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

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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 Izmir Bay and the surrounding area is located at the NE-trending strike-slip dominated zone of weakness known as the Izmir-Balıkesir Transfer Zone forming the western end of the west Anatolian extensional province. The Izmir Bay is a marine basin that controlled by NE, NW, N-S and E-W trending active faults. The bay of Izmir 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 ´Izmir Fault which is made up of two main segments trending approximately in E-W. According to field studies, the ´Izmir Fault is an oblique-slip normal fault dipping to the north. The northern sector of the inner bay is bounded by Kar¸sıyaka Fault which is antithetic to the Izmir Fault. Kar¸sıyaka 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 ´Izmir 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 ´Izmir 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 (Izmir 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 Izmir Fault, Seferihisar Fault and Kar¸sıyaka Fault have been contributed to the opening of the inner bay of under the control of the transtensional forces.

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

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