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Source Characteristics of 2017 Ayvacik, Lesvos, and Bodrum-Kos Earthquakes Obtained from Regional Moment Tensor Inversion

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The Aegean Sea and its surrounding coastal areas of Greece and western Turkey is one of the most seismically active extensional zones in the Mediterranean Sea Region (Taymaz et al., 1990, 1991; Yolsal-Çevikbilen and Taymaz, 2012; Yolsal-Çevikbilen et al., 2014). Recently intense earthquake activities are observed in Ayvacik (Çanakkale), Lesvos and Lesvos and Bodrum-Kos (Gulf of Gökova) in the East Aegean Sea. These include several moderate size earthquakes, e.g., 06 February 2017 Ayvacik–Çanakkale (M_w 5.2), 12 June 2017 Lesvos (M_w 6.2) and 20 July 2017 Bodrum-Kos (M_w 6.5) revealing the geometry of active fault structures and deformation styles in the region.

This study aims to obtain reliable source parameters of the 2017 East Aegean Sea earthquakes with $M_w \geq 3.5$ by applying Regional Moment Tensor (RMT) inversion method using the ISOLA software package (Sokos and Zahradnik, 2008) which is widely used to determine source parameters of moderate size earthquakes recorded at regional distances ($1^\circ \leq \Delta \leq 10^\circ$). Earthquake data are retrieved from national seismographic networks of Turkey and Greece. Prior to inversion, the data quality is checked and high-quality broadband data have been selected by means of signal-to-noise (S/N) ratios. Different filter frequency ranges are chosen for each earthquake depending on the earthquake magnitude, S/N and location uncertainty, and at least 7 stations with three-components providing good azimuthal coverage are used in inversions. The solution quality have been assessed by using variance reduction (VR), double-couple (DC), condition number (CN), space time variability (STVAR), and focal mechanism variability (FMVAR) values. The overall results clearly indicate normal faulting mechanisms with shallow focal depths (h:8-12 km)) that are in good agreement with regional active tectonics, and those of high-resolution local GPS arrays, and point-source and finite-fault source models obtained independently.

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