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Tectonic Implications of the 2017 Ayvacık (Çanakkale) Earthquakes, Biga Peninsula, NW Turkey

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Abstract

The west to southwestward motion of the Anatolian block results from the relative motions between the Eurasian, Arabian and African plates along the right-lateral North Anatolian Fault Zone in the north and left-lateral East Anatolian Fault Zone in the east. The Biga Peninsula is tectonically influenced by the Anatolian motion originating along the North Anatolian Fault Zone which splits into two main (northern and southern) branches in the east of Marmara region: the southern branch extends towards the Biga Peninsula which is characterized by strike-slip to oblique normal faulting stress regime in the central to northern part. The southernmost part of peninsula is characterized by a normal to oblique faulting stress regime. The analysis of both seismological and structural field data confirms the change of stress regime from strike-slip character in the center and north to normal faulting character in the south of peninsula where the earthquake swarm recently occurred. The earthquakes began on 14 January 2017 (Mw: 4.4) on Tuzla Fault and migrated southward along the Kocaköy and Babakale's stepped-normal faults of over three months. The inversion of focal mechanisms yields a normal faulting stress regime with an approximately N-S (N4ºE) σ3 axis. The inversion of earthquakes occurring in central and northern Biga Peninsula and the north