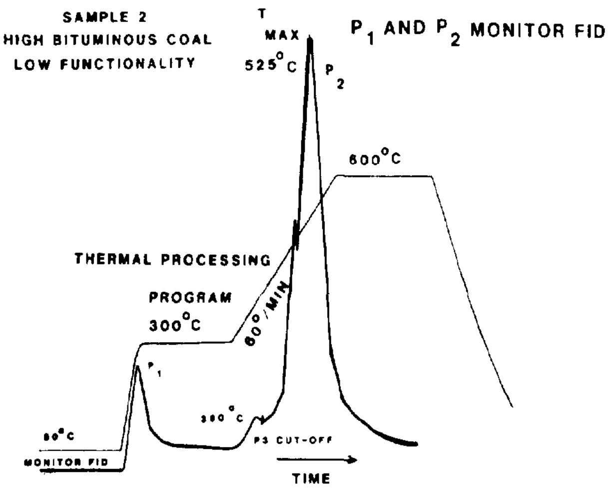

(P_1, P_2, P_3), and on-line high-resolution FID capillary gc analysis of the P_1 and P_2 composites. P_3 is determined by thermal treatment of the source rock to 390°C by internal trapping and subsequent desorption into a chromatographic column with thermal conductivity detection for carbon dioxide and other evolved gases. These data provide valuable insight into the sample composition, maturation, relation to process yields, and pollution/transport mechanisms.

Illustrations will be given of the organic analysis of kerogens, oil shales, coals, and sediments. The growing significance of analytical pyrolysis combined with concentrator technology will be demonstrated in applications of these advanced configurations dedicated to the geosciences.

GATENBY, G. M., JR., Union Oil Co. of California, Lafayette, LA

Temperature Anomalies and Gulf Coast Structures

Temperature anomalies associated with various structures in the Gulf Coast are interpreted to be the result of fluid migrations from depth. Pressure and salinity data are also part of an exploration model where hot, fresh, hydrocarbon-laden waters are believed to be migrating up faults. Traps in the vicinity of these migrations are of special interest to the explorationist because they are more likely to be charged with hydrocarbons.

The part of southeastern Louisiana studied has twelve areas of possible subsurface fluid migrations. Eight hydrocarbon fields are in the vicinity of these migrations. The areas of migration are most likely to occur at areas of structural expansion, i.e., grabens, crests of diapirs, and most importantly, intersections of faults.

GEALEY, W. K., Chevron Overseas Petroleum, Inc., San Francisco, CA

Margin Types: Their Characteristics and Potential

Offshore exploration has tested passive, convergent, and transform margin types. Passive margins are characterized by an initial rift structure, commonly involving nonmarine sediments, sometimes evaporites, and an overlying mostly marine sedimentary terrace of clastics and/or carbonates. Potential has proved variable. Significant hydrocarbons have been found in MacKenzie Delta, Gulf of Mexico, offshore Newfoundland, northwest Europe, Gulf of Suez, India, Indonesia, Australia/New Zealand, Brazil, and central west Africa from Ivory Coast to Angola. To date, little success has been obtained on the passive margins of the rest of Africa, South America south of Brazil, the east coast of the U.S., and most of Australia/New Zealand.

Convergent margins are characterized by an arc-trench system with intervening fore-arc basin and subduction complex. Sediments of fore-arc basins are predominantly marine volcanogenic clastics derived from the magmatic arc. The subduction complex is a tectonically imbricated package composed predominantly of volcanogenic clastics, but may incorporate significant amounts of deep-sea cherts, limestones, red clays, and slices of oceanic crust. Potential appears poor with the only significant hydrocarbons discovered in this setting being in southern Alaska and northern Peru.

Transform margins are relatively limited worldwide and are characterized by sharp fault-bounded basins with clastics derived from adjacent sides and carbonates developed in situ. Compressive structuring locally accompanies basin evolution. Potential is variable. Significant hydrocarbons have been found in this setting off southern California, Trinidad, northern Brazil, Ivory Coast, and Sakhalin Island, but none so far off western Canada, the northern Caribbean, or western Madagascar.

GERHARD, LEE C., SIDNEY B. ANDERSON, JULIE A. LEFEVER, and CLARENCE G. CARLSON, North Dakota Geol. Survey, Grand Forks, ND

Geological Development, Origin, and Energy and Mineral Resources of Williston Basin, North Dakota

The Williston basin of North Dakota, Montana, South Dakota, and south-central Canada (Manitoba and Saskatchewan) is a major producer of oil and gas, lignite, and potash. Located on the western periphery of the Phanerozoic North American craton, the Williston basin has undergone only relatively mild tectonic distortion during Phanerozoic time. This distortion is largely related to movement of Precambrian basement blocks.

Oil exploration and development in the United States portion of the Williston basin from 1972 to present have given impetus to restudy of basin evolution and geologic controls for energy resource locations. In consequence, oil production in North Dakota, for instance, has jumped from a nadir of 19 million bbl in 1974 (compared to a previous zenith of 27 million in 1966) to 32 million bbl in 1979 and 40 million bbl in 1980. Geologic knowledge of carbonate reservoirs has expanded accordingly.

Major structures in the basin, and the basin itself, may result from left-lateral shear along the Colorado-Wyoming and Fromberg zones during pre-Phanerozoic time. Deeper drilling in the basin has established several major new structures with indications of others. Most structures probably result from renewed movement or "tensing" of pre-Phanerozoic faults. Meteorite impact events have been suggested as the origin for one or two structures.

GHOSH, SANTOSH K., Univ. Los Andes, Merida, Venezuela

Origin of Quebrada Arriba Oolitic Ironstone (Eocene), Venezuelan Andes

The Quebrada Arriba Formation consists of alternating beds of chamositic oolite, limestone, sandstone, and shale. The oolites consist of a framework of originally calcareous ooids, fossils, and intraclasts set in a calcareous cement, all virtually replaced by chamosite, siderite, hematite, pyrite, and silica. Tex-