Geophysical Research Abstracts
Vol. 13, EGU2011-8957, 2011
EGU General Assembly 2011

The Miocene to Recent evolution of the western Antalya Basin and its linkage with the Anaximander Mountains and Isparta Angle

Heather King (1), Ezgi Çınar (1), Jeremy Hall (1), Ali Aksu (1), Savaş Gurçay (2), and Günay Çifçi (2)
(1) Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, (2) Institute of Marine Sciences and Technology, Dokuz Eylül University, Izmir, Turkey

The Miocene to Recent evolution of the western Antalya Basin is studied using the interpretation of ∼1200 km of high-resolution marine multi-channel seismic reflection and the lithostratigraphic data from two onshore exploration wells. Onshore seismic profiles extending to the present-day shoreline allow the correlations of the major lithostratigraphic markers delineated in the two onshore exploration wells to the offshore seismic profiles. Four stratigraphic units are identified: Unit 1 – Pliocene-Quaternary, Unit 2 – Messinian evaporite succession, Unit 3 – pre-Messinian Olio-Miocene and Unit 4 – crystalline basement. The M-reflector is a prominent marker separating the siliciclastics series of Unit 1 and the evaporite succession of Unit 2 (when present) or Units 3 or 4 when Unit 2 is absent.

Detailed seismic stratigraphic studies and mapping showed that the evolution of the western Antalya Basin is complex and revealed that the strain has been temporally and spatially partitioned. During the Miocene a major south- and southwest-verging crustal-scale fold thrust belt developed across the marine portion of the western Antalya Basin. The belt is characterised by 5-7 major thrust panels, involving the entire Unit 3 successions. The thrust surfaces can be readily traced in seismic profiles where they merge onto common detachment surface extending well below 5 seconds twt. The leading thrust of the belt defines a huge thrust culmination, with its forelimb delineating the entire continental slope. In the eastern portion of the study area the thrusts have WNW-ESE trending map traces, but they gradually swing to assume a NW-SE trend toward the west, delineating an overall NE-concave fold thrust belt. This fold-thrust architecture is very similar to the geometry of the onland Isparta Angle. In fact, the major thrusts mapped in the marine areas can be readily traced to the present-day shoreline, suggesting that they link with large Miocene thrusts mapped onland.

During the Pliocene-Quaternary the strain was partitioned into several regionally distinct domains. A domain characterised by continued contraction and thrusting occupies the eastern portion of the study area. Several superficial extensional faults occur in this region over the crests of major thrust culminations. A prominent N-S and NE-SW trending, predominantly E- and SE- dipping normal fault zone developed in the western portion of the study area, along the eastern slopes of the Beydağları margin. The fault zone comprises 6-9 high-angle normal faults that show notable vertical stratigraphic separations. The zone can be shown to define the morphology and architecture of the Beydağları margin, and extend south toward the Anaximander Mountains. In the southwestern segment of the study area, a prominent zone characterised by a series of domino faults is clearly associated with this zone, suggesting that the zone must have a strike-slip component. This zone is believed to define a new crustal-scale transform system shaping the western margin of the Antalya Basin, but also delineating the easternmost elements of the western limb of the Isparta Angle.