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