

# GEOLOGICAL EVOLUTION OF WESTERN ANATOLIA AND THE GEOPHYSICAL STUDIES IN THE BAY OF IZMIR

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Izmir Bay was formed by an asymmetric E-W directed graben to other important bays in western Anatolia. It was partially separated by Karaburun Peninsula from the Aegean Sea morphologically, and was formed and controlled mainly by NE and N directed uplifted and subsided blocks (1, 2, 3).

The geology of Izmir Bay and its surrounding is given in the Figure 1. In the Bay, which formed in a subsided valley, the effects of Alpine Orogenesis in general can be seen. The area was first established in the Valanginian period and the surrounding rocks were represented with Cretaceous deposits of flysch facies. This suggests that the depositional environment was not stable. Periodic sea level oscillations caused conglomerate, sandstones-marl and limestone alternations. But the greater thickness of limestones suggests that the marine environment continued in a longer period (4).

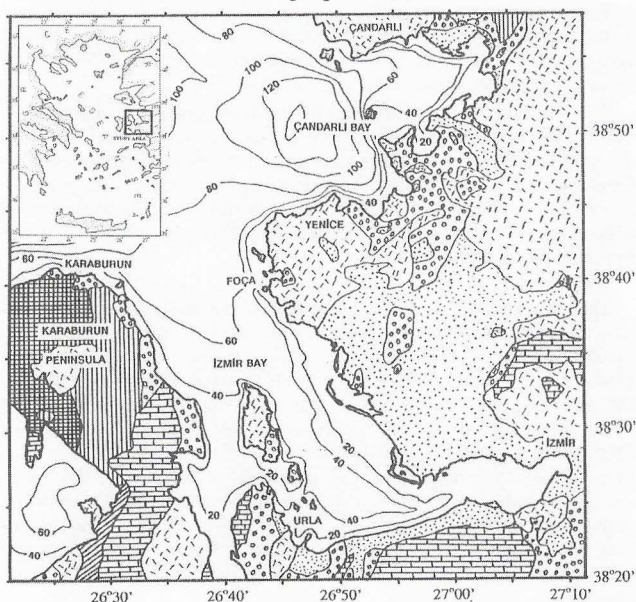


Figure 1: Geology of Izmir Bay and its surrounding (5) on the Bathymetry (6)

Miocene period started with shallow lake sediments after an important absence between Cretaceous and Miocene. The gradual subsidence of the lake caused the continental depositions. Volcanic tuffaceous and similar materials, which cover large areas in the Miocene period were deposited after the extension in N, NW-SE and NE-SW directed fault systems caused by orogenic movements.

According to some scientists, Izmir Bay was formed by normal faults at the end of the Neogene or probably in Middle Pleistocene. Terraces located on the shore and in the valley suggest that the movements continued also in the Quaternary. In the Quaternary, Izmir Bay was a deep valley in the glacial (cold) periods, and it was a Bay like today in the interglacial (warm) periods. It can be said that Izmir Bay reached the present form first in the Flandrien transgression.

Numerous shallow seismic, multichannel reflection and several seismic refraction studies were done in the Bay in various times. Most of these studies were carried out by the R/V K. Piri Reis of the Institute of Marine Sciences and Technology in Izmir. After the multichannel seismic studies an exploration well Foça-1 with 2220 m final depth was drilled in the outer bay between Foça and Karaburun (Figure 2).

In this well of thick Miocene sequence was cut. The lower 1000 m of this sequence was volcanic origin. This is a negative point for the oil potential in the Bay. However, 360 m thick evaporites were also cut during the drilling (7). Finally, for a better understanding of the geology of Izmir Bay seismic refraction studies along a profile, which cut the Foça-1 oil well, were carried out and compared with older data.

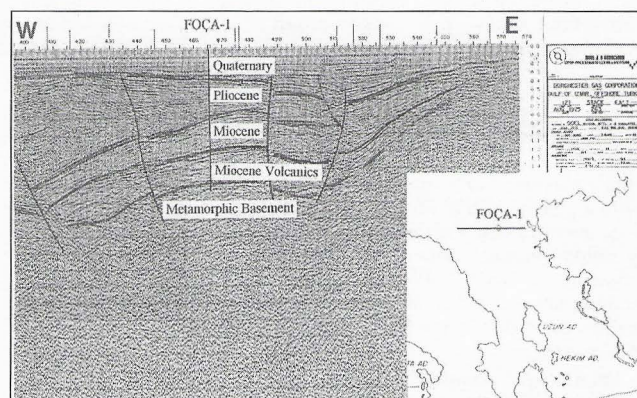


Figure 2. Multichannel seismic reflection section from the Izmir Bay.

## References

- 1 - Kaya O., 1979. The Stratigraphy and Tectonics of the Middle Eastern Aegean Depression (in turkish). *Bulletin of the Geological Society of Turkey*, 22: 35-38.
- 2 - Sengör A.M.C., 1987. Cross-faults and differential stretching of hanging walls in regions of low-angle normal faulting: examples from western Turkey. In: Coward, M.P., Dewey, J.F. and Hancock, P.L. (eds.) *Continental Extensional Tectonics. Geological Society Special Publication*, 28 : 575-589.
- 3 - Ulug A. and Günay C., 1993. Plate Tectonic Movements in the Western Anatolia and its Signatures on off-shore Geophysical Observations, Proceeding of the General Assembly of Turkish National Geodesy-Geophysics Union (in turkish), pp.597-608.
- 4 - Basoglu S., 1975. Hydrography and Sedimentology of Inner Izmir Bay. Aegean Univ. Science Fac. Unpublished Ph.D. Thesis (in turkish), 90 p., Izmir.
- 5 - M.T.A., 1964. Geological Map of Turkey (Izmir). Institute of Mineral Research and Exploration, Ankara.
- 6 - Aksu A.E., Konuk, T., Ulug, A., Duman, M., Piper, D.J.W., 1990. Quaternary Tectoni and Sedimentary History of Eastern Aegean Shelf Area. *Jeofizik*, 4 (1): 3-35.
- 7 - Turgut S., 1988. Observation in the Aegean Sea from the Point of View of Hydrocarbon Exploration. *Bulletin of Turkish Assoc. Petroleum Geologists* (in turkish), 1(1): 27-38.