Eratosthenes Seamount

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One of the main objectives of Leg 160 in the Eastern Mediterranean Sea (Figure 1) was to study the origin and the early stages of collision of a crustal fragment, known as the Eratosthenes Seamount, with the active continental margin of the Eurasian plate to the north, represented by southern Cyprus. These drilling results represent one of the major achievements of ODP related to understanding of the tectonic processes of continental collisions and as such have excited many land-based as well as marine scientists.

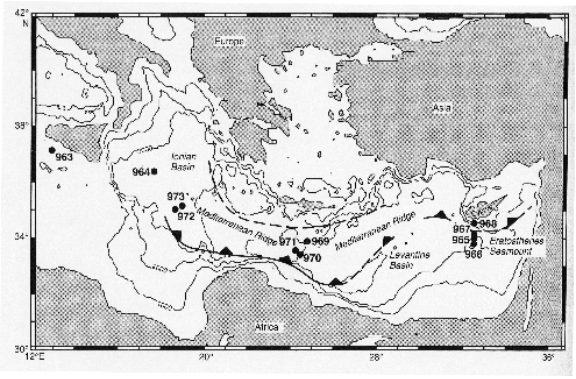

Figure 1. Outline map of the Mediterranean region showing the main tectonic features and the location of the sites drilled during Leg 160.

Drilling into the Eratosthenes Seamount recovered both shallow- and deep-water carbonates dating back to Early Cretaceous times (about 110 million years ago). A shallow-water carbonate platform, similar to that of the onshore Levant continental margin to the east (i.e., part of the North African plate), was created by sedimentary processes then was submerged into deep water. This process was punctuated by depositional and tectonic hiatuses. Tectonic uplift then took place and the platform was eventually exposed. Later, platform subsidence to deeper depths was associated with localized accumulation of limestone debris flows. Subsidence accelerated several million years ago and culminated in tectonic break-up of the Eratosthenes Seamount (Robertson et al., 1995).

Site survey seismic data suggests that the base of the northern slope of the Eratosthenes Seamount is in the process of detachment to form a separate thrust slice. This process would affect the formation of on-land units, as these include large masses of similar carbonate rocks within highly deformed melange terranes. Comparisons can be made with the collapse and partial subduction of the Daisha Seamount in the Japan Trench.

The break up of the Eratosthenes carbonate platform is believed to have been achieved by a combination of loading-related subsidence and high-angle normal faulting. Subsidence of the Eratosthenes Seamount was synchronous with rapid surface uplift of the over-riding plate. Isostatic effects of sediment loading and flooding of the Mediterranean Sea also influenced subsidence of the Eratosthenes Seamount. The ultimate fate of the Eratosthenes Seamount is likely to be preservation as slices of mainly limestone within a subduction-accretion complex, forming part of a collisional suture zone. Thus, the tectonic evolution Erathostheses seamount helps to document fundamental processes of tectonic accretion and continental collision that are directly relevant to the understanding of formations on land.

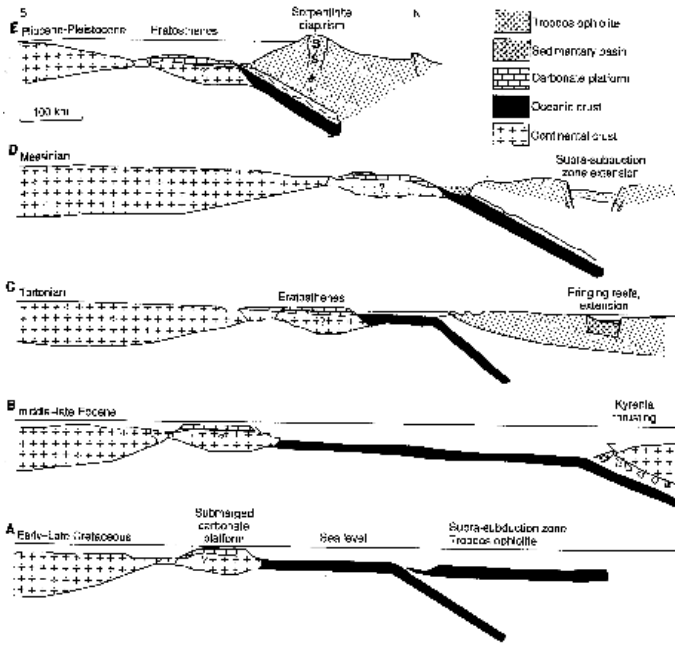

Figure 2. Plate tectonics model for the evolution of the Eratosthenes Seamount in relation to Cyprus.

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