The southern margin of the Rhodes Basin and its geological relationship with the Anaximander Seamounts, eastern Mediterranean

C. Squires and J. Hall

Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador A1C 5S7

The boundary between the deep Rhodes Basin and the Anaximander Mountains represents a critical region at the junction between the Hellenic and Cyprus arcs, here investigated by multi-channel seismic reflection profiling. The seismic data were processed using the Landmark Graphics ProMAX software running on a Linux operating system. The raw data were passed through quality-control flows to eliminate noisy and dead traces, and to filter out low-frequency noise. The data then underwent velocity analysis, CDP stacking, and migration. Geological interpretation of ~1500 km of profiles (including those processed and adjacent lines) allows us to assess plate motion-related deformation in the area. Westward tectonic escape of the Aegean-Anatolian microplate from the Arabian-Eurasian collision in the east and collision in the west with the Apulia-Adriatic platform forces a counterclockwise rotation of the microplate towards the subduction of the African plate at the Hellenic Arc. This rotation is responsible for the protracted Miocene convergence (episode P1), which resulted in the development of a mainly SSE-verging fold-thrust belt, affecting the Anaximander Mountains. The belt is composed of several south-verging fore thrusts, and a number of prominent back thrusts, which collectively create significant morphological expression and continuing development as positive flower structures in the Pliocene-Quaternary sediments. The morphology of the strong late Messinian M-reflector and the architecture of the lowermost Pliocene growth strata in the central portion of the Rhodes Basin demonstrate the existence of rugged paleo-relief over the pre-existing Miocene fold-thrust belt. Later Pliocene–Quaternary deformation is characterized by NE-SW sinistral transpression (P2), and rapid regional subsidence. The P2 deformation is likely related to the rollback of the subducting plate at the Hellenic Arc and the consequent tear in the down-going African plate resulting in the transform fault of the Pliny-Strabo Trenches. During this time, the P1 structures became reactivated as transpressional faults. Immediately above the M-reflector lies a poorly reflective unit at the base of the Pliocene–Quaternary of Unit 1. This is interpreted as a thin succession continuing from the Messinian evaporites below. The succession is interpreted as very thin evaporites (and/or interbedded siliciclastics) formed prior to the post-Messinian flooding of the Mediterranean.

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