The Pulau Seribu patch-reef complex, located 50 km northwest of Jakarta, is elliptical in plan view, measuring 40 km north-south and 12 km east-west. Individual reefs range in length from 50 m to over 6 km, show a strong east-west lineation due to seasonal winds and currents, and grow up into the intertidal zone.

Facies mapping (based on 250 bottom samples and Landsat image analysis) shows the extent of reef-crest, reef-flat, beach, island, reef-slope, and lagoonal facies. The reef crest is fairly narrow, flat, continuous along strike, and consists of coral-algal boundstones. The reef framework of predominately platy and branching corals is infilled with coral-skeletal packstones and wackestones and represents a small percentage of reef-related facies developed in the reef complex, being overshadowed by extensive reef flats of coral-skeletal packstones. Commonly, beach and island facies of coral-skeletal grainstones occur near the center of individual patch reefs. In front of the reef crest, an apron of reef-derived coral-skeletal packstones is deposited as reef-slope facies. This grades downdip into lagoonal facies of highly burrowed molluscan foraminiferal wackestone and packstone and coral molluscan wackestone and packstone, both with low TOC values that indicate no source rock potential.

Pulau Seribu is an important lithofacies model for better understanding Tertiary reefs in Indonesia, especially the prolific hydrocarbon reservoirs of northern Sumatra.

JORDAN, CLIFTON F., JR., Mobil Research & Development Corp., Dallas, TX, WALTER C. PUSEY, III, Conoco, Inc., Houston, TX, ROBERT C. BELCHER and ROBERT L. BORGER, Mobil Research & Development Corp., Dallas, TX

Carbonate Facies and Landsat Imagery of Shelf Off Belize, Central America

A reevaluation of Holocene sediments on the Belize shelf is based on (1) a newly constructed composite of 7 Landsat images, enhanced and registered to form a regional base map, and (2) a Holocene facies map based on a rigorous treatment of compositional and textural parameters for approximately 600 bottom samples. The sediments are mapped in terms usually applied to lithified carbonate rocks, allowing direct comparisons with carbonate facies in the subsurface.

By combining Landsat imagery with this facies map, it is possible to point out the following geologic features: (1) major tectonic elements, such as the Maya Mountains, the Yucatan Plateau, several offshore ridges, and 3 large atolls, (2) major physiographic features such as the Belize barrier reef with its reef platform and crest, middle-shelf shoal deposits, middle-shelf patch reefs (including lagoon reefs or rhomboid reefs), (3) Holocene facies patterns with potential reservoir facies of foraminifera-grainstone bars, *Halimeda* grainstones, and branching-coral, encrusting red-algae boundstones, and (4) nearshore clastics and a sharp transition eastward to carbonate sediments.

An understanding of Holocene facies patterns on the Belize shelf is important to the explorationist, because these facies patterns are living examples of exploration fairways and invite comparisons with several petroleum provinces: (1) Cretaceous reefs of Texas, (2) upper Paleozoic skeletal-grainstone bars in west Texas, and (3) Devonian reefs of the Alberta basin.

KANES, W. H., Earth Sciences and Resources Inst., Columbia, SC, and THOMAS E. O'CONNOR, Aminoil Inc., Houston, TX

North African Geology: Exploration Matrix for Potential Major Hydrocarbon Discoveries

Based on results and models presented previously, it is possible to consider an exploration matrix that examines the 5 basic exploration parameters: source, reservoir, timing, structure, and seal. This matrix indicates that even those basins that have had marginal exploration successes, including the Paleozoic megabasin and downfaulted Triassic grabens of Morocco, the Cyrenaican platform of Libya, and the Tunisia-Sicily shelf, have untested plays. The exploration matrix also suggests these high-risk areas could change significantly, if one of the 5 basic matrix parameters is upgraded or if adjustments in political or financial risk are made.

The Sirte basin and the Gulf of Suez, 2 of the more intensely explored areas, also present attractive matrix prospects, particularly with deeper Nubian beds or with the very shallow Tertiary sections. The Ghadames basin of Libya and Tunisia shows some potential, but its evaluation responds strongly to stratigraphic and external nongeologic matrix variations based on degree of risk exposure to be assumed. Of greatest risk in the matrix are the very deep Moroccan Paleozoic clastic plays and the Jurassic of Sinai. However, recent discoveries may upgrade these untested frontier areas.

Based on the matrix generated by the data presented at a North African Petroleum Geology symposium, significant hydrocarbon accumulations are yet to be found. The remaining questions are: where in the matrix does each individual company wish to place its exploration capital and how much should be the risk exposure?

KAPLAN, I.R., Inst. Geophysics and Planetary Physics, Los Angeles, CA

Role of Minerals in Generation and Release of Hydrocarbons

The morphology and composition of minerals are known to be of great importance in determining the suitability of rocks as hydrocarbon reservoirs. However, their role in the generation and release of hydrocarbons from kerogen is still poorly understood. Recent studies suggest that the interaction of some clay minerals with the organic matter in source rocks results in a series of processes which can be characterized as follows: (1) catalytic increase in the rate of organic carbon decomposition, (2) control of the chemical nature of the hydrocarbon products, (3) retention of bitumens and asphaltenes that may be carried to depths where the geothermal gradient causes them to be cracked to light hydrocarbons, (4) transform nonporous carbonate rocks to porous reservoir rocks as a result of early catagenic CO_2 and organic acids' release, (5) recrystallize minerals involving release of water, mineral dissolution, and release of trapped bitumen, and (6) influence the formation of mature sweet light oil or immature sour heavy oil.

This evaluation suggests that the character of hydrocarbons produced, which is generally thought to be facies controlled, is a result of both mineral as well as kerogen type within the source rock. Recognition of the above could have important implications in the strategy of geochemical exploration for oil and gas.

KARLO, JOHN F., Shell Offshore Inc., New Orleans, LA

High-Resolution Seismic Data of Atlantic Margin Basement

Reflection seismic data for petroleum exploration have improved resolution of the rift structure of the United States Atlantic margin. Previously conjectural features are not clearly seen and additional features have been recognized. Our best data are from the Long Island-George's Bank area. Generally, the geologic elements visible, looking landward, are: (1) a belt of block-faulted oceanic crust that merges into a wedge of synrift sediments, (2) a basement ridge 10-15 km wide with maximum relief of 1.5 km, at a depth generally below 9 km, under the East Coast Magnetic Anomaly (ECMA), (3) a very wide zone of rising basement, structurally bland except for a major hinge near the updip edge of the ECMA, (4) an updip zone of complicated rift-stage faults with basinward-dipping listric faults, which visibly sole at ~14 km, and common listric counter-regional faults, and (5) a major unconformity, the base of the drift sequence, with rift-stage structures extensively peneplaned. Graben fill is 2-stage and includes earlier highly rotated beds separated by an unconformity from mildly deformed sediments. Downdip, the major unconformity at the base of the drift sequence becomes a strong, continuous reflector that downlaps the landward edge of oceanic crust.

KATZ, SAMUEL B., Marathon Oil Co., Houston, TX, and JOSEPH P. SMOOT, U.S. Geol. Survey, Reston, VA

Sedimentary Features and Soil-Like Fabrics in Cycles of Upper Lockatong Formation, Neward Supergroup (Upper Triassic), New Jersey and Pennsylvania

The Upper Triassic Lockatong Formation is composed of cycles of fine-grained sediments interpreted as lacustrine deposits. These sedimen-