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NEOGENE TECTONICS of PART of THE JUNCTION of CYPRUS and HELLENIC ARCS in THE EASTERN MEDITERRANEAN SEA

H. M. Küçük (1), D. Dondurur (1), G. Çifçi (1), S. Gürçay (1), J. Hall (2), C. Yaltırak (3), and A.E. Aksu (2)
(1) Institute of Marine Sciences and Technology, Geophysical Laboratory, Dokuz Eylül University, 35340 Inciralti, Izmir, Turkey (h_mert_kucuk@yahoo.com), (2) Department of Earth Sciences, Centre for Earth Resources Research, Memorial University of Newfoundland, St. John's, Newfoundland, Canada A1B 3X5, (3) Department of Geology, Mining Faculty, Istanbul Technical University, 80626 Ayazağa, Istanbul, Turkey

The junction between the Hellenic and Cyprus Arcs is one of the tectonically most active regions of the eastern Mediterranean. This junction developed in association with convergence between the African and Eurasian Plates, and the re-organization of the smaller Aegean-Anatolian and Arabian Microplates. Recent studies have shown that the predominant Miocene deformation process in the eastern Mediterranean is compressional tectonism. However, many studies have also shown that the strain is partitioned in the Pliocene-Quaternary and the area displays regions dominated by compression, strike slip and extensional tectonism. The junction between the Hellenic and Cyprus Arcs exhibits complex morphological features including submarine mountains, rises, ridges and trenches.
Approximately 600 km of high resolution 72-channel seismic profiles were collected from the junction of Cyprus and Hellenic Arcs using a 450 m long 6.25 m hydrophone spacing streamer and a seven gun array with a 200 cubic inch total volume. This project was part of the joint scientific venture between Dokuz Eylül University (Turkey) and Memorial University of Newfoundland (Canada), and was funded by TÜBITAK and NSERC. The study area includes the southwestern Antalya Basin and the Anaxagoras Mountain of the larger Anaximander Mountains. The multichannel data were processed both at Dokuz Eylül and Memorial University of Newfoundland, using the Landmark Graphics ProMAX software, with automatic gain control, short-gap deconvolution, velocity analysis, normal move-out correction, stack, filter (typically 50-200 Hz bandpass), f-k time migration, and adjacent trace sum. Despite the fact that the source volume was modest, reflections are imaged to 2-3 s two-way time below seabed, even in 2 km water depth.
The processed seismic reflection profiles show that there are three distinct sedimentary units, separated by two prominent markers: the M-reflector separates the Pliocene-Quaternary from the underlying Messinian evaporite successions, and the N-reflector separates the Messinian evaporite successions from the pre-Messinian Miocene sediments. Interpretation of the data clearly shows that the Miocene and Pliocene-Quaternary tectonic frameworks of the Anaxagoras Mountain are dominated by thrust faults. These major faults in turn, control all of the sedimentary structures observed over the submarine mountain. These thrusts display E-W trending map traces and show southerly vergence. The seismic profiles across the southwestern margin of the Antalya Basin, immediately north of the Anaxagoras Mountain show the presence of numerous upright anticlines and their intervening synclines. These structures are interpreted as salt-cored anticlines. Although mud volcanoes and diapiric structures have also been observed in the area, the normal-move-out velocities suggest that these structures are indeed cored by evaporites.
The western margin of the Anaxagoras Mountain is delineated by a profound lineation which separates it from the Anaximander Mountains in the west. In the seismic reflection profiles, this lineation appears to be controlled by NE-SW-trending and mainly west-verging thrusts. The tip points of these thrusts lie at the depositional surface, and their trajectories can be traced well below 4-5 seconds. It is speculated that this prominent and somewhat arcuate boundary defines a crustal scale structure that links the Anaximander Mountains to the Antalya Basin. If so, it might have a sinistral strike slip component, possibly associated with the clockwise rotation of the Anaxagoras Mountain.
The acoustic basement is located at approximately 5-6 s in the seismic reflection profiles from the Antalya Basin, and is interpreted to include Miocene-Oligocene sediments. A short seismic profile from the eastern side of Finike basin shows that Pliocene-Quaternary thickness of Finike Basin is more than in the Antalya Basin. The fact that no unequivocal evaporite successions are observed in the Finike Basin is puzzling and requires that the Finike Basin either remained above the depositional surface during the Messinian or was isolated from the eastern Mediterranean Sea.