TECTONICS OF THE MIDDLE AMERICA TRENCH

OFFSHORE GUATEMALA

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ABSTRACT

A geophysical and geological survey conducted over the landward slope of the Middle America Trench offshore Guatemala has revealed landward-dipping reflectors which are associated with high compressional wave velocities, large magnetic anomalies, and basic/ultrabasic rock. Multifold seismic reflection data reveal that the edge of the continental shelf is a structural high on which Cretaceous and younger sediments of the shelf basin onlap and pinch out. The upper part of the continental slope is covered in most places by a 0.5 to 1.0 km thick sediment apron with seismic velocities of 1.8 to 2.6 km/sec. Immediately beneath the sediment apron an irregular surface is the top of an interval with velocities of 4.3 to 4,7 km/sec. Within this interval landward-dipping reflections are traced to about 6 km below sea level. Above this zone of dipping reflectors two positive magnetic anomalies are observed as well as a positive free-air gravity anomaly reported by other workers.

The sediment apron pinches out on the lower continental slope where refraction results indicate only a few hundred meters of 2.5 km/sec material lying over about a kilometer of 3.0 km/sec sediment. Between the 3.0 km/sec sediment and a landward continuation of ocean crust an interval of 4.1 to 4.7 km/sec material occurs which thins seaward. Near the interface between the 4+ km/sec material and oceanic crust with velocities of 6.5 to 6.8 km/sec, reflection records indicate a landward-dipping horizon that can be followed about 30 km landward from the trench axis.

Coring on the continental slope returned gravels of unweathered metamorphosed basalt, serpentine, and chert, unlike rock found onshore in Guatemala. These gravels, which were probably derived from local subsea outcrops, are similar to Nicoya lithologies.

A canyon cut in the outer continental shelf and upper continental slope may be associated with faulting as indicated by an offset of linear and magnetic anomalies at the shelf edge.

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