (Austin-Taylor) contacts.

The stratigraphic distributions of cytheracean ostracode faunas in the upper Austin and lower Taylor appear to be controlled by the distribution of lithofacies. Some of the faunas, however, differ primarily in abundances of species, as opposed to containing different species. Such faunas can be differentiated by comparing values of species diversity and its components. Plotted trend-curves of the indices provide visual aids for this purpose. The parallel shapes of the trend-curves for two outcrops suggest potential use of diversity trend-curves for stratigraphic correlation, and major breaks in these curves at known disconformities show potential for detecting previously unrecognized disconformities. Appearances and disappearances of a few species, including *Alatacythere cheethami, "Hazelina" austinensis, Schuleridea travisensis,* and *Loxoconcha retiolata,* may be temporally significant.

SELF, ROBERT P., Nicholls State Univ., Thibodaux, LA

Petrologic Variation in Pliocene to Quaternary Gravels of Southeastern Louisiana

Grain-size analyses and chert-to-quartz ratios were studied on Pliocene and Quaternary gravel fractions from the Florida parishes of southeastern Louisiana to differentiate between gravels of different ages. Gravels are found in the following units: (1) Pliocene-Pleistocene Citronelle Formation; (2) Prairie Formation (< 35,000 y.B.P.); (3) Deweyville terrace deposits (30,000 to 17,000 y.B.P.); and (4) Holocene channel and bar deposits.

Petrologic studies show that the Citronelle gravels are easily distinguished from the younger terrace gravels by their coarser grain size, low granule content and high chert-to-quartz ratios. Prairie and Recent gravels have similar textures and composition indicating they were deposited under similar conditions. Both Prairie and Recent gravels were derived directly from the Citronelle (Bogue Chitto valley), whereas in others (Tangipahoa valley) they were cycled through the Prairie Formation.

In the Pearl River valley, Prairie and Deweyville gravels are significantly finer and contain higher granule content and lower chert-to-quartz ratios than other gravels in the Florida parishes; this suggests that the late Pleistocene Pearl River was mature and had high discharges, possibly due to an enlarged drainage basin that contained quartz-rich sources which are not available to the modern Pearl River. Post-Deweyville climatic and hydrologic changes have resulted in a smaller drainage basin and less discharge for the modern Pearl River.

SIESSER, WILLIAM G., Vanderbilt Univ., Nashville, TN

Paleogene Calcareous Nannoplankton Biostratigraphy: Mississippi, Alabama, and Tennessee

Distribution and abundance of calcareous nannoplankton in the Paleogene formations of Mississippi (MS), Alabama (AL), and Tennes-