E. S. HUGHES: Some comparisons of Neogene microbiostratigraphy in offshore Louisiana and Blake Plateau 1:30–1:50
2. P. ČEPEK, W. W. HAY: Calcareous nannoplankton and biostratigraphic subdivision of Upper Cretaceous 1:50–2:10
3. W. P. LEUTZE: Significance of Pliocene stratigraphic paleontology, Gulf Coast 2:10–2:30
4. R. H. PARKER: Megafaunal facies, estuary to shelf edge, surrounding Gulf of Mexico 2:30–2:50
5. W. D. BOCK: *Thalassia testudinum*, habitat and means of dispersal for shallow-water benthonic Foraminifera 2:50–3:10
6. D. S. MARSZALEK, R. C. WRIGHT, W. W. HAY: Function of test in Foraminifera 3:10–3:30
7. H. S. PURI, B. DICKAU: Use of radial pores in taxonomy and paleoecology of Ostracoda 3:30–3:50
8. N. E. ANDRESS, F. H. CRAMER, R. F. GOLDSTEIN: Ordovician chitinozoans from Florida well samples 3:50–4:00
9. R. F. GOLDSTEIN, F. H. CRAMER, N. E. ANDRESS: Silurian chitinozoans from Florida well samples 4:00–4:10
10. D. P. DOMNING: List, bibliography, and index of fossil vertebrates of Louisiana and Mississippi 4:10–4:20
11. D. NICOL: Deposit-feeding Pelecypods in recent marine faunas 4:20–4:40
12. D. R. MOORE: Systematics, distribution, and abundance of West Indian micromollusk *Rissoina catesbyana* 4:40–5:00

FRIDAY MORNING, OCTOBER 31

GCS-SEPM SYMPOSIUM

Marine Quaternary of Caribbean and Gulf of Mexico Regions

Presiding: JAMES L. LAMB, W. H. AKERS

1. W. C. ELSIK: Late Neogene palynomorph diagrams, northern Gulf of Mexico 9:00–9:15
2. M. A. ROGERS, C. B. KOONS: Organic carbon δ C^{13} values from Quaternary marine sequences in Gulf of Mexico: a reflection of paleotemperature changes 9:15–9:30
3. J. H. BEARD: Pleistocene paleotemperature record based on planktonic foraminifers, Gulf of Mexico 9:30–9:50
4. E. ROBINSON: Coiling directions in planktonic Foraminifera from Coastal Group of Jamaica 9:50–10:05
5. J. L. LAMB: Planktonic foraminiferal datums and late Neogene epoch boundaries in the Mediterranean, Caribbean, and Gulf of Mexico 10:05–10:25
6. N. D. WATKINS: Virtues and vices of paleomagnetic method as applied to marine sedimentary cores 10:25–10:40
7. J. P. KENNETT, K. R. GEITZENAUER: Relations between *Globorotalia truncatulinoides* and *G. tosaensis* in Pliocene-Pleistocene deep-sea core from South Pacific 10:40–10:55
8. L. A. SMITH: Pleistocene discoasters from stratotype of Calabrian Stage (Santa Maria di Catanzaro) and section at Le Castella, Italy 10:55–11:10
9. S. GARTNER, JR.: Correlation of Neogene planktonic foraminifer and calcareous nannofossil zones 11:10–11:30
10. H. G. RICHARDS: Review of recent studies on marine Pleistocene of Atlantic coastal plain—New Jersey to Georgia 11:30–11:50
11. D. E FRAZIER: Depositional episodes: their relation to Quaternary sea-level fluctuations in Gulf Coast region 11:50–12:05

SEPM TECHNICAL PROGRAM

FRIDAY AFTERNOON, OCTOBER 31

Presiding: W. A. ATIEL, J. W. FOWLER, E. B. O'QUINN

1. P. R. SUPKO: Diagenetic patterns in subsurface Bahaman rocks, San Salvador Island 1:30–1:50
2. R. W. FREY, T. D. HOWARD: Profile of biogenic sedimentary structures in Holocene barrier island—salt marsh complex 1:50–2:10
3. E. HOPKINS, S. CHESSER, J. MAY, D. POCHE, H. G. GOODELL: Relict nature of sediments and submarine topography off Alligator Harbor, Florida 2:10–2:25
4. E. G. OTVOS: Moreau-Caminada chenier complex, southeastern Louisiana 2:25–2:40
5. J. P. MANKER, G. M. GRIFFIN: Distribution of silicate minerals in Florida Bay 2:40–2:50
6. J. R. CONOLLY, M. EWING: Redeposition of pelagic sediment by turbidity currents; a common process for building abyssal plains 2:50–3:15
7. E. BONATTI, K. BOSTROM, B. EYL, E. RONA: Geochemistry, mineralogy, and absolute ages of Caribbean sediment core 3:15–3:35

ABSTRACTS

CHARLES C. ALMY, Chevron Oil Co., New Orleans, La.

SEDIMENTATION AND TECTONISM IN UPPER CRETACEOUS PUERTO RICAN PART OF CARIBBEAN ISLAND ARC

Throughout Late Cretaceous and earliest Tertiary times, large masses of volcanic material were deposited adjacent to and contemporaneously with thick limestone sequences in the Puerto Rican part of the Caribbean island arc. The detailed study of one of these limestones, the Parguera Limestone (Upper Cretaceous Mayagüez Group), and a study of available regional data, suggest a direct relation between tectonism and these lateral changes in rock type.

Late Cretaceous and Eocene deformation in western Puerto Rico consists of northwest-trending open folds cut by west-trending strike-slip faults. The regional overthrusting commonly ascribed to island arcs is not found in this area. Furthermore, the overthrusting initially suggested as a mode of emplacement for the Parguera Limestone is eliminated because of good correlation between the variations in rock fragments

included in the basal limestone and the variations in the underlying volcanic rocks and serpentinite complex.

Tectonic isolation of the Parguera Limestone is suggested by the internal consistency of the unit, as opposed to the internal abrupt changes which characterize other rock types surrounding the Parguera, and by the contemporaneity of adjacent volcanic units. Contemporaneous tectonism and sedimentation as shown not only by the volcanic flows included in the Parguera but also by the thinning of the Parguera Limestone toward structurally high areas.

Vertical and lateral shifting of upper crustal blocks probably took place in response to deeper crustal movements. In a carbonate-producing environment, carbonate-rich sediments would accumulate on the higher standing blocks while lower areas would be flooded with volcanic debris. Such tectonic isolation of neighboring crustal blocks may have permitted adjacent and contemporaneous development of limestones and volcanic sequences throughout the developing Caribbean island arc.

NOEL E. ANDRESS, FRITZ H. CRAMER, and ROBERT F. GOLDSTEIN, Florida State Univ., Tallahassee, Fla.

ORDOVICIAN CHITINOZOANS FROM FLORIDA WELL SAMPLES

Ordovician chitinozoans recovered from a grayish-black shale are described for the first time for subsurface north-central Florida. The lowest sample of the Sun Oil Company, Earl Odom No. 1 well, Suwannee County, Florida, is dated between late Arenigian and early Caradocian. The Ordovician is overlain directly by Silurian rocks. A new chitinized species is described.

JOHN W. ANTOINE, Texas A&M Univ., College Station, Tex.

GEOPHYSICAL STUDIES OF NORTHERN FLORIDA PLATFORM, GULF OF MEXICO

The western edge of the North Florida platform has been delineated in some detail by seismic-reflection investigations. The platform boundary is not apparent from topographic surveys because of the thick sediment cover. The platform edge appears to coincide with the trend of a probable offshore extension of the Lower Cretaceous (Washita-Fredericksburg) reef trend.

The presence of a more recent reef, normal to the lower Cretaceous reef, is indicated from interpretation of additional reflection records. This feature trends almost east-west and crosses the buried edge of the North Florida platform. It can be traced for approximately 30 mi and can be aligned with an old buried shoreline on the east.

The top of the Upper Cretaceous has been traced over most of the continental slope south of the Florida Panhandle by seismic-reflection profiling. Studies on the outer slope indicate that this horizon rises near the center of the platform, along long. 86°30′, to less than 5,000 ft below sea level. On the west, near the edge of the platform at long. 87°30′, the top of the Upper Cretaceous is at 7,000 ft whereas on the east where the Florida escarpment intersects 85°30′ long., the indicated depth is more than 5,700 ft below sea level.

The reflection surveys show that erosion has played a very important role in the formation of the western part of the platform. It is evident that erosional processes have been active at least since the Late Cretaceous. This can be interpreted to indicate that the circulation in the Gulf of Mexico, and the loop current in particular, has been essentially the same during the entire Cenozoic Era.

DANIEL D. ARDEN, JR., Signal Exploration (Jamaica) Co., Kingston, Jamaica

GEOLOGIC HISTORY OF NICARAGUAN RISE

A study of refraction-seismic velocity data beneath the Caribbean Sea and nearby areas of the Atlantic Ocean reveals that the thickest crust is in the Antillean island belts and the Nicaraguan Rise. In the Nicaraguan Rise, the maximum thickness is about 22 km and is south of the present topographic crest. Isopach maps of total crustal thickness indicate that the Caribbean crust is intermediate between average oceanic and continental crust.

The oldest dated rocks in the Caribbean are Jurassic, a fact which is consistent with the idea that the region had its origin in early Mesozoic time as a result of rifting and subsequent drift between the American and Afro-European continental blocks.

Throughout Jurassic and Early Cretaceous time, the Nicaraguan Rise was a mobile belt associated with vast submarine lava flows and mafic intrusives. Volcanism gradually decreased during the Late Cretaceous. Terrigenous clastic and carbonate strata alternated with tuff, agglomerate, and mixed-origin volcanic-sedimentary units. The first phase of the Laramide orogeny occurred at the end of the Cretaceous, and it may have been at this time that a rift along the southern flank of the rise separated it from the Beata Ridge which now is south of Hispañola.

Normal marine sedimentation—clastic and chemical—prevailed during the Tertiary. Islands emerged and sank as movement occurred between crustal blocks. Tectonism beginning in middle Miocene time markedly altered the topography and depositional pattern of the rise. The Cayman Trough rift formed as a result of left-lateral displacement of at least 250 mi. The Nicaraguan Rise was tilted southward, with the result that the topographic crest was shifted 50–100 mi north.

Recent geophysical work related to petroleum prospecting has aided in interpreting the structure and stratigraphy of the rise. Cross sections and a map of depth to magnetic basement are presented.

MAHLON M. BALL, Inst. Marine Sci., Univ. Miami, Miami, Fla.

ORIGIN OF GULF OF MEXICO AND CARIBBEAN SEA; IMPLICATIONS REGARDING OCEAN RIDGE EXTENSION, MIGRATION, AND SHEAR

The Gulf of Mexico and Caribbean Sea are a zone of north-south extension and left-lateral shear opened between the Americas as those continents moved westward from Africa. The movements are related to ocean-floor spreading from the mid-Atlantic ridge. To accommodate spreading, the ridge itself migrates westward from Africa. Ridge migration is radial outward from Africa and results in opening triangular sheared grabens with apexes against Africa. A new ridge segment extends across these openings. Spreading rates vary and the migrating and extending ridge is sheared on fracture zones in response to these variations.

The currently popular related concepts of plate tectonics and transform faults are inconsistent with ridge migration and shear because those concepts do not allow for shear on fracture zones beyond ridge offsets and in the directional sense indicated by the position of ridge segments. Ridge migration and shear are a