sents a transition between the bioturbation patterns of the channel and overbank deposits—that is, it results from a transition in the factors that dictate the preservation of biogenic sedimentary structures.

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Cay Sal Bank, Bahamas—A Partially Drowned Carbonate Platform

Recent high resolution seismic profiling, sediment sampling, scuba observations, and Landsat imagery show that Cay Sal Bank (CSB) has very limited reef development, no active sand shoals (ooid or otherwise), few islands, a thin to nonexistent sedimentary cover, and a relatively deep margin (20 to 30 m [66 to 100 ft]) and shelf lagoon system (10 to 20 m [33 to 66 ft]). Windward and leeward margins can be discerned, but their health and general development are poor when compared to the shallower, more active margins of Little Bahama Bank (LBB) and Great Bahama Bank (GBB).

Windward margins (facing north and east) along CSB are generally deep, rocky, sediment barren terraces supporting limited, low relief, relict(?) reefs. Leeward margins do have small sand bodies (maximum thickness 10 m [33 ft]) covering reef structures at the bank edge, indicating the offbank transport of sands has occurred. However, these marginal sand bodies are limited in extent, suggesting that this transport system was not ubiquitous along these south and west facing margins.

Seismic and grab sample data from the deep (200 to 500 m [660 to 1,650 ft]) slopes seaward of the leeward margins show a thin, discontinuous unit of periplatform, shallow-water derived *Halimeda*, molluscan, nonskeletal sands. The limited extent (no deeper than 330 m [1,080 ft]) of this unit, which is easily recognized by its reflection-free seismic facies, also indicates that sand production and transport off the bank were never prolific. This is in stark contrast to new seismic data from the leeward margins of GBB which clearly show thick (20 m [66 ft]) sand bodies covering 12 to 15 m (40 to 50 ft) high reefs along the outer margin and multiple reflection-free units extending to great depths (600 m [2,000 ft]) all along the adjacent slope.

The apparent immature development of normal bank-top processes and facies and the absence of key modern depositional environments on CSB may be related to the rate at which this platform was submerged. Due to its comparatively low elevation, the initial Holocene flooding occurred at approximately 8 to 10 ka when sea-level rise was rapid (6 m/ka [20 ft/ka]). By comparison, the higher LBB/GBB were flooded later at a much slower rate (1.5 m/ka [5 ft/ka]). The relatively rapid flooding of CSB provided little time for the shallow depositional environments to start up. The continued rapid rate of rise after drowning, plus offbank sediment transport and the export of chilled waters (formed during winter), prevented the resulting facies from catching up. Consequently, CSB appears to be partially drowned, particularly when compared to the other, healthier, rimmed Bahamian platforms.

Other investigators have pointed out that drowned carbonate banks are very common in the ancient and that these features potentially provide excellent stratigraphic traps for hydrocarbons. CSB provides us with a modern example of a bank that may be in the very early stages of termination.

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Two Depositional Models for Pliocene Coastal Plain Fluvial Systems, Goliad Formation, South Texas Gulf Coastal Plain

The Goliad Formation consists of four depositional systems—the Realitos and Mathis bed-load fluvial systems in the southwest and the Cuero and Eagle Lake mixed-load fluvial systems in the northeast. Detailed facies analysis indicates that Goliad bed-load and mixed-load fluvial systems represent two contrasting depositional environments.

Five facies are recognized in the Realitos and Mathis bed-load fluvial systems: (1) primary channel-fill facies, (2) chaotic flood channel-fill facies, (3) complex splay facies, (4) flood plain facies, and (5) playa facies. Both channel-fill and splay deposits consist primarily of gravel, sandy gravel, and coarse to medium gravelly sand. Primary channel-fill deposits are characterized by large-scale accretionary foresets and trough cross-beds, localized scour-and-fill structures, and massive beds. Fining upward trends are crudely developed to absent, and no diagnostic vertical sequence of sedimentary textures and structures has been recognized. Chaotic flood channel-fill deposits are characterized by erratic interbedding of coarse and fine units, and of erosional and accretionary features. Individual beds have chaotic or poorly ordered textural profiles, and an absence of well-developed internal structures. Extensive flocks of stacked scour-and-fill structures are common. Complex splay deposits share characteristics of both crevasse and sheet splays.

A model for Realitos-Mathis depositional environments shows arid-climate braided stream complexes with extremely coarse sediment load, highly variable discharge, and marked channel instability. Broad, shallow, straight to slightly sinuous primary channels were flanked by wide flood channels. These acted as part of the flood plain under most conditions, but as channels during high intensity flood flow. Flood channels passed laterally into broad, low-relief flood plains. Small playas occupied topographic lows near large channel axes.

Three facies are recognized in the Cuero and Eagle Lake mixed-load fluvial systems: (1) channel-fill facies, (2) crevasse splay facies, and (3) flood plain facies. Channel-fill deposits consist of coarse to medium sand and gravelly sand, with a variety of large- and intermediate-scale sedimentary structures. Small-scale structures are common in finer grained beds. Fining-upward sequences are moderately well developed and commonly stacked. Crevasse splay deposits consist of medium to fine sand and silt, with abundant small-scale sedimentary structures.

A model for Cuero–Eagle Lake depositional environments shows coarse-grained meander belts in a semi-arid climate. Slightly to moderately sinuous meandering streams were flanked by low, poorly developed natural levees. Crevasse splays were common, but tended to be broad and ill-defined. Extensive, low-relief flood plains occupied interaxial areas.

While a number of models for coarse-grained meander belts exist in the literature, there are few models for arid-climate, gravel-rich braided stream complexes. These systems are likely to be characterized by extreme hydrodynamic complexity, which will be reflected in the resultant sedimentary package. The model proposed for the Realitos and Mathis fluvial systems may aid in recognition of analogous ancient depositional systems. In addition, since facies characteristics exercise broad controls on Goliad uranium mineralization, the proposed depositional models aid in defining target zones for Goliad uranium exploration.

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Carbonate and Siliciclastic Deposits on Slope and Abyssal Floor

Adjacent to Southwestern Florida Platform

Three distinct carbonate deposits have been identified on the slope and adjacent sea floor of the Southwestern Florida platform: (1) reef talus, recognized by shape and location, found on the upper slope of the Yucatan Channel and also east of the Marquesas Keys; (2) hemipelagic sediments, with complex sigmoid-oblique bed forms, filling the intervening gap between the channel and Keys and forming two lobes on the floor of the northern Florida Straits; and (3) turbidite deposits, with chaotic internal bed forms, covering siliciclastic Mississippi fan sediments at the base of the canyons in the Florida escarpment. The source of the talus, eroded and transported during the many storms which frequent the region, is the reef complexes which have formed on the platform rim. The sediment of the other two deposits is of foraminiferal tests, produced in nutrient-rich waters at the shelf edge. This sediment is deposited on the outer shelf and is vigorously transported southward as evidenced by 5 m (16 ft) high asymmetric sand waves.

Geophysical, geochemical, and sedimentological data suggest that the spatial relationships of these deposits are related to sea level variations. During extreme lowstands, with much of the shelf exposed, the dominant sedimentation is siliciclastic deposition on the abyssal floor, and slope talus development at the edge of the shelf. During a subsequent rise in sea level, after carbonate production on the shelf is initiated, sediment is transported southward to the head of the canyons and funneled to the abyssal floor. Subsequent rising sea level shifts the axis of transport farther on the shelf, bypassing the canyons and funneling the sediment through breaks in the carbonate reef-banks at the southern edge of the platform. At the sites of both the hemipelagic and the turbidite deposition, high-resolution seismic data indicate that at least three cycles of deposition have occurred. In the abyss, this cyclic nature has produced alternating layers of carbonate and noncarbonate sediments, recognizable in the sedimentary record as chaotic limestone units interlayered with fine shales. The hemipelagic deposits would be almost indistinguishable in the geologic record from deep sea foraminiferal oozes.

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Shallow Geology of North Aleutian Shelf Area, Bering Sea, Alaska

In 1981, the geological hazards analysis group of the U.S. Geological Survey's Conservation Division collected 4,009 line-km (2,491 line-mi) of high-resolution seismic reflection data in the south-central Bering Sea. The survey area is bounded on the south by the Alaska Peninsula and Unimak Island and on the north, east, and west by lat. 56°30'N., long. 160°45'W., and long. 165°W., respectively. The U.S. Department of the Interior has tentatively selected this area for inclusion in Outer Continental Shelf Oil and Gas Lease Sale 92 scheduled to be held in 1985. This study was part of the surface and shallow subsurface geological investigation of the sale area.

The seismic systems used in this study include a seismic reflection profiler that comprises an array of four 15-in.^{3} waterguns with both analog and 12-fold processed formats, an 800-joule minisparker, a 3.5-kHz profiler, a narrow-bean fathometer, and a side-scan sonar.

A bathymetric map constructed from these data reveals a prominent, 20-m (33 ft) high, gentle scarp which trends obliquely across the survey area. Two fields of 10-m (33 ft) high, undulating features, which might be either waveforms or relic glacial moraines, were detected. Several linear moraine deposits, and several sag depressions related to the presence of near-surface faults were also found in the area.

Holocene sediment consists predominantly of silt and fine to coarse-grained sand. The silt component increases toward the western end of the survey area, and gravel is locally present in the eastern end.

A Holocene isopach map reveals that sediment distribution is current-controlled. Contemporary current-related features consist of ripple marks, sediment waves, and scour zones. These features generally occur within 60 km (37 mi) of the shore and in water depths of less than 70 m (230 ft). Although current flow generally parallels the shore, side-scan sonographs indicate that the current direction which produced these features is strongly influenced by small and intermediate scale bathymetric features.

Faults are present in the southwestern portion of the survey area where they occur in a 30 km (19 mi) wide, east-west trending zone. This zone is an eastward extension of the St. George graben system. Within it, faults trend approximately east-west and sense of movement is exclusively normal. There are also several examples of growth faults. Acoustic anomalies, which may represent gas, are present throughout much of the survey area and occur at two different relatively shallow depths. No relationship appears to exist between acoustic anomalies and faults.

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Tectonostratigraphic Terranes of the Frontier Circum-Pacific Region

Many major exploration frontiers around the Pacific are in regions where complex geologic relations reflect plate-tectonic processes, crustal mobility, and accretion of exotic terranes. A preliminary map at a scale of 1:20,000,000 portrays the location and character of major terranes, as well as the position of suture zones and ophiolitic belts.

The destruction of the proto-Pacific ocean (Panthalassa) involved accretion of terranes to cratonal regions such as Gondwana and Laurasia. In eastern Australia, accretion occurred in the Lachlan foldbelt during the early Paleozoic, followed by accretion within the New England foldbelt from late Paleozoic to early Mesozoic time. Terranes in southwestern New Zealand and eastern Antarctica were also probably accreted during the Paleozoic. The southern margin of Siberia, extending into China, underwent a protracted period of accretion from the late Precambrian through the early Mesozoic. Mid-Paleozoic accretion is reflected in the Innuitian foldbelt of the Arctic Ocean, the "Black Clastic" unit of the northern Rocky Mountains, and the Antler orogeny of the western U.S. cordillera.

The Mesozoic breakup of Pangaea and the acceleration of subduction aided in the rifting and dispersal of terranes from equatorial paleolatitudes. Fragments of these terranes now compose much of the continental margins of the Pacific basin, including New Zealand, Indochina, southern China, southeast Siberia, the North American cordillera, and South America.

Combined paleomagnetic, paleobiogeographic, and lithologic data substantiate that some terranes have been displaced thousands of kilometers, but adequate data of these kinds are still lacking for many terranes. Some terranes are presently being further fragmented by post-accretionary dispersion processes such as strike-slip faulting in western North America and Japan. Although the character and distribution of terranes in the western U.S. are fairly well documented, details are needed for other terranes around the Pacific basin. Interpretation of structure and stratigraphy at depth will be aided by more data on the timing of