necessary complication of the spreading hypothesis. T-intersections of ridges are explained as intersections between a spreading and migrating ridge with a shear. The shear is only active on the side of the ridge toward which the migration is taking place. The junction of the mid-Atlantic ridge with the Azores-Gibraltar ridge is an example of such a feature.

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GRAVITY SURVEY OF FLORIDA BAY AND LOWER KEYS

A Bouguer gravity map of the southern part of Florida, including stations ranging from about 24° to 26° N lat., and 80° to 83° W long., is presented.

The salient features depicted are: (1) the western rim of the South Florida basin, with gravity values increasing toward the basin's center; (2) a large minimum anomaly centered near Homestead in Dade County; (3) an elongate gravity minimum extending from the area of Barnes Sound southwestward over most of Florida Bay; and (4) a minimum indicated by two gravity readings obtained in the Marquesas Keys, suggesting a need for further investigation.

Examination of cuttings and cores recovered from oil tests drilled on or near the minimum anomalies indicates that if salt is present, it is deep seated (below 11,000 ft). Wells near Homestead show that the area is structurally high at levels ranging from Eocene to Lower Cretaceous. The preponderance of anhydrite, dolomite, and dense aphanitic limestone in more than 4,000 ft of Lower Cretacous rocks penetrated in the area suggests that the average density of this section may exceed that of the underlying basement. If true, a minimum anomaly would occur over an uplifted or topographically high area of the basement.

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PLEISTOCENE PALEOTEMPERATURE RECORD BASED ON PLANKTONIC FORAMINIFERS, GULF OF MEXICO

Planktonic foraminifers from deep-water sediment cores in the northern Gulf of Mexico indicate alternating cold- and warm-water faunas, and are interpreted to represent glacial and interglacial stages of the Pleistocene. *Globorotalia menardii* (warm) and *Globorotalia inflata* (cold) are the most sensitive indicators for delineating severe changes in Pleistocene temperature in the Gulf of Mexico.

Based on planktonic datums the cold-warm cycles are correlated with water-depth changes in the shallower shelf environment which are interpreted to represent eustatic sea-level changes. The cold intervals represent times of lowered sea level and are correlated with the glacial stages of North America. Age relations of the glacially related events recognized in the marine Pleistocene section with the continental glacial stages are well documented to about 35,000 years ago based on carbon 14 dates. Age relations between the older part of the marine Pleistocene and the continental glacial stages are not as well documented but can be inferred from correlation between the glacial-interglacial cycles and paleomagnetic reversal events which are well dated by potassium-argon.

Onset of severe climatic deterioration and beginning of the Quaternary (Nebraskan Stage) in the Gulf of Mexico corresponds with the extinction horizon of *Globoquadrina altispira*. Correlation of this horizon with the paleomagnetic reversal events indicates an age of about 2.8 m.y. ago for the Pliocene-Pleistocene boundary.

Placement of the Pliocene-Pleistocene boundary at 2.8 m.y. ago allows recognition of five major glacially-related events in the marine Pleistocene based on climatic and eustatic criteria. Faunal data indicate that the Nebraskan, Illinoian, and Wisconsin were severely cold periods, whereas, the Aftonian, Kansan, and Yarmouth were warmer, the Aftonian being the warmest. Carbon 13/12 isotope data support these conclusions.

Foraminifera and discoasters from the marine Calabrian Stage of southern Italy at Santa Maria di Catanzaro indicate a correlation with the marine Nebraskan Stage, as here defined, in the Gulf of Mexico. Paleontologic evidence indicates that the Pliocene-Pleistocene boundary falls near the base of the Kansan. The cold and warm interval shown below the Pliocene-Pleistocene boundary of Glass and his co-workers is interpreted to represent the Nebraskan and Aftonian Stages. Paleomagnetic evidence indicates that the Olduvai magnetic event probably represents the Gilsa event at about 1.6 to 1.8 m.y. ago.

Advances in paleomagnetic stratigraphy clearly indicate that the magnetic reversals facilitate dating and correlation of marine stages at latitudes where differing paleontologic criteria must be used to delineate the glacial and interglacial episodes. The major paleomagnetic epochs apparently are reliable for stratigraphic correlation; however, the minor events of relatively short duration appear to be less reliable as stratigraphic markers.

A new species of the *Globorotalia menardii* group is described.

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ENVIRONMENTAL CONTROL OF POROSITY IN UPPER SMACKOVER LIMESTONE, NORTH HAYNESVILLE FIELD, CLAIBORNE PARISH, LOUISIANA

Present porosity of the reservoir rock in North Haynesville field is limited to primary intergranular pore space. Certain facies contained larger, better connected pores as a result of deposition in a higher energy environment, but preservation of this porosity against cementation and pressure solution makes the diagenetic environment equally critical.

Regionally, Smackover porosity is confined to a coastal shelf where calcarenites with primary intergranular porosity were widespread, and to a shelf slope where the calcarenites were confined largely to local shoals resulting from contemporaneous uplift. A calcarenite bar along the seaward edge of the shelf slope restricted circulation. North Haynesville field is behind this barrier.

Because of hypersalinity, Smackover allochems are almost entirely nonskeletal, and deposition resembled that of the Bahama Banks. Pelletal mud was deposited in quiet, shallow water with probable periods of subaerial exposure. Slight differential structural movement permitted turbulence in local areas where a mixed facies was deposited. Further movement, probably including lowering of the seaward barrier, created conditions favorable for extensive oölitic accretion during deposition of the reservoir facies. This turbulent shoal environment produced clean, well-sorted calcarenite with excellent porosity, much of which was destroyed through cementation with sparry calcite, possibly under subaerial conditions. A completely cemented zone at the top of the reservoir facies prevented further entry