



Crustal structure and tectonic evolution of the Hecataeus Rise near the Cyprus-Eratosthenes Seamount collision zone

Sönke Reiche (1,2), Kim Welford (3), Christian Hübscher (1), and Jeremy Hall (3)

(1) Institute of Geophysics, Department of Earth Sciences, University of Hamburg, Hamburg, Germany, (2) now at Institute for Applied Geophysics and Geothermal Energy, E.ON Energy Research Center, RWTH Aachen University, Aachen, Germany (sreiche@eonerc.rwth-aachen.de), (3) Department of Earth Sciences, Memorial University of Newfoundland, St. John's, NL, Canada

The Hecataeus Rise represents a plateau-like structure, adjacent to the southern Cyprus margin and directly next to the Cyprus - Eratosthenes Seamount convergence zone, where incipient continent- continent-collision is believed to occur.

Newly acquired wide-angle seismic profiles together with a dense grid of seismic reflection and multibeam bathymetric data provide insight into the crustal structure and Miocene-Quaternary structural evolution of this yet underexplored sector along the African-Anatolian plate boundary.

Refraction seismic modeling suggests that the Hecataeus Rise is composed of a thick sedimentary cover underlain by an intermediate crust of presumably continental origin. Velocity models show significant lateral velocity variations along the African-Anatolian plate boundary, directly south of the Hecataeus Rise. High-velocity basement blocks coincide with highs in the magnetic field and appear to extend parallel to the margin of the Hecataeus Rise. We relate these high-velocity blocks to the presence of remnant Tethyan oceanic crust along a transform margin.

Seismic reflection interpretation suggests that a Miocene period of tectonic compression has significantly deformed the western and southern part of the plateau area. Onshore Cyprus, structural lineaments were presumably active at the same time (Robertson, 1998) and can be traced offshore across the Hecataeus Rise.

Post-Messinian convergence was accommodated along the southeastern flank of the Hecataeus Rise, where NE-SW trending anticlinal structures experienced reactivation and significant growth. A prominent intra-Pliocene-Quaternary unconformity in the northwestern part of the plateau area may correlate with the Plio-Pleistocene transition and indicates the near synchronous occurrence of several tectonostratigraphic events. We suggest that these events represent a chain of structural and depositional changes initiated by incipient collision of Eratosthenes Seamount with Cyprus and the northwestern corner of the Hecataeus Rise.

References:

Robertson, A.H.F., 1998. Mesozoic-Tertiary tectonic evolution of the easternmost Mediterranean area: Integration of marine and land evidence. In: Robertson, A.H.F., Emeis, K.-C., Richter, C., Camerlenghi, A. (Eds.), Proceedings of the ODP, Scientific Results, vol. 160. Ocean Drilling Program, College Station, TX, pp. 723-782.