An examination of the continental shelf in the Ventura–Port Hueneme, California, area included the collection of can cores, box cores, and vibrocores to determine the primary physical and biogenic sedimentary structure to establish a depositional-facies model.

Core analysis permits recognition of three principal zones: (1) nearshore facies (backshore to 9 m water depth), made up primarily of parallel-laminated, ripple-laminated, and cross-bedded, clean sand; bioturbation is only locally significant; (2) transition facies (9 to 18 m water depth), zone of fine sand and silty sand, characterized by an increase in biogenic over physical sedimentary structures; wave-ripple bedding and parallel lamination are important structures in this facies; (3) offshore facies (>18 m water depth), sandy silt is the primary texture, and bioturbation is the dominant sedimentary structure; remnant parallel lamination is the only physical sedimentary structure present.

Comparison of the results of this study with a previous description of "low-energy" beach-to-offshore facies at Sapelo Island, Georgia, indicates that the two areas do not differ greatly in overall vertical sequence of sedimentary structures. The principal difference is in the thickness of the three facies: the California facies are significantly thicker than their Georgia counterparts. It is concluded that this difference is in direct response to the role of higher wave energy on the California coast.

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Mixed-Layer Clays in Eocene Interlaminated Shales and Sandstones

Kaolinite, illite, and mixed-layer montmorillonite-illite are present in interlaminated sandstones and shales from the Eocene Wilcox Formation of the Texas Gulf Coast at depths of 2,000 to 4,000 m. Ratios of kaolinite to discrete illite are higher in the sandstones than in the interlaminated shales. Mixed-layer clays in the sandstones are 5 to 20% more expansible and less ordered than those in interlaminated shales. These mineralogic differences are interpreted to reflect a significant difference in the solution chemistry of pore waters in the sandstones from that of pore waters in the interlaminated shales. At the relatively shallow depth of 2,000 m, mixed-layer montmorillonite-illite from the shales is roughly 30% expansible; this figure is significantly less than the 75% expansibility reported by J. Hower et al for Miocene age mixed-layer clays at similar depths. Assuming similar source and geothermal gradient for the two sets of samples, two explanations may account for these differences. The most plausible explanation is that the expansibility of the mixed-layer clay is controlled by the montmorillonite-to-illite transformation rate. Because the Eocene sediments have had an additional 25 m.y. to react, the montmorillonite-to-illite transformation is more complete in these samples. An alternative explanation is that the chemistry of pore waters in the Wilcox Formation is significantly different from that of pore waters in sediments studied by Hower.

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Carbonate Rocks of Montoya Group (Middle and Upper Ordovician) of Trans-Pecos Texas

In the petroliferous Permian basin of west Texas the subsurface Montoya Formation consists of a monotonous sequence of dolomitic limestones. However, 100 to 200 mi (160 to 320 km) west in the Franklin and Hueco Mountains of Texas and the Cooks Range and Sacramento Mountains of New Mexico, the Montoya is divided into three distinctive carbonate formations (in ascending order): the Upham Limestone, the Aleman Limestone, and the Cutter Limestone.

Study of microscopic sections shows several carbonate lithologies including: (1) crinoidal calcarenite with calcareous mud matrix (biomicrite); (2) crinoidal calcarenite with clear calcite cement (biosparite); (3) micrites with abundant cherty nodules and layers of interbedded chert; (4) laminated micrites without chert; (5) shelly limestones (mainly brachiopodal biomicrites); (6) autochthonous reef rock (coralline biolithite); and (7) partly or completely dolomitized equivalents of any of the former.

Crinoidal calcarenites with a calcareous mud matrix characterize the Upham Limestone except for the uppermost beds. There, shallow-water, high-energy conditions apparently winnowed out the calcareous mud, which is replaced by clear calcite cement. Cherty and chert-free micrites and biomicrites form the dominant lithologies of the overlying Aleman and Cutter Limestones.

At some localities, especially near faults, dolomitization is massive, cutting across all facies and rock layers. Dolomitization progresses from sporadic small crystals embedded in the original matrix to total replacement where original features are obscured or destroyed. Layered dolomites are most common in the Cutter Formation.

Montoya deposition is cratonic, averaging only 320 ft (96 m) over about 10 m.y. Individual rock units representing specific shallow-water epineritic environments may be traced widely (in some places more than 100 mi; 160 km).

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Strachan-Ricinus Gas Field, Alberta

Exploration for reef reservoirs in the "Deep Basin" of Alberta during the mid-60s resulted in the discovery of 1.9 Tcf of sales gas, 50 million bbl of condensate, and 24.5 million LT of sulfur in two reefs of Late Devonian age, at Strachan and Ricinus. The reefs were discovered in 1967 and 1969, respectively, by adapting the seismic CDP techniques of data acquisition and processing that were then being developed (particularly in the Rainbow area, in the shallower part of the Western Canada sedimentary basin).

The key well for these discoveries was the Gulf-Strachan well in Lsd. 12-31-37-9 W5M, which was drilled in 1955. This well encountered a partial buildup of Upper Devonian reef which yielded some gas and salt water