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Seismic Anisotropy in the Upper Mantle at Dikili, Gelibolu and Lesvos Regions (W-NW Turkey) Retrieved from Shear Wave Splitting Analysis

Ceyhun Erman, Seda Yolsal-Çevikbilen, and Tuncay Taymaz

Istanbul Technical University, the Faculty of Mines, Department of Geophysical Engineering, Maslak, 34469 Istanbul, Turkey (ermanc@itu.edu.tr; yolsalse@itu.edu.tr; taymaz@itu.edu.tr)

Shear wave splitting measurements are one of the most reliable indicators of deformation processes in the crust, lithosphere and upper mantle. It is known that the mantle anisotropy is particularly associated with the lattice-preferred orientation (LPO) of anisotropic minerals such as olivine that are abundant in the upper mantle. The olivine fast axis aligns with the maximum finite strain direction. In anisotropic medium, shear wave splitting occurs due to the seismic velocity difference between the components of the shear wave, and one component of the shear wave travels faster than the other orthogonal component. To characterize the seismic anisotropy, delay time (δt) between two shear wave components and fast polarization directions (φ) are obtained.

We analyzed teleseismic shear waves (SKS and SKKS), polarized at the core-mantle boundary (CMB) due to the conversion from P- to S- waves, for understanding the main characteristics of seismic anisotropy in upper mantle of the northern part of the Aegean Sea. Earthquakes (M_w $\geq$6.0; h$\geq$10km) recorded by seismic stations DKL (Dikili, İzmir), GELI (Gelibolu, Çanakkale), and PRK (Lesvos, Greece) with epicentral distances between 85°–120° were retrieved from Incorporated Research Institute for Seismology-Data Management Center (IRIS-DMC; http://ds.iris.edu/wilber3/find_event) and European Integrated Data Archive (EIDA). Theoretical arrival times of SKS/SKKS phases were computed by using the IASP91 reference Earth model (Kennett et al., 1995). The code of Teanby et al. (2004) based on Silver and Chan (1991) algorithm was used. Overall results present clear signs of seismic anisotropy with NE-SW oriented fast polarization directions in the upper mantle of the study area, consistent with observations of Confal et al. (2016).

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