



Field evidence for an active transtensional basin in western Anatolia: The Inner Bay of İzmir

B. Uzel (1), H. Sözbilir (1), Ö. Sümer (2), U. Inci (1), Ç. Özkaymak (1,2)

(1) Dokuz Eylül University, Department of Geological Engineering, Buca-Izmir, Turkey, (2) Dokuz Eylül University, The Graduate School of Natural and Applied Sciences, Geological Engineering, İzmir, Turkey

The west Anatolian extensional province is dominantly shaped by an E–W-trending graben-forming high-angle normal faults. However, there are some studies revealing the presence of a number of NE-trending strike-slip faults deforming the western Anatolia crust onshore and offshore. The İzmir Bay and the surrounding area is located at the NE-trending strike-slip dominated zone of weakness known as the İzmir-Balıkesir Transfer Zone forming the western end of the west Anatolian extensional province. The İzmir Bay is a marine basin that controlled by NE, NW, N-S and E-W trending active faults. The bay of İzmir is topographically divided into an E-trending inner bay and an NW-trending outer bay. The southern sector of the inner bay is bounded by İzmir Fault which is made up of two main segments trending approximately in E-W. According to field studies, the İzmir Fault is an oblique-slip normal fault dipping to the north. The northern sector of the inner bay is bounded by Karşıyaka Fault which is antithetic to the İzmir Fault. Karşıyaka Fault in this section has a characteristic of oblique-slip normal fault dipping to the south.

The NE-trending Seferihisar Fault, which is approximately developed normal to the İzmir Fault is approximately 30 km long on the land. Morphological, geological and seismological evidences suggest that the northern segment of the Seferihisar fault has been activated during Holocene time. The fault is a dextral strike-slip fault with oblique-slip movement. The fault trends in N20E at the southern part where it cuts the Upper Cretaceous Bornova Flysch and Quaternary alluvium. Towards the north, the strike of the fault changes to N40-50E and it gets connected with the İzmir Fault. Within the excavated trenches on the fault segments mapped in 1/1000 scale, it is established that the strike-slip fault (Seferihisar Fault) is transformed by bending into the normal fault (İzmir Fault). Kinematic analysis carried out at 9 stations suggest that the faults have controlled by an N-S extensional direction associated with E-W contraction. The data support that the kinematically linked İzmir Fault, Seferihisar Fault and Karşıyaka Fault have been contributed to the opening of the inner bay of under the control of the transtensional forces.

Key words: The İzmir Bay, active fault, fault kinematics, transtensional basin.

This research was supported by the Dokuz Eylül University Research Foundation (Project number: DEU-BAP-2007.KB.FEN.039)