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Physiographic, Morpho-tectonic provinces and Sedimentary patterns of the Cilicia-Adana basin, the NE-Mediterranean

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Seismic reflection profiles collected between the years of 1972-1977 by R/V Shackleton from the Cilicia Basin, the Northeastern corner of the Mediterranean, were interpreted to investigate structural development and dynamic evolution of the Cilicia salt tectonic and evaporitic back-arc basin.

The Cilicia Basin has maximum depths 1100 m and 1300 m to the west. The continental shelf of the N-NE province of the basin shows broadly widening margin platform of the deltas, which are the huge progradational margin systems actively controlled by gravitational tectonism and halokinesis. The continental shelf of the S-margin of the basin, the N-Cyprus coasts, is generally narrow, steeply normal-faulted and rocky or thinly covered by draped sediments. It is a typical erosional-tectonic margin, actively controlled by the Kyrenian transpression/transtension belt. The offshore part of the N-Cyprus toward the basin appears to be stepped-like flat-lying platforms with a regular sediment thickness 300-400 m, deformed by salt diffusion-seeping processes and salt pillow-related collapse-solution graben-like mini depressions. The W-province of the Cilicia Basin or the NW-margin of the Cyprus, is tectonically most active mobile region with normal faults, mainly responsible for the Neogene sediment loss and was followed by “extension-related sedimentation” in the Late Miocene.

In this region, the former of the two main features is the flight of marine terraces and the latter is well exposed Neogene extensional basins to the north. The N-S trending a fault lineament, “Anamur-Kormakiti shear zone” controlled by Kyrenia belt, repre-

sents a critical position that is a transitional kinematic link between the deep Antalya and Cilicia Basins or tectonic hinge line, separating the N from NW-Cyprus province. The presence of the two subsurface stratigraphic units (Messinian evaporites and Plio-Quaternary deposits) and two different erosional boundaries (reflectors M and N) are clearly identified from seismic reflection data. The main erosional boundary is marked by subbottom “reflector M”, representing the top of the Messinian evaporites. The Messinian episode underlying the Plio-Quaternary sediments has a relatively complex depositional history, and appearing to have been the main source of salt tectonism and halokinetic regime. The Plio-Quaternary episode is underlined by this irregular strong discordance, which is dissected by salt-related piercement structures. The second erosional boundary “reflector N”, partly seen on seismic profiles from the coasts of the N-Cyprus, is thought to be represented by the base of Upper Messinian. This reflector having poorly discontinuous and acoustically low reflection amplitude, and regularly mimics the horizon M does not show any regular continuity.

The depth of the “M discordance” varies - 400 to -2800 m all over the basin. The Plio-Quaternary sediments have 100-600 m thick along the N-NE-deltas, resulted from the intense downslope sediment movement or gravitational sediment instabilities rather than from lack of sediments. Considerably thicker series accumulated in the deep basinal plain. In the center of abyssal zone, sediment thickness increases gradually 600-800 m and more. Sediment thickness is nearly 300 m thick along the N-Cyprus coasts. However, the basinward thickness increases from 300 to 600 m. The thickest sediments at the abyssal plain extending from NNE-SSW are represented by contour lines of 700 and 800 m. To the further west, the sediment thickness abruptly decreases and reaches to 250-300 m.

An axial elongation of the graben-like depression/channel zone along the overburden slopes is well developed on the N-NE Cilicia margin platform as a result of the gravity tectonism and halokinesis. The deeper part of the central basin is nearly flat and covered with the well-stratified platform-style deposition. These abyssal plain sediments are gently warped and effectively folded by the salt-related deformations and halokinetic regime. The deep basin is structurally subjected to rapid graben subsidence by vertical differential movements or extensional block faulting. Submarine canyon/valley systems, which are important elements of back-arc basin sediment dispersal system, are named “Oxbow canyons” seen along only the N-NE-margin and a canyon, named “Cilicia canyon” at the western exit of the basin. These canyons form the huge delta sediment transport and dispersal system from the N-NE margin through the deep abyssal plain to west.