include waters from the Lake Gosiute basin, late in the history of Lake Gosiute, led to a significant increase in water supplies to Lake Uinta. Initially, the sediment load of this water was trapped in the greater Green River basin during the final stages of Lake Gosiute, so that the water from the north was devoid of clastic debris. The influx of this water, nearly devoid of terrigenous material, resulted in high biologic productivity and the deposition of rich oil shales (Mahogany Bed) in the Piceance basin.

Facies patterns in the Green River Formation in the Piceance Creek and Uinta basins suggest that these two basins were separate lakes until the addition of water from the Lake Gosiute hydrographic basin. Prior to the merging of the lakes in the Piceance and Uinta basins, the brine evolution and, hence, the saline mineralogy were different in the two basins. In the Piceance Creek basin the evaporite minerals were sodium carbonates and chlorides, whereas, in the Uinta basin, the evaporite minerals were sulfate-rich. After merging of the lakes into greater Lake Uinta, the evaporite facies were characterized by sodium carbonate minerals.

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Biostratigraphy of Early and Earliest Late Cretaceous Ostracoda from Peninsular Florida

Deep wells in central and southern Florida have yielded 68 species of marine and brackish-water Ostracoda of Early Cretaceous and earliest Late Cretaceous ages. About 40% of the ostracods are referable to described species. The rock sequence is more than 2,250 m thick.

A partly oolitic limestone facies of the Washitan Stage (early Cenomanian–late Albian) contains 17 species, of which 15 are restricted to the unit. Brackish-water, and perhaps freshwater, as well as marine Ostracoda are represented.

Pre-Washitan Cretaceous rocks of peninsular Florida are principally massive, interbedded carbonate rocks and evaporites and thin shales. Ostracods occur chiefly in the shales. Of 23 species in the Fredericksburgian Stage (middle Albian), nine are restricted to the unit; marine and a few brackish-water species are represented.

Trinitian Stage (early Albian–late Aptian) ostracods are represented by 21 species, of which seven are restricted to that unit; several are brackish-water forms.

Coahuilan Series (early Aptian–Neocomian) rocks contain 35 species, of which 25 are confined to that unit; several are brackish-water types.

The environment represented by the ostracod populations is mainly that of an open-marine shelf bordered by partly brackish-water lagoons. Trinitian Stage rocks contain representatives of a few species which indicate outer-shelf or slope environments.

The population as a whole has strongest affinities for Cretaceous species of the Gulf coastal or Atlantic coastal United States. Several of the Coahuilan and Trinitian species show relationships to European and to South American forms. Few such relations are shown by Fredericksburgian and Washitan species.

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Normally and Reversely Graded Beds Within Large-Scale Foresets of Oolitic Lake-Margin Bench Sequence—Shoofly Oolite of Southwestern Idaho

Pliocene lacustrine oolites composing the lower part of the Glenns Ferry Formation crop out in a 40-km northwest-southeast-trending belt along the southwestern margin of the Snake River plain. Near Oreana, Idaho, where this limestone reaches 40 m in thickness, the oolite occurs as three progradational sequences, each consisting of thinly coated ooids in foreset beds up to 20 m thick; these beds are abruptly overlain by thickly coated, massive, burrowed oolite. Foreset beds, each 5 to 15 cm thick, dip basinward to the northeast at 30°; they exhibit both coarsening- and fining-upward trends. Reversed grading (coarsening upward) occurs high in each foreset unit, but the beds become normally graded (fining upward) near the base.

The Shoofly Oolite was deposited as three progradational bench sequences which built lakeward during short periods of stillstand in a longer transgressive phase of Lake Idaho. As such, each bench sequence is analogous to a "Gilbert" delta which extended laterally along the lake margin, but was fed by littoral sands which became coated during transport on the bench platform. Deposition of foreset beds by grain flow on the upper parts of the bench slope, and by fluidized sediment flow on the lower parts of the bench slope, resulted in the formation of reversely graded beds near the bench platform and normally graded beds near the base of the slope. During periods of rising lake level, but prior to the deposition of a subsequent bench sequence, abandoned bench platforms were extensively burrowed and winnowed by waves. As a result, deposition of cortical laminae on platform ooids continued, and the massive oolites which now cap each progradational bench sequence were formed.

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South Hallettsville; Gas Field in Lower Wilcox, Lavaca County, Texas

South Hallettsville field, discovered in 1976, produces gas and condensate from a lower Wilcox clastic wedge. The discovery well, General Crude Oil 1 Anderson, was drilled on an Edwards seismic closure, encountered high pressure gas sands in the lower Wilcox, blew out, and was abandoned. The replacement well had potential of 23,926 MCFGD flowing and 38.7 bbl condensate per MMCF of gas through perforations from 9,909 to 10,011 ft (2,973 to 3,003 m). Within 2 years this well had produced 2.1 Bcf of gas and 74,543 bbl of condensate.

The wedge has a sandstone shale ratio of 20%. Reservoir sands are medium to very fine grained, individual or stacked, and several inches to 25 ft (7.5 m) thick. The sand is 40 to 70% quartz with 10 to 35% feldspar and lithic fragments. The matrix is kaolinite, chlorite, illite, and illite/smectite with minor carbonate cement. Reservoir sands have porosities of 18 to 24.7% and permeabilities of 0.5 to 83 md. Primary sedimentary structures, textures, mineralogy, and stratigraphic sequences from core analysis, log character, and paleontology suggest a delta to prodelta environment. Convolute structures within reservoirs and chaotic dipmeter patterns suggest complex subaqueous mass movement, similar to that within the modern Mississippi delta complex.

General Crude Oil has drilled 17 wells in the field with 15 containing hydrocarbon-bearing sands. The productive sandstones rarely correlate between wells, thus masking reservoir geometry and indicating a restricted aerial extent for most reservoir sandstones. Production in most wells has declined rapidly, and results of stimulation by fracturing, acidizing, and clay stabilization appear to substantiate the interpretation of multiple, small, discontinuous reservoirs.

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Lithology Data Systems—Rocks to Applications

As geologists we should take a close look at the development and use of Lithologic Data Systems as hydrocarbon finding tools. The technology and experience are now available for us to do this.

A Lithologic Data System must be capable of accepting descriptive data from sample cuttings, cores, outcrops, and that purchased from commercial concerns. The capture of the company data is very time consuming and expensive. Purchase of lithologic data from commercial firms is the fastest and least expensive method of obtaining a Lithologic Data System. Their data are more adaptable to a computer system because of the higher degree of standardization and are already prepared for computer storage. Commercial firms are currently generating more intervals of data per month than most companies. The three commercial firms currently in the data processing business have in their files approximately 15,000 lithologic digital logs. The files are increasing at the rate of approximately 100 wells per month. No longer are data systems the sole property of the larger companies. All three commercial lithologic data firms have retrieval programs that will process their data.

With the increase of computer usage, industry-wide standardization of logging methods, geologic terms, and data formats are essential. After storage, geologic models can be developed and retrievals created for output in any desirable form such as log strips, multiple types of maps, histograms, statistical data, etc. Of all data systems developed by the oil companies, the Lithologic Data System has the greatest potential for aiding in the search for future energy reserves.

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Deep-Sea Drilling and Global Tectonics

The start of the Deep Sea Drilling Project coincided with the development of the ideas of "global tectonics" or "plate tectonics," which had been mainly derived from geophysical data. The results of drilling have been able to confirm the ideas of plate tectonics and have been important in adding important information in many areas: the age of the oceanic crust, relative and absolute plate motions, composition of the oceanic crust, sources of magnetic anomalies, tectonics at subduction zones, and initiation of rifting.

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Characteristics of LANDSAT System for Geologic Applications

LANDSAT satellites were launched into orbit in 1972 and 1975. Additional LANDSAT satellites will be launched in 1978 and 1981. The satellites orbit the Earth every 18 days at an altitude of approximately 900 km. A sun-synchronous orbit is utilized to insure repeatable illumination conditions. Seasonal variations in solar illumination must be analyzed to select the best LANDSAT data for geologic applications. LANDSAT data may be viewed in stereo where there is sufficient sidelap and sufficient topographic relief. Repetitive satellite coverage allows optimal cover conditions for geologic applications to be identified. The present LANDSAT satellites detect only solar radiation that is reflected from the earth's surface in visible and near-visible wavelengths. The third LANDSAT satellite will detect emitted thermal radiation. The Multispectral Scanner (MSS) is the only sensing instrument operating on the first two satellites. The MSS on LANDSATS 1 and 2 detects radiation which is reflected from a 79 × 79-m area, and the data are formated as if the measurement were made from a 56 × 79-m area.

The MSS integrates spectral response from all cover types within the 79 × 79-m area. The integrated spectral signature often does not resemble the spectral signature from individual cover types, and the integrated signature is also modified by the atmosphere. LANDSAT 1 and 2 data are converted to 70-mm film and computer compatible tapes (CCT's) at Goddard Space Flight Center (GSFC) and are shipped to the EROS Data Center (EDC) for distribution to users. LANDSAT-C data will be converted to 241-mm wide film and CCT's at EDC. LANDSAT-D data will be relayed from the satellite collection platform directly to geosynchronous satellites and then to the United States from any location on Earth.

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Computer Processing of LANDSAT Data for Geologic Applications

The main objectives of computer processing of LANDSAT data for geologic applications are to improve display of image data to the analyst or to facilitate evaluation of the multispectral characteristics of the data. Image enhancements involve adjustments of brightness values for individual picture elements. Image classification involves determination of the brightness values of picture elements for a particular cover type. Histograms are used to display the range and frequency of occurrence of brightness values.

LANDSAT 1 and 2 data are preprocessed at God-