detailed x-ray radiography (for sediment structure) and x-ray diffraction (for clay mineralogy) analyses evaluated in conjunction with their geotechnical properties (shear strength, Atterberg limits, etc). Sediments from each major part of the mudflow system (gully heads, chutes, and mudflow lobes) share a set of common sedimentary structures. The most complicated deposits are the wide-spread and rapidly deposited mudflow lobes. They are composed of overlapping wedges of highly remolded, low-shear-strength deposits, separated by thin, interlobe units of acoustically reflective and slowly accumulated hemipelagic sediment. Gas-related features, convolute structures, inclined bedding, evidence of flowage, and indications of thorough mixing are found in mudflow lobe deposits. Clay mineral assemblages are typical of rapidly deposited pro-delta clays (smectite:kaolinite:illite ≈4:4:1). In contrast, thin interlobe units and distal shelf sediments contain evidence of biogenic activity (micro-organism tests, burrows, and shell fragments) and diagenetic products. Interlobe and distal shelf deposits have clay mineral suites characterized by an increase in kaolinite and illite at the expense of smectite, which allows for distinction of individual flows and the general mudflow base.

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A New Holocene Sea Level Curve for Upper Florida Keys and Florida Reef Tract

A new Holocene sea level curve for the upper Florida Keys and Florida reef tract has been constructed by integrating existing and new data from ^{14}C age analyses. New data are derived from 21 mangrove peat samples from 5 locations and 3 laminated $CaCO_3$ soilstone crust (caliche) samples from 3 locations. The new sea level curve is based on ^{14}C ages ranging from 360 ± 60 y.B.P. to 14,000 ± 160 y.B.P., and indicates a fluctuating sea level rise of approximately 0.3 mm/yr (from 14,000 to 7,000 y.B.P., sea level rose from 9.2 to 7.0 m, 30.2 to 23 ft, below MSL), approximately 1.2 mm/yr (from 7,000 to 2,000 y.B.P., sea level rose from 7.0 to 0.75 m, 23 to 2.5 ft, below MSL), and approximately 0.3 mm/yr (from 2,000 y.B.P. to present, sea level rose from 0.75 m, 2.5 ft, below MSL to present MSL).

No evidence was found in this area that, during the last 14,000 yr, any highstand was greater than the present sea level. The rate of rising sea level, however, has varied. Sea level stand in this area at 14,000 y.B.P. is much shallower than indicated on other published curves for the east coast of the United States.

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Bright Spot Validation Using Comparative *P*-Wave and *S*-Wave Seismic Sections

Coincident *P*-wave and *S*-wave CDP lines were shot across the Willow Slough and Putah Sink fields, Yolo County, California, by the 1977-78 Conoco *P*-Wave/Shear-Wave Group Shoot. The fields produce gas from pay sands in the Cretaceous Starkey and Winters formations. Several of the thicker pay sands correlate with amplitude anomalies on the *P*-wave sections, and these amplitude anomalies are true seismic "bright spots." The equivalent events on the *S*-wave sections are much lower in relative amplitude when the overall gains of the *P* and *S* sections are balanced. The difference in the *P* and *S* responses is consistent with laboratory experiments which show that introducing gas into the pore space of a liquid-saturated rock dramatically lowers *P* velocity but minimally affects *S* velocity. The experimental lines demonstrate that comparison between the amplitudes of *P* and *S* is a diagnostic technique that can be sued to distinguish gas-liquid contacts from lithologic interfaces. An *S*-wave section validates a *P*-wave bright spot attributed to gas saturation when there is no anomalous amplitude at the equivalent *S*-wave event.

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Exploration Consequences of Divergent Strike-Slip Motion on Mexia Fault Zone of Central Texas

The several proposed models for the evolution of the Gulf of Mexico suggest different types of movement on the Mexia fault zone. One recent model suggests that the Yucatan Peninsula, in the Gulf at the beginning of the Jurassic, moved southwest to its present position during the Jurassic. This requires major right-lateral strike-slip movement with minor divergence in the vicinity of the Mexia fault zone. This fault zone trends north-south, consists of en echelon horsts and grabens striking about 30° east of the zone's trend, and was active from the Jurassic through the Eocene. The presence of the grabens, their orientation and en echelon arrangement, and the age of movement are all consistent with divergent strike-slip movement.

Hydrocarbons are generally produced from the basin side of the fault zone but have also been produced from fault traps within the grabens. Theoretical models, physical models, and field examples of strike-slip faults suggest the presence of en echelon anticlinal traps along the fault zone, and development of smaller antiformal structures where the en echelon grabens overlap. Such structures have not been described along the Mexia fault and may be important new structural plays, particularly for oil in the Smackover.

Post-Jurassic movement on the fault zone enhanced the structural relief of the grabens and probably was related to the mobilization of the Louann salts. Traps in the Cretaceous which produce most of the hydrocarbons are due to this later movement.

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Cyclicity Concept in a Deltaic to Shallow-Marine Environment of Deposition Concerning an Oil-Sand Setting

The need to accurately define sand trend and quality in a deltaic to shallow-marine environment of deposition where facies changes take place over a short distance is widely recognized. In an oil-sand environment, such as the Cerro Negro area of the Orinoco Petroliferous Belt, this need is more evident because enhanced recovery projects are necessary. Facies variability and correlation problems in such a setting have led many workers to apply indiscriminately the cyclicity concept as an exploration/exploitation tool. According to this concept, a cycle begins with a transgressive sand and ends with a marsh facies represented by a coal bed. Subdivision of the rock column into cycles allow delineation of sand geometry.

Recent works have demonstrated that rooted coal beds can be formed in different coastal environments, ranging from the upper delta plain to the back-barrier lagoon facies. Therefore, it is obvious that the association of these facies will differ from one another and from the standard cycle concept.

In the Cerro Negro area, the process-controlled genetic unit concept was of great help in defining sand geometry and quality. The rock column of cored wells can be subdivided according to the presence of physical and biological parameters into 4 units, differentiated by the occurrence of rooted coal, limestone, sand, shale, *Ophiomorpha*-type burrows (*Fositextura figurativa*), bioturbation structures (*Fositextura deformativa*), and shell fragments.

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Flexural Modeling of Devonian Catskill Delta in Eastern United States and Formation of Taghanic Unconformity

The Devonian Catskill delta is an exogeosynclinal clastic wedge in the Appalachian basin. Subsidence caused by this load is modeled as flexure of a perfectly elastic crust. Subsidence can be measured accurately in eastern New York and Pennsylvania because of excellent well and outcrop control and the ability to recognize shoreline position.

Calculated flexural response to the load of the Erian Series sediments predicts subsidence smaller than observed values, especially in the eastern portion of the delta. It is necessary to postulate an additional tectonic component of subsidence. Additional subsidence is modeled as a cosine curve decaying exponentially with distance from a point deflection of the crust. This model, plus the flexure caused by sediment load, produces subsidence consistent with observations.

The flexural response of the crust offers an explanation for an unconformity in black shales that developed during the Taghanic age on the west side of the Appalachian basin, with at least 50 m (165 ft) of expected strata missing. This unconformity expands westward and southwestward