both hiatuses and preserved sediments are approximately 1-2 m.y. The inferred Miocene glacial epochs are of the same duration as the glacial epochs of the Pliocene-Pleistocene. Oligocene hiatuses are found in all of the world's oceans, indicating cold bottom-following waters. Evidence (e.g., hiatuses or ice-rafted material) demonstrates the occurrence of Eocene continental glaciers in Antarctica. Interaction between the three planetary orbital parameters of eccentricity, tilt, and precession apparently control much of long-term climate change, with the dominance of eccentricity dictating glacial cycles. Continuity of climate pattern for the Tertiary is indicated, given constancy of planetary motion. Miocene, Frio, and Wilcox hydrocarbon reservoirs in the Gulf Coast should be reviewed in terms of a more subtle climatic model to refine interpretation of known depositional sequences.

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Ostracoda of Cretaceous-Tertiary Contact Sections in Central Texas

At the Littig Quarry in Travis County, the Navarro claystones yield sparse ostracod assemblages with low species diversity and equitability, dominated by *Haplocytheridea*, which suggest stressful coastal environments with rapid sedimentation. The ostracod assemblages in the overlying Midway glauconitic claystones are fully marine, moderately diverse, and characteristically Paleocene but sparse, except in the three condensed zones, the lowest of which marks the disconformable contact.

At Walkers Creek in Milam County, the Navarro assemblages are richer and of normal marine, nearshore aspect, with moderate diversity but low equitability, dominated by *Cytherella*. They belong to the "*Cythereis*" *lixula* interval zone, but perhaps not to the youngest part. The condensed zone at the disconformable base of the Midway yields a fully Paleocene fauna with moderately high diversity, either younger or farther offshore than at Littig, with a few reworked specimens of Cretaceous species.

On the Brazos River in Falls County, the Navarro claystones yield assemblages of offshore aspect with moderate species diversity and equitability; they belong to the upper part of the "*Cythereis*" *lixula* zone. A barren sandstone ledge marks a turbidite deposit at which a few Cretaceous species disappear. The claystones above this ledge have sparse, fragmentary assemblages, which gradually become more abundant, more diverse, and better preserved but less equitable upward, reflecting offshore but somewhat stressful conditions with intense naticid predation. *Brachycythere plena, Bairdoppilata suborbiculata,* and other characteristic Paleocene species appear one by one through this 3-m transitional interval, as holdover Cretaceous species gradually disappear, until a fully Paleocene fauna is established.

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Plate Tectonic Controls of Hydrocarbon Traps in Carbonate Rocks

Recent advances in understanding depositional environments and diagenesis of carbonate rocks provide a wealth of information regarding the nature of carbonate hydrocarbon traps. Projections of such data from control wells to unexplored areas are somewhat limited in scope because of paucity of data. This problem is particularly acute in frontier regions, where observations from only a few wells must be projected into a vast unexplored area.

The effects of eustatic sea level fluctuations on the carbonate facies are another focus of recent research. Undoubtedly, sea level fluctuations greatly influence the environmental and diagenetic stratigraphy of carbonate rocks. Additionally, the subsidence mechanisms in various types of basins profoundly control the morphology and distribution of carbonate facies.

This paper documents the various influences of synsedimentary tectonics on development of carbonate traps in various plate tectonic settings. Understanding such models allows projection of environmental and diagenetic data from a limited number of control wells into the sparsely explored areas.

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Upper Jurassic Norphlet Hydrocarbon Potential Along Regional Peripheral Fault Trend in Mississippi, Alabama, and the Florida Panhandle

Recent Upper Jurassic Norphlet oil discoveries associated with the West Bend fault system in Clarke County, Alabama, and Foshee fault system in Escambia County, Alabama, have renewed interest in exploring for hydrocarbons along the regional peripheral fault trend in Mississippi, Alabama, and the Florida Panhandle. The recently discovered Chavers Creek and Sizemore Creek oil fields and the Strickland 10-4 2 oil discovery in Escambia County, Alabama, are upthrown to the Foshee fault system. The trapping mechanism at Chavers Creek field is a faulted salt anticline, and the petroleum trap at Sizemore Creek field is an elongate salt anticline. The 1985 Womack Hill Field Unit 14-5 oil discovery in Clarke County, Alabama, is upthrown to the West Bend fault system. The petroleum reservoirs at Chavers Creek and Sizemore Creek oil fields include eolian and wadi sandstones of the Norphlet Formation. Porosity is estimated to be 11-22%, and permeability is estimated to be 14-47 md. Oil gravity in Chavers Creek field is 42.7° API, and that in Sizemore Creek field is 59.9° API.

The Norphlet oil discoveries in Clarke and Escambia Counties, Alabama, and the existence of established productive Norphlet hydrocarbon fields in Mississippi, Alabama, and the Florida Panhandle demonstrate the petroleum potential along the regional peripheral fault trend in central and eastern Mississippi, southwestern Alabama, and the Florida Panhandle. The key to successful prospecting for hydrocarbons along this fault trend is to delineate faulted salt anticlines or other salt anticlines and identify reservoir-grade eolian, wadi, and marine sandstones of the Norphlet Formation.

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Sources of Pleistocene and Holocene Sand for Northeast Gulf of Mexico Shelf and Mississippi Fan

Grain shape, surface texture, and mineralogic analyses were conducted on the Pleistocene and Holocene sands of the northeast Gulf of Mexico shelf and the Mississippi fan to determine their sources. Two distinct petrologic provinces of sand are present in this area: the Mississippi province, characterized by spherical quartz grains derived from older strata in the drainage basin of the Mississippi River, and the eastern Gulf province, characterized by a mixture of spherical and elongate quartz grains. The former is derived from Cretaceous and Tertiary coastal plain strata; the latter is derived from sedimentary and crystalline rocks of the southern Appalachian Mountains.

Sand distribution patterns of these two provinces on the northeast shelf are distinct; Mississippi province sands are found in the western part of the shelf near the Mississippi delta, while Eastern Gulf province sands are found throughout the remaining parts of the shelf. However, sands of the Mississippi fan are a mixture of Mississippi and Eastern Gulf province sand. Glacial sand is uncommon in both the Holocene and Pleistocene deposits of the Mississippi province.

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Fluid-Flow Patterns in Central Tuscaloosa Trend, Louisiana

Contoured hydraulic-head cross sections constructed from well logs in the central Tuscaloosa gas trend of Louisiana provide information about fluid flow near the hydropressure-geopressure interface. Extensive head inversions correspond to long, dip-oriented convolutions of the interface. The inversions occur where permeable, hydropressured, massive sandstone facies in the lower Tuscaloosa underlie geopressured Eagle Ford Shale updip of fault zones that preserve geopressures downdip. Thus, regional fluid pressure regimes in the Tuscaloosa and Eagle Ford are predominantly structurally controlled, with some lithofacies control updip.

Hydraulic-head trends indicate an overall pattern of regional upward flow from depth, with highest hydraulic gradients corresponding to the top of the Austin Chalk in most places. This pattern is complicated by inversions—which are nearly horizontal and tend to show high hydraulic gradients—and by a sharp, upward-protruding head peak that becomes nearly vertical along a trend above the Lower Cretaceous limestone shelf edge. This peak represents the escape of highly pressurized fluids from depth along a preferred path, which may be fault controlled.

Highest hydraulic gradients occur locally and regionally where fluids flow from geopressured shale toward permeable, hydropressured sandstone. Salinities are also reported to show a regional increase toward