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Structural Evidence for Fault Reactivation: the Active Priene-Sazli Fault Zone, Söke-Milet Basin, Western Anatolia

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Western Anatolia is located at tha eastern part of the Aegean region that forms one of the most seismically active and rapidly extending regions in the world. One of the most prominent structural component of the Western Anatolia is E-W trending grabens. One of them is the Büyük Menderes Graben (BMG) showing a major change in strike ranging from E-W to NE-SW in its western end. This NE-SW oriented part of the graben is known as the Söke–Milet basin (SMB). The depression is 35 km long and 16 km wide. NW border of the basin is characterized by a morphotectonic structure namely Priene–Sazlı fault zone (PSFZ). The 16 July 1955 Söke-Balat earthquake (M=6.8) was atributed to this fault (Eyidogan and Jackson, 1985; Sengör, 1987; Altunel, 1998). However, field based kinematic studies on the PSFZ are lacking except for Gürer et. al. (2001). In this paper, we studied several reactivated fault segments of the PSFZ that are repeatedly formed under changing stress fields in order to evaluate the kinematic and stress history of the region by using structural relationships between striations and fault-plane related structures.

The PSFZ consists of 5 fault segments which are en échelon arranged on the basis of mapping geological structures. The northern segments that strikes NE in the north and bends into an approximately E-W direction around Doganbey to the SW. Each segment is identified as steep opographic scarps ranging in height from a few meters to several hundred meters. Fault segments become to linkage and show breaching of the relay ramps between them. We interpret that such fault patterns have been formed in a region where extension has reactivated on pre-existing structures in an oblique sense. Evidence for this is the presence of three sets of striations each with different orientations on the same slip surface of the studied fault segments. Here, two differently oriented strike-slip slickenlines are postdated by dip-slip striations. Based on our structural observations, we suggest different episodes of fault evolution for the PSFZ; (i) first the fault formed as a dextral strike-slip faulting, (ii) then, sense of the direction was sinistral oblique-slip (iii) and finally PSFZ was reactivated during the Quaternary as an approximately pure dip-slip normal fault.

Key words: Reactivation, strike-slip fault, active fault, western Anatolia

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