structed in three dimensions by illuminating the plate with white light or light rich in the wavelength to which the hologram is tuned.

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Microbiological Prospecting for Hydrocarbons

No abstract available.

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Early Mesozoic Tectonic Framework and Sedimentation, Northwest Africa

In northwest Africa, Triassic and Early Jurassic deposits accumulated in two different tectonic provinces, the African platform and the Variscan (Hercynian) orogene.

In southern Algeria and Tunisia, Lower, Middle, and Upper Triassic sediments, essentially devoid of volcanic materials, were deposited on the stable African platform south of the Saharan flexure (South Atlas fault zone). Here the basal Triassic beds lie on a post-Variscan unconformity which marks a progressively longer hiatus northward toward the orogene. The sequence consists mainly of nonmarine arenaceous and argillaceous evaporite facies, with intercalations of marine limestone and dolomite increasing toward the northeast. These deposits resemble correlative ones in western Europe. On the unstable eastern cratonic margin and adjacent southwestern corner of the Pelagian block (Djeffara Plains) Lower Triassic detrital paralic sedimentary rocks conformably overlie a thick succession of Permian marine strata.

Most of the Variscan province apparently was stable and emergent during Early and Middle Triassic times. Nevertheless, the mid-Triassic Tethyan transgression that spread a carbonate-evaporite mantle across central and northern Tunisia did encroach westward onto the eastern part of the orogene. Early Mesozoic extensional deformation of the Variscan domain produced differential vertical displacement along the Saharan flexure between the orogene and the African platform, as well as on the orogene along the central Altantic, Middle Atlas, and Gibraltar fracture zones. In the west, this deformation outlined the Moroccan and Oranian mesetas which remained relatively stable and were extensively eroded during early Mesozoic time. Red beds, evaporites, and basaltic flows filled the basins. Although poorly dated by fossils, their linear pattern and discordant boundaries, and radiometric ages of the volcanic rocks, indicate that the basins were formed during the Late Triassic extensional phase that disrupted eastern North America.

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Draney Limestone—Early Cretaceous Lacustrine Carbonate Deposition in Western Wyoming and Southeastern Idaho

The Lower Cretaceous Draney Limestone, a lenticular carbonate sequence well exposed throughout the Overthrust belt in western Wyoming and southeastern Idaho, records deposition in an extensive, shallow, low-salinity lacustrine system that minimally covered 30,000 sq km. The predominant lithologies of calcareous mudstone, micrite, intramicrite, and biomicrite contain a lacustrine biota composed predominantly of ostracods and the calcareous alga *Chara*, with less common bivalves and gastropods. The continuity of the Draney throughout the area indicates that this lake was a more or less continuous body of water throughout deposition. Individual units within the Draney, however, cannot be correlated over large distances; this fact suggests significant local chemical and/or physical variations within the lake basin during carbonate deposition.

The lake appears to have been relatively shallow throughout its extent, as evidenced by the presence of winnowed sandy biomicrite and the ubiquitous *Chara*, which in modern systems is restricted to shallow photic zones. Limonitic calcareous mudstones which exhibit well-developed calcite boxwork fabrics and vugs filled with calcite spar indicate infrequent subaerial exposure and alteration of lake sediments. Modern playa systems do not serve as a satisfactory analog to the Draney lake because features indicative of (1) frequent subaerial exposure, (2) deposition in exceedingly shallow water, or (3) coprecipitation of more evaporitic minerals have not been observed in the Cretaceous sections. On the contrary, lithologic, faunal, and floral features of Draney strata are more nearly identical to those of marl deposits in modern, temperate-region, hardwater lakes. Therefore, Cretaceous carbonate deposition under somewhat similar conditions is suggested.

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Regional Hydrocarbon Source-Rock Evaluation of Atlantic Coastal Plain Adjacent to Georgia Embayment

In January 1978, GeoChem Laboratories completed a regional hydrocarbon source-rock study involving 13 wells in the Atlantic coastal plain adjacent to the GE-1 COST well. The purpose of this study was to characterize the geochemical zones within the stratigraphic section of the individual wells, to establish their onshore hydrocarbon generating potential, and to assist in the evaluation of the Georgia embayment by projection of the geochemical data into the offshore region.

Although the analyses were performed on the Tertiary through Lower Cretaceous sediments, only the Upper Cretaceous section exhibited source-generating potential. Evaluation of the sediments as to total organic content (richness), organic-matter type (prone to be gas-, condensate-, or oil-productive), and state of thermal maturity, showed that both the Selma Group of the Upper Cretaceous (Navarro, Taylor, and Austin Formations) and the Tuscaloosa exhibit good to very good source-generating potential. This favorable potential appears to extend into the offshore region to the northern part of the blocks involved in OCS Sale 43, held in March 1978. Unfortunately, the Upper Cretaceous ap-

pears to be geothermally immature in both the onshore and offshore region and neither the Selma Group nor the Tuscaloosa is considered capable of generating producible quantities of either liquid or gaseous hydrocarbons within these areas.

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Subaqueous Landslides and Diapirs, Gulf of Mexico

No abstract available.

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Gravity-Slide Origin for Mexican Ridges Foldbelt, Southwestern Gulf of Mexico

The geometry of a part of the Mexican Ridges foldbelt in the southwestern Gulf of Mexico as detailed by multifold seismic data suggests an origin by large-scale gravity sliding. Here, apparently competent, lower Tertiary–Holocene strata, probably sandstones and shales, have moved downslope along an underlying deformed zone probably consisting of weak and incompetent Upper Cretaceous–lower Tertiary geopressured shales. Gravity-generated horizontal compressive stresses apparently caused uniform folding and imbricate thrusting within the competent strata. This deformation is probably an important mechanism for overcoming resistance to basal sliding within the incompetent layer. Large-scale submarine sliding is also suggested by the grouping of the fold trends into two large lobate areas. Sliding apparently has continued periodically since about middle Tertiary time. This massive sliding may have been triggered by periods of uplift and seaward tilting and perpetuated by sediment loading in a large growth-fault system just landward of the main foldbelt along the upper slope.

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Miocene Submarine Fans in Deep Western Gulf of Mexico as Interpreted from Seismic Reflection Profiles

Sequences of regularly spaced, seaward-dipping reflections seen on east-west seismic profiles along the lower slope of the western Gulf of Mexico are interpreted to be prograding clinoforms in the distal parts of large submarine-fan complexes. North-south lines define the lobate nature of the fans, some of which are over 50 km across. Some fans appear to be composites of overlapping, individual fan lobes. DSDP hole 90 recovered upper Miocene laminated, silty mud at the top and bottom of one of the prograding sequences, suggesting that any sand in the system must have been deposited farther upslope in the more proximal parts of the fan. Deposition of these sequences may have occurred during a major late Miocene lowering of sea level.

The late Miocene fans appear to be part of an overall fining-upward sequence along the lower slope beginning with the middle Miocene sandy turbidites and continuing through deposition of late Miocene silty clay laminites into Pleistocene deposition of hemipelagic and pelagic sediments. The sandy middle Miocene turbidites were derived from the Mexican mainland on the west and correspond to a zone on the seismic profiles characterized by chaotic and discontinuous reflections. These reflection patterns suggest a fan environment more proximal than the younger fans above—perhaps a suprafan environment with fan channels.

The overall fining-upward sequence and gradual cessation of turbidite deposition probably were due to the late Tertiary growth of the Mexican Ridges foldbelt, which apparently trapped terrigenous sediment and prevented turbidity currents from reaching the deep sea.

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Pan-Pacific Neogene Diatom Correlations

On the basis of piston cores and DSDP sites, a Neogene diatom correlation for Pacific Ocean sediments was determined. Where possible, these correlations rely on the paleomagnetic-reversal record in piston cores. In the central Pacific, diatom datum levels are directly tied to this reversal record. Furthermore, they are extended eastward to DSDP Sites 77 and 158. Although datum levels are generally isochronous in the low-latitude Pacific, some forms have substantially longer ranges in upwelling regions of the easternmost equatorial Pacific. In addition, some high-latitude elements are also present in this region. A mixed assemblage containing both high- and low-latitude diatoms is present at DSDP sites and in piston cores in the northwest and southwest Pacific. This fact permits correlation across several zonal schemes and verifies correlations to such high-latitude sites as 178, 183, and 192 in the North Pacific and 278 in the South Pacific. A series of time-slice maps for the Pacific Neogene depicts changes in the temporal and spatial distribution of diatoms. Diatom-distribution maps reflect accurately the productivity of the overlying water with diatom-bearing sediment present in the eastern equatorial regions and the higher latitude North Pacific. In the South Pacific, diatoms are present south of the Subtropical Convergence. Elsewhere, in the Central Water Masses, the surface sediments are free of diatoms. This pattern holds true generally for much of the Neogene, but major changes in diatom species distribution are indicated in the early Miocene and near the middle/late Miocene boundary.

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Pre-Strike-Slip Positions of Polochic Fault Blocks as Determined from Geomorphic Evidence in Guatemala

Previously reported left-lateral slip of 132 ± 5 km across the Polochic fault of Guatemala and Chiapas, Mexico, was based on a match of structures and stratigraphic units. This amount of offset can also be established by a match of present topographies in the region