resulting from future satellite and airborne systems, must be utilized in an interactive manner with field geology and spectrometer measurements and computer-processing techniques to obtain the optimum integrated geologic, geophysical, and geochemical information contained in these data. Successful applications of satellite remote sensing requires a realistic understanding of the earth's surface and its relationship to the exploration models being used. As originally recommended by the Geosat Committee, the addition of the shortwave IR TM spectral bands, higher spatial resolution (10-20 m), and Synthetic Aperture Radar in the present and planned systems, combined with the Landsat/MSS system, will substantially improve these systems as a whole for more efficient geologic mapping and improved exploration success worldwide.

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Reservoir Characteristics of Lower Wilcox Sandstones, Lobo Trend, Webb and Zapata Counties, Texas

To date, over 340 bcf of gas have been produced from the Lobo sandstones in the Laredo field area at depths of less than 10,000 ft (3,050 m). Gas accumulation is controlled by faulting and erosional truncation. The resulting structural complexity has made accurate prediction of reservoir sandstones difficult. Cored sections display repetitive ordered sequences of sedimentary structures and textural and compositional gradations indicative of turbidity-current deposits. The reservoir sandstones were deposited as constructional channels having vertical and lateral variation from channel-fill to channel-margin to overbank deposits. Channel-fill units are 2-10 ft (0.61-3.05 m) thick and composed of AB, AE, and ABE bedsets. Channel-margin units are 1-3 ft (0.31-0.92 m) thick and contain thinner, more complete ABC, ABE and ABCE sequences. Overbank deposits consist of highly bioturbated, thinly interbedded sandstones and shales. Sandstones are feldspathic litharenites that have 15% matrix and 15% calcite cement. Porosities average 16% and permeabilities range from 0.54 to 12 md, decreasing with increased matrix, cement, and bioturbation. The channel-fill sandstones are linear, dip-trending bodies less than 3,000 ft (915 m) wide, which bifurcate downdip into distributary channels. High-intensity, small-scale, soft-sediment deformation indicates the sandstones were deposited in an unstable outer-shelf to upper-slope environment. A slumped, dip-trending channel-fill interpretation for the Lobo sandstones provides a mechanism for sediment transport beyond the present downdip limits of the trend.

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Deposition and Diagenesis of Flippen Limestone (Wolfcampian), Fisher and Jones Counties, Texas

The Flippen carbonate (Wolfcampian) was deposited during a high stillstand of sea level under subtidal to intertidal conditions. Eleven cores in Fisher and Jones Counties have been subjected to megascopic and petrographic analysis with special interest given to the Alkali Creek SW field in Fisher County. Five distinctive limestone facies, designated according to their most outstanding characteristics are: (1) constructional phylloid algal buildups, (2) crestal boundstones, (3) flanking bed packstone-wackestone, (4) foremound pelloidal grainstone, and (5) capping grainstones.

Early diagenesis occurred after deposition of the sediments in the marine environment. This is evident in micritization, submarine cements, and effects attributed to binding and encrusting habits of algae, particularly *Archaeolithoporella* and *Tubiphytes*.

Primary intergranular and intrabiotic porosity is best developed and preserved in biograinstones along the shallow flanks of the constructional mound. Stabilization and lithification of originally deposited sediments began early during subaerial exposure and subsequent freshwater diagenesis. Secondary porosity was formed by the dissolution of aragonitic phylloid algae and pelecypods, forming hollow micrite envelopes or biomolds. Aragonitic lime mud was replaced by calcite micrite and microspar. Calcitization and dissolution resulted in the precipitation of crusts of calcite scalenohedra in primary and secondary voids. Dolomite cement crusts also line primary and secondary voids, and these rhombs subsequently were dedolomitized. Precipitation of blocky equant nonferroan calcite, ferroan calcite, and ferroan dolomite cements partially to completely filled primary and secondary voids. A late stage of dissolution, which presumably occurred at depth, enhanced existing primary and secondary porosity. No cementation followed the late stage of diagenesis.

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Crystallographic Influences on Pressure Solution in a Quartzose Sandstone

The solubility of quartz differs with crystallographic direction. A universal stage was used to measure the orientations of the optic axes and contact planes of 160 pairs of quartz grains in the Bromide Formation (Simpson Group) of Oklahoma. These quartz grains exhibit long, sutured, and concave-convex contacts. Results indicate that the geometry of a pressolved contact is independent of the crystallographic orientation of opposing grains. However, given a concave-convex contact, the optic axis of the concave grain tends to lie at a higher angle to the contact plane than the optic axis of the convex grain. We conclude that the extent and type of pressure-solution contacts in quartzose sandstones are not significantly influenced by crystallographic orientation. Other factors, such as grain size and clay content, are probably more important in controlling the pressure-solution features.

Geometric etch pits, which form at the point of emergence of crystal defects, were produced by hydrothermally etching quartz crystals, quartz sand, and quartzose sandstones. The abundance, nature, and distribution pattern of crystal defects inherited from source rocks might be more important factors in affecting pressure solution of quartz grains than differences in quartz solubilities arising solely from variations in Si-O bond strengths. The extent of etch-pit formation on quartz cement may also serve as a qualitative indicator of the dissolved silica saturation in pore fluids.

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Evaluation of Potential Hydrocarbon Sources in Lacustrine Facies of Newark Supergroup, Eastern United States

Lacustrine rocks are a significant component of many rift-valley sequences. Comparisons of both active and ancient rift valleys indicate that the lacustrine facies are commonly rich in organic matter and may be important sources for oil. For example, Holocene sediments in Lake Tanganyika and Cretaceous lacustrine rocks in west Africa contain as much as 12% and 20% TOC, respectively.

The Newark Supergroup contains abundant lacustrine rocks. The widespread occurrence of "black shales," the general similarity to known organically rich rift systems, and a few isolated geochemical analyses have caused some speculation about the potential of the Newark Supergroup to be an effective source of oil and gas.

Sufficient geochemical analyses are available from lacustrine rocks in the Newark, Connecticut, and Deep River basins to evaluate their potential as hydrocarbon sources. In general, both the quantity and quality of organic matter in these rocks are less than that required for potential source rocks. Some samples do qualify as potential sources, but the total generative capacity of lacustrine rocks within these basins is relatively small.

Despite these results, the numerous unexplored buried Newark rift basins retain some potential for containing significant hydrocarbon source rocks. Analyses of the lacustrine rocks from the Newark basin indicate that the original sediments were rich in oil-prone organic matter. However, the unusual water chemistry of this lake resulted in the almost complete destruction of the organic matter by sulfate-reducing bacteria. Slight changes in water chemistry in other Newark lakes could have resulted in large volumes of organically rich sediment being preserved in these unexplored basins.

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Regional Geology of Georges Bank Basin—OCS Sale 42 Drilling Results

Industry bid aggressively in OCS Sale 42, spending $816 million. Eight wildcats were drilled in 1981-82 to test 5 major plays. All wells were dry; no potential reservoir or source rocks were found.