wealth of data needed and to evaluate and identify prospect areas, computer technology is employed. Through computerization, inputs varying in scale and information content can be registered to a common scale and integrated into a single geographic data base. Establishment of a geographic data base provides the explorationist a simpler, faster, and more cost-effective method to plan geophysical programs and field work. Most important, investment decisions can be made with greater confidence when all pertinent information is current and accurately presented. Several models illustrate that satellite technology applied to exploration allows costly on-site investigations to be focused on the most promising targets.

RAPOPORT, L. A., and G. C. GRENDER, Virginia Polytechnic Inst. and State Univ., Blacksburg, VA

Field Size Distributions and Exploration Efficiencies by Depth Zones in Gulf Coast Area

The results of an extensive series of analyses of the field size distributions and discovery rates observed in the main producing provinces of the United States focus on the successive depth zones in the onshore Gulf basin. The analyses deal with the relationships between exploratory drilling density (feet/cubic mile of sediment) and (a) corresponding field size distributions, and (b) hydrocarbon discoveries. They distinguish between oil and gas. This analysis by depth zones can be used to develop estimates of the ultimately discoverable hydrocarbon resources in the various producing zones of United States basins.

REYNOLDS, LESLIE A., U.S. Geol. Survey, Woods Hole, MA

Modern Benthic Foraminifera from Gyre Intraslope Basin, Northern Gulf of Mexico

The Gyre basin, situated 155 mi (250 km) off the Texas coast, is the site of a preliminary study of living benthic foraminiferal assemblages from oxic (oxygenated) intraslope basin environments. The Gyre basin was formed by the blockage of a submarine canyon by rising salt diapirs, and is similar to other intraslope basins in the northern Gulf of Mexico. The environmental conditions are markedly different at the basin rim and floor, and this is reflected in the composition of the modern foraminiferal assemblages. Rim sediments are composed primarily of pelagic tests and detrital clay particles which have accumulated at a slow and steady rate, whereas the deeper sediments are derived chiefly from the slumping of basin walls, the result of diapiric uplift. Sediment accumulation is considerably faster on the bottom than on the rim of the basin, and occurs intermittently. Thirty-seven species of living benthic Foraminifera, including *Ammobaculites gyrensis* n. sp., and 82 nonliving species are found in rim sediments, but samples from the deepest region of the basin contain only one living specimen within the 26 species collected there. A total of 38 living and 85 dead species was identified. Sediment accumulation rate and mode appear to determine assemblage composition.

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Gulf Coast Magic

Our Gulf Coast region is, in a sense, magical. It is widely thought to hold the most important oil and gas reserves of the lower 48 United States—found and unfound. This northern limb of a continuously evolving petroliferous basin may be the finest place in the world to observe and confirm the workings of an active oil and gas-making system. Not only is it remarkably accessible, but the quantity and variety of information available are probably unmatched anywhere.

A few simple, but vital, principles may help to explain the Gulf Coast magic. Those who know the Gulf Coast are qualified to judge the validity of the reasoning.

Attention centers on interactive sediment-fluid relationships characteristic of shelf and hinge-line situations. Differential compaction, subsidence, growth-faulting, diapirism, and abnormal pressures are relevant to water movement. The hydrologic interplay of offshore compaction effluent and onshore meteoric recharge enhances the entrapment of water-borne materials (especially hydrocarbons) in the coastal belt. Probably, the same magic can be projected backward (and forward) in the geologic history of the Gulf Coast province, explaining many of the inland productive trends paralleling the present coastal belt.

ROLLING, T. W., Continental Resources Co., Houston, TX

Future Energy Invulnerability

The forces of supply and demand in a free-market economy will result in increased supplies and lower consumer prices for energy resources in the United States. A review of post-World War II trends in oil and gas resources shows the relationships between market price and the supply of oil and gas, and verifies the importance of profits in the economic cycle of energy development.

One of the main points considered in this analysis is the effect of government regulation on the oil and gas markets. Government price ceilings on both oil and gas have encouraged excessive consumption of scarce oil and gas resources while at the same time discouraging producers from searching for new supplies. This excess demand, coupled with the lid on prices, has resulted in shortages in several periods and a general misallocation of resources in the energy sector.

The abundance of domestic reserves of oil and gas remaining to be discovered in the United States is ample to carry our nation into the next century without excessive dependence on unstable foreign sources of supply. Free-market forces and successful "team effort" exploration will not only allow the efficient development of those reserves, but will also bring forth supplies of substitutes for oil and gas, such as coal, nuclear, thermal, wind, and synthetic fuels, as prices and costs warrant.

SANNESS, TORSTEIN, Saga Petroleum U.S., Inc., Houston, TX, and DAVID HANCOCK, Hunt Energy Corp., Jackson, MS

Catahoula Creek Field—a Complex Structural and Stratigraphic Trap in Downdip Cotton Valley Sands

Catahoula Creek field, one of Mississippi's most significant discoveries, is located in Hancock and Pearl River Counties approximately 14 mi northwest of Bay St. Louis. The field was discovered in August 1981, with the successful completion and testing of the 1 Rhoda Lee Brown, Sec. 28, T6S,R15W, by Hunt Energy Corp./Saga Petroleum et al. Stabilized flow rates of 10 to 13 MMCFGD were encountered with pressure of 9,100 to 9,250 lb through 28/64 in. choke from Cotton Valley sands at a depth of 19,816 to 20,038 ft (6,039 to 6,100 m). A total of 114 ft net sand was perforated and acidized. Two additional field wells have been drilled (a western offset in Sec. 29, T6S, R15W, and a southern offset in Sec. 33, T6S, R15W) and are nearing completion. A northern offset in Sec. 18, T6S, R15W is presently being drilled and further development is planned.

The Catahoula Creek Cotton Valley sands are presently not definable by seismic methods, therefore, structure interpretation is based on the upper Smackover-Haynesville carbonate reflection approximately 950 ft (290 m) below the top of the Cotton Valley sand complex, or the middle Cotton Valley carbonate reflection approximately 1,000 ft (300 m) above the pay zones. The Catahoula Creek field is underlain by a high relief (900 to 1,000 ft; 275 to 300 m) northwest-southeast-trending salt-created closed structure at the upper Smackover-Haynesville carbonate level, bounded by major and minor down-to-the-coast faults. The structure at the middle Cotton Valley carbonate level is almost flat, and only the major faults seem to carry through up to this level, indicating a Late Jurassic time of structural growth.

The Cotton Valley gas sands (Kimmeridgian) in the Catahoula Creek field were deposited in a shelf environment and can be numbered according to porosity zones from 1 through 11. At this stage in the field development only zones 1 through 7 have been perforated, but there are indications of hydrocarbons in all zones.

The reservoir rock exhibits matrix porosity of 4 to 18%, which is directly related to mineralogy, lithology, and diagenetic history. Matrix permeability is low, $0.3 > K > 0.01$ md or less, but intense vertical fracturing is prominent, and fracture permeability has been measured in the range of 1 to 4.3 md, explaining the high flow rates while testing.

SHANMUGAN, G., and R. J. MOIOLA, Mobil Field Research Lab., Dallas, TX

Prediction of Deep-Sea Reservoir Facies

Global changes in sea level, primarily the results of tectonism and glaciation, control deep-sea sedimentation. During periods of low sea level, the frequency of turbidity currents is greatly increased. Episodes of low sea level also cause vigorous contour currents which winnow away the fines of turbidites. In the rock record, the occurrence of most turbidites and winnowed turbidites closely corresponds to global lowstands of paleo-sea level. An important exploration attribute of this model is the possibility of predicting the occurrence of potential deep-sea reservoir facies in frontier areas of exploration. This model may also be useful in resolving the controversy over a shallow-versus deep-water origin for certain Gulf Coast reservoirs.

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Depositional Environment of Carter Sandstone (Chesterian) of Black Warrior Basin in Northwestern Alabama and Northeastern Mississippi

The Late Mississippian (Chesterian) Carter sandstone, which is present in the subsurface of the Black Warrior basin in northwestern Alabama and northeastern Mississippi, was deposited as lower to subaqueous delta-plain facies of a high-constructive delta. Specific deltaic environments identified include bar finger, which is a combination of distributary mouth bar and channel facies, delta front, and prodelta or interdistributary bay. These paleoenvironmental interpretations are based on primary sedimentary rock properties and characteristic spontaneous potential curves.

The Carter delta prograded from the northwest toward the southeast in the basin. The morphology of the delta is elongate through most of the basin; however, in the area of the southeasternmost extent of Carter deposition the morphology becomes lobate. The change in morphology is a result of reworking of the delta-front sands by marine proceses. The overall compositional maturity of the sandstone suggests that the constituents had a long distance of transport, with the source area being most likely a sedimentary source terrane. The direction of transport was from the northwest to the southeast, as indicated by sandstone morphology, grain size and thickness trends, paleontology, and facies distribution.

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Tectonic Evolution of Trans-Pecos, Texas

Southern Trans-Pecos Texas contains parts of two of the major overthrust belts of North America, the older Ouachita and the younger Cordilleran. In addition, this area has been deformed by two other major tectonic episodes. As early as 1,000 m.y. ago, the Van Horn mobile belt was formed by the closure of an inner arc basin during the formation of a proto-Pangea. This mobile belt provided the base upon which the Diablo platform formed. Recent petrologic evidence suggests that the Van horn mobile belt continues southward into Mexico and underlies the Coahuila platform. During Late Pennsylvanian to Early Permian time, this platform, a continental promontory, impeded the northward movement of the overriding Ouachita orogenic thrust sheets, bending them southwestward at the intersection of this thrust complex.

During the late Mesozoic, the Diablo platform acted as a stable buttress, against which sediments of the Chihuahua trough were deformed and thrust. These folds and thrusts comprise the Chihuahua tectonic belt, which forms part of the Cordilleran thrust belt of North America. East of this platform, faulted monoclines may represent the southern limit of the fault-bounded, basement-cored uplifts of the front ranges.

Finally, western Trans-Pecos Texas was overprinted by extensional basin and range faulting during the Cenozoic, with concomitant igneous intrusive and extrusive activity. The igneous intrusions occur in a belt trending roughly north-northwest, following the trend of the basin and range faulting. These intrusions are scattered through most of Trans-Pecos except for an area to the south where the four tectonic belts intersect. Here, extensive crustal fracturing and extension have resulted in the emplacement of a greater density of igneous material into the overlying crust.

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Depositional Environments and Gas Production Trends, Olmos Sandstone, Upper Cretaceous, Webb County, Texas

The Olmos Sandstone is part of the Upper Cretaceous Taylor Group of south Texas. It is overlain by shales and sands of the Escondido Formation, and underlain by shales of the lower Taylor Group. In the subsurface of Webb County, the Olmos has produced over 142 bcf of gas from 11 fields.

The composition, texture, and sedimentary structures of the Olmos were examined from more than 300 ft (91 m) of full-diameter, diamond bit cores and 50 thin sections. The morphology of the sandstones was determined by correlation of over 300 electric logs.