O4-6 FIRST RESULTS FROM THE MULTICHANNEL SEISMIC REFLECTION STUDY IN THE IZMIR BAY

N. OCAKOGLU [1], E. DEMIRBAG [1], A. GUNEY [1], B. ECEVITOGLU [1], I. KUSCU [2], S. KARAGOZ [2] and C. GOCMEN [2]
[1] ITU, Maden Fakultesi, Jeofizik Muh. Bolumu, 80626, Ayazaga, Istanbul, Turkey
[2] Maden Tetkik ve Arama Genel Mudurlugu, Ankara, Turkey

Three different paleotectonics belts are present in the Izmir area. The easternmost of these is the Menderes Massif, which consists of very thick mica schists and platform type marble successions in ascending stratigraphic order. The Izmir–Ankara zone is the second tectonic belt lying to the west of the Menderes Massif. This belt is represented by an ophiolitic melange in the Akhisar area, whereas in the south near Izmir, flysch–type successions are predominant. To the west of the Izmir-Ankara zone, the Karaburun belt is located. This third belt consists mainly of a thick Mesozoic carbonate succession that was deposited in the platform conditions (Erdogan, 1990).

The neotectonic framework of Western Anatolia-Aegean Sea is characterised by numerous east-west trending grabens, such as Bakýrcay, Gediz, Menderes and Gokova grabens associated with the regional north-south extension of the region (Dewey and Sengor, 1979). These grabens and the intervening horsts control the west-flowing drainage system of western Turkey. In the center of this neotectonic evolution, the submarine geological and geophysical properties of Izmir Bay is not well known in spite of some onland geological studies. Main purpose of this study is to map submarine structurel features of the Izmir Bay and correlate them with the onland features, and finally to investigate the evolution of the bay under the N-S extensional regime.

In order to investigate the submarine active tectonism in the Izmir Bay, total of 115 km reflection sismic lines were collected by MTA Seismic-1 research vessel with an airgun source array and 96 channel streamer. The recording parameters are as follows: 237.5 m offset, 50 m shot interval, 12.5 m group interval, 5 sec record length, 2 msec sampling interval. The data were processed in the Department of Geophysics in ITU as follows: data transcribing, editing, refraction and direct wave muting, gain analysis, in-line geometry definiton, sorting, velocity analysis, NMO correction, Notch filtering, stacking, time migration, muting and AGC. The seismic line map, migrated section and its interpretation are given in Fig. 1. According to this interpretation, smoothly deepening seabed is disturbed by normal faults cutting through the recent deposits (possibly Plio-Quaternary) as well as the basement rocks of possibly Triassic age on offshore Karaburun. Minor steps at the seabed indicate that the faulting is active and basin formation, i.e., evolution of the Izmir Bay is continuing under the extensional forces in the Western Anatolia-Aegean Sea.

GPS measurements of present-day crustal movements show 14±5 mm/yr N-S stretching rates across southwestern Anatolia (Reilinger et al., 1997). High seismic activity is seen in the study area is possibly due to the N-S extensional regime and counter clockwise rotation of Western Anatolia-Aegean region. Under these deformational forces, large earthquakes (M≥5.5) in the area show dominant normal faulting as well as minor strike-slip focal mechanism solutions (Eyidogan, 1987). Moreover, approximately 1763 earthquakes with magnitutes between 0-4 and focal depth of 15 kilometers occurred in Izmir area between 1964-1993 (from ISC records) as seen in Fig.1 (Caliskan, 1998). How the submarine structures in the Izmir Bay explains this observed seismicity is another question in this study?

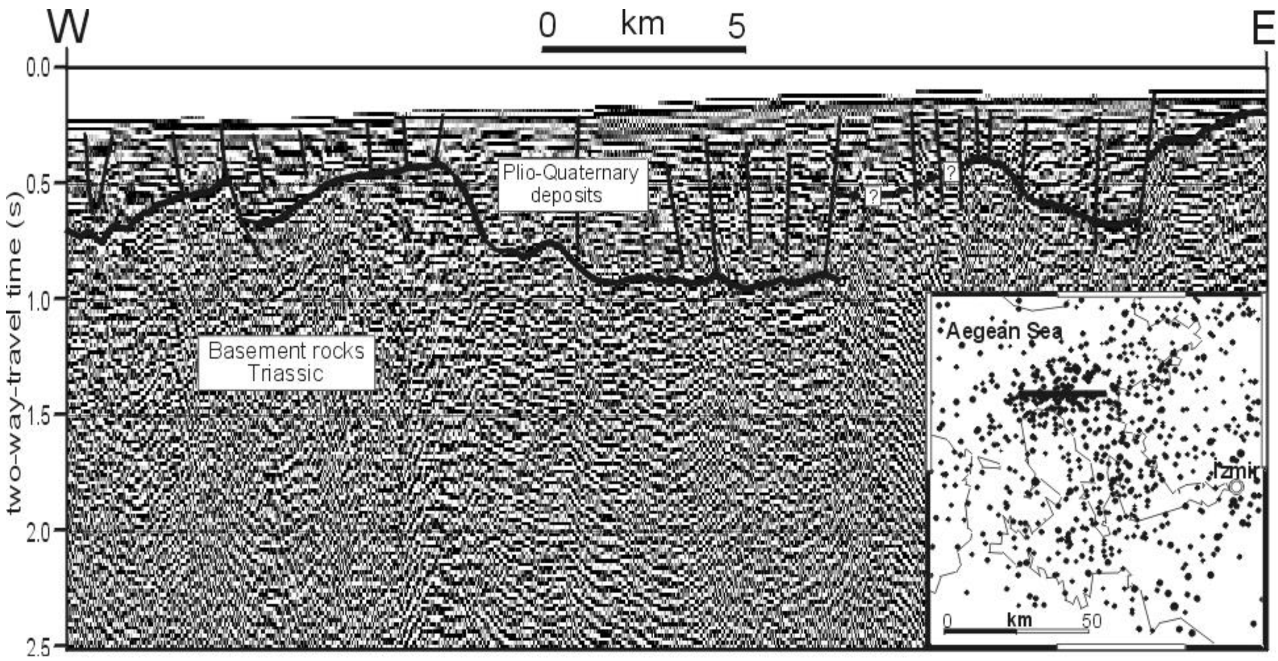

Fig.1. Interpreted time-migrated seismic section, its location and earthquake epicentral distribution map.

References

Caliskan, U., 1998, Izmir aciklari sismik verilerinin degerlendirilmesi (B.Sc. thesis), I.T.U., 41 pages.

Dewey, J.F. and A.M.C. Sengor, 1979, Aegean and surrounding regions complex multiplate and the continuum tectonics in a convergent zone, Geol. Soc. Amer. Bull., 90, 84-92.

Erdogan, B., 1990, Izmir-Ankara zonu'nun Izmir ile Seferihisar arasindaki bolgede stratigrafik ozellikleri ve tektonik evrimi, TPJD Bul., C.2/1 Aralik, s:1-20.

Eyidogan, H., 1987, Rates of crustal deformation in western Turkey as deduced from major earthquakes, Tectonophysics, 148, p. 83-92.

Reilinger, R. E., McClusky, S.C., Oral, M.B., King, R.W., Toksoz, M.N., Barka, A.A., Kinik, I., Lenk, O. and Sanli, I., 1997, Global positioning system measurements of present-day crustal movements in the Arabia-Africa-Eurasia plate collision zone, Journ. Geophy. Resch., Vol.102 NO. B5, p. 9983-9999.