of the general principles without ignoring the complexity of the gas versus oil problem.

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Authigenic Illites in Sandstone Reservoirs

Authigenic illites have been found in pores of many sandstones which are known to be hydrocarbon reservoirs. Typical samples are from the Norphlet Formation in southern Mississippi, the Wilcox Formation in south Texas, and the Lance Formation in Wyoming. Illites in these sandstones are mainly in the form of laths with perfectly developed morphologies. Laths have widths of 0.1 to 0.3μ and lengths ranging up to 30μ. Scanning electron (SEM) images show that these "hair like" illites fill many of the pores of these sandstones, and cause a serious reduction in permeability. Elemental analysis of the laths with EDAX energy dispersive X-ray analyzer shows that Si, Al, and K are the major constituents and Mg is the minor constituent in the chemical composition of the laths. Transmission electron images show that illite laths have grown from an amorphous core which is rather similar to an irregular smectite aggregate. X-ray diffraction patterns display the coexistence of discrete illite (9.9Å) with an illite/smectite mixed layer with a distinct reflection varying from 10.5 to 11.0Å. In the sample from the Wilcox Formation the laths form regular arrangements which lead to the development of platelets.

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Geological Significance of LANDSAT Data on Some Known Giant Fields

No abstract available.

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Pore Types in Sunniland Limestone (Lower Cretaceous)

The Sunniland Limestone of south Florida produces hydrocarbons from five types of porosity in carbonate reservoirs. (1) Primary interparticle pores are volumetrically most abundant. Secondary pores after dissolution of aragonite are common but less abundant than primary pores and occur both as (2) matrix porosity and (3) vuggy porosity. (4) Fracture porosity is important in one reservoir and occurs at several localities in the lower Sunniland Limestone. (5) Intercrystalline pore space in dolomite occurs in thin intervals in several reservoirs. Any one reservoir contains two or more of the pore types.

Three types of dolomite are present in the Sunniland Limestone. A presumed early tidal-flat (sabkha) dolomite is composed of 1-to-10 μm crystals that are strontium- and calcium-rich and iron-poor compared with other dolomite from the unit. The dolomite is enriched in C^{13} and 0^{18} relative to PDB-1 standard. It is associated with tidal-flat sedimentary structures and is nonporous. A second dolomite, composed of crystals up to 500 μm along an edge, is porous, iron-rich and strontium-poor relative to earlier dolomite, enriched in C^{13} but depleted in 0^{18}, and is considered to be a later replacement. A rare third type of dolomite is petrographically distinct as pore-filling crystals up to 1 mm in width with markedly undulose extinction ("baroque" dolomite).

Cementation by a thin calcite fringe around grains and a later blocky calcite cement is present locally. The latter cement precipitated in part during or after compactional grain fracture. Sunniland carbonate rocks contain less than 100 ppm manganese, and a manganese/iron value below 0.06. These low values are believed responsible for a lack of cathodoluminescence in Sunniland limestones and dolomites.

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Porosity Preservation and Early Freshwater Diagenesis of Marine Carbonate Sands

Observations from Holocene and Pleistocene limestones of south Florida and the Bahamas provide the basis for a general outline of freshwater alteration of marine, primarily aragonitic, sands. Porosity and mineralogic data suggest that metastable carbonate recrystallization takes place before significant porosity loss. The outline proposes the following main points: (1) porosity is only slightly modified during mineralogic stabilization and early cementation; (2) secondary porosity development during early cementation preserves overall porosity; (3) early cements formed during metastable-phase recrystallization are almost entirely autochthonous on a reservoir scale. The time of stabilization may be as short as 10^4 years but may be slowed for long periods (e.g., by salt water intrusion, dry vadose conditions, stagnant water). Major porosity reduction occurs after stabilization and takes longer periods of time $>10^6$ years (e.g., extended period of subaerial exposure, burial diagenesis). Our observations of the effects of early freshwater diagenesis underscore the importance of later diagenetic events in porosity reduction of limestones.

This outline suggests that reservoir limestones developed through early freshwater diagenesis of aragonitic sands should be characterized by high porosity, most of which is secondary. Conversely, high-porosity reservoirs with considerable amounts of primary pore space have either escaped pervasive freshwater diagenesis or are developed in sediments that were originally calcite.

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Hummocky Cross-Stratification—Indicator of Storm-Dominated Shallow-Marine Environments

Hummocky cross-stratification (HCS), as formally defined by Harms and others in SEPM Short Course 2, is the preferred term for very distinctive, low-angle (2 to 15°), curved to undulating laminae which are broadly