Structure and evolution of Antalya Basin deducted from geophysical data

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The objective of this study is about the structure of the Antalya Bay area as well as its relation with the Taurus belt in the northeast and west, and Cyprus in the southeast. After reviewing the available geophysical and geological data for the eastern Mediterranean in general, the analysis and interpretations of gravity, magnetic and seismic reflection data were attempted for the Antalya basin in proper.

There are still a lot of controversery about the structure and geological evolution of the eastern Mediterranean, its basins and the land surrounding it . There is an argument on the possibility of an early continental break-up, and the north of Africa-Arabia can be interpreted as the formation of a passive continental margin during the Late Triassic-Liassic. Evidence of rifted margins during this time has also inferred from different tectonic sequences (Antalya, Mammonia, and Hatay-Baassit nappes).

The eastern Mediterranean is divided into several subbasins. As in the other parts of the Mediterranean, the Messinean event which is characterized by thick sequence of evaporities, is observed almost all of these basins. Maximum salt layer has been found to be reaching up to 2000 m in the deep Antalya basin where this thickness is controlled by previous topography and the structural evolution of the Cyprus arc in the south.

The Antalya Bay area has a broad 100 mgal Bouguer gravity anomaly closure, appears to be a natural continuation of the Cyprus anomaly to the southeast). This anomaly is terminated abruptly against the authochtonous Beydağ range at the west of Antalya Bay. The eastern part of the Antalya Bay is free from magnetic anomalies. Main magnetic anomalies are located along the axis of the deepest part of the Antalya Bay running in the north-south direction. In this respect that the Antalya Bay area and the Antalya complex may be the extension of Troodos massif where the Bouguer gravity and magnetic anomalies continue under the sea. The Antalya complex thrusting against the Beydağ range, may be the over thrusted segments of the ophiolitic rocks at depth of the Antalya basin giving rise to these magnetic anomalies.

Seismic stratigraphic interpretation of deep penetration multichannel seismic data collected by the Turkish Geological Survey with the R/V Sismik I. using Bolt Airgun Array as a seismic source and 3600 m streamer, was attempted. One main reflecting horizon was distinguished as the base of Plio-Quaternary. Velocity data analysis indicated that the base of Plio-Quaternary can be correlable with the basement velocities possible of ophiolithic rocks. These basement rocks were indicated by weak and dispersed reflections without any special characteristics.

The ophiolities of Antalya, Cyprus and Hatay-Baassit could be pieces of obducted oceanic floor where the eastern Mediterranean deep basins were located on remnants of an old oceanic basin and on an attenuated continental crust. It is very difficult to reconstruot the successive paleographies of the basins in the region because the area has been tectonized continously since the Maestrichtian. In this context, the north of Florence, the Antalya deep basin constitutes a single basin which can be interpreted as interdeep (or fore-arc) basin without no well-defined volcanic arc.

High-resolution seismic reflection (Uniboom) profiles in and around the head of the Anamur Submarine Canyon, Turkey, NE-Mediterranean

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A detailed bathymetric survey, supported by the high resolution seismic reflection (Uniboom) profiles was carried out onboard the R/V Bilim in the Bay of Anamur (Southern Turkey) (Figure.1) in 1985.

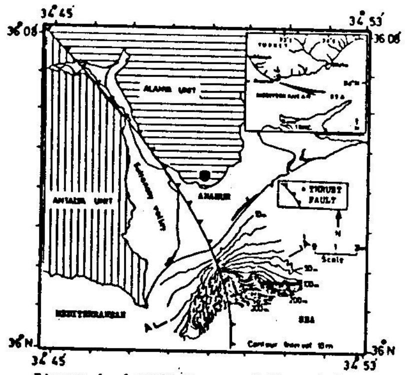

Figure.1. Location map of the study area showing the onshore thrust fault coinciding with the Anamur Canyon.

The main purpose of the study was to investigate the features of an onshore thrust fault of early Tertiary in age beneath the sea floor, if they were present. A total of 36 continuous seismic profiles were obtained both in N-S, and W-E direction. Data obtained in this study has shown that the continental shelf and the upper slope here is dissected by V-shaped submarine canyon head (Figure.2). The rim of the canyon occurs at about the 100 m countour line and its apex is only about 1 km away from the shoreline.

The canyon head shows a dentritic system of tributaries (Figure.3) suggesting its partial erosion during the post-glacial stage as the eustatic sea level fell some 100 m below its present level.

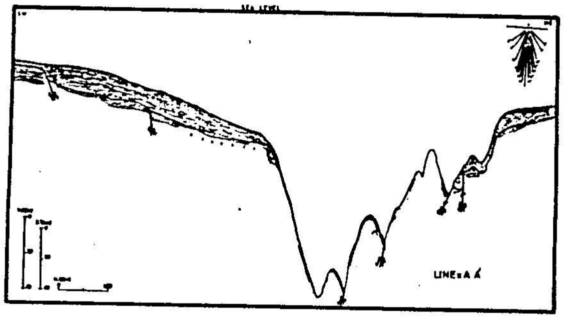

Figure.2. Sketch of a seismic profile along a survey line in the study area. Note the bedrock overlain by unconsolidated sediments.

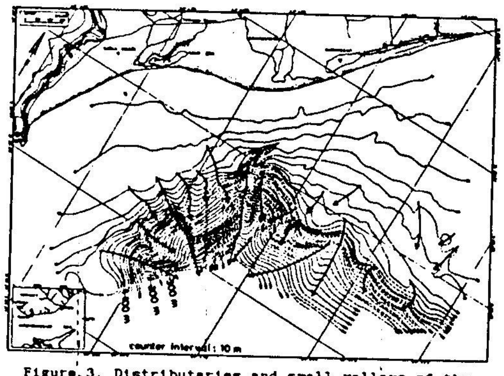

Figure.3. Distributaries and small valleys of the upper reaches of the canyon.

Occurrences of moderately sorted siliciclastic gravelly sand around the rim of the canyon also support this view. The unconsolidated sediment layers were often less than 1 m over most parts of the sides of the canyon. This is presumably due to slope instability on the walls of the canyon.

As the axis of the canyon head is found to be in alignment with a major thrust fault onshore, it is conjectured that the canyon may itself be the expression of tectonic movements. However, the processes of submarine or even aerial erosion in the past may also be partially responsible.