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M_L SHEAR WAVE VELOCITY TOMOGRAPHY IN TURKISH PLATEAU

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Turkish plateau consisted of several continental terranes amalgamated in the late tertiary (Bozkurt et al., 2001). To study the gradient of lateral crustal thickness in Turkey and to identify borders of different crustal blocks, we calculated a 2D M_L shear wave velocity tomography map (Maheri-Peyrov et al., 2016) using the waveforms recorded by the KOERI permanent Seismic Network and the European Integrated Data Archive (EIDA). The M_L velocity is very sensitive to lateral crustal thickness variations and varies between the velocity of Lg and Sn phases. For crustal earthquakes, the maximum amplitude of the M_L shear wave usually belongs to Lg wave with a group velocity interval of 2.8-3.5 km/s. Paths with M_L velocities faster than the interval are considered as blocking Lg paths because the quality of Lg wave propagation is sensitive to the gradient of crustal thickness (Press et al., 1952). The selected dataset includes 22584 M_L velocity readings from 382 earthquakes with a location error of 5 km or less, a magnitude range of 4-6.5 happened from 2005 to 2017 (Figure 1). Using a constrained least-squares inversion scheme, we calculated the 2D M_L tomography map of Turkey (Figure 2). Our results show an Lg blocking region (i.e., M_L velocity larger than 4 km/s, near to Sn phase) in eastern Turkey (indicated by letter C in Figure 2) where a thickened crust resulted from the collision of the Arabian Plate and the Anatolian plate. The M_L velocity for the Pontides (indicated by letter B in Figure 2) in the north of the Anatolian fault and south of the Black Sea is in the range of 3.2 to 3.5 km/s, implying an Lg passing region. Due to the larger average velocity of the Pontides relative to central Turkey, the Izmir-Ankara-Erzincan suture zone is well resolved by the velocity map. Our velocity map shows an Lg blocking region for the Tauride area (indicated by letter E in Figure 2) in the

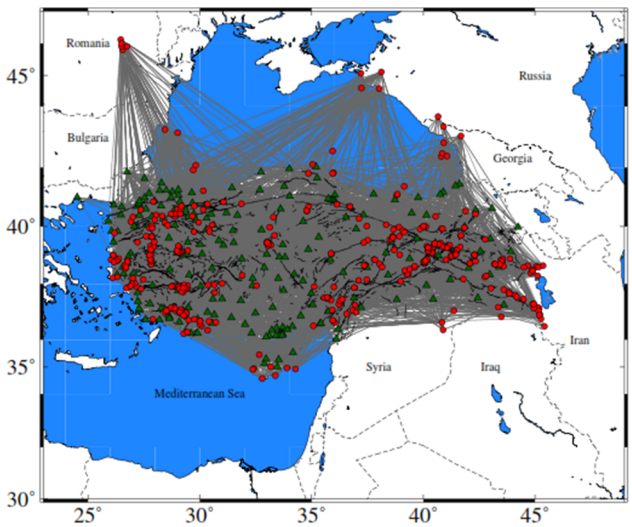

Figure 1. Ray coverage for M_L amplitude readings. The grey lines are the surface trace of the event–station paths; red circles are epicenters of the selected events, green triangles are seismic stations, the black lines are simplified traces of active faults and the dashed grey lines are political borders.

southwest of Turkey. Previous studies indicate a tensional regime in the Tauride area (Bozkurt et al., 2001); thus our map probably shows with good resolution the borders of the region with a strong crustal thinning. The M_L velocity for the Menderes Massif (indicated by letter D in Figure 2) in western Turkey is in the range of 2.1 to 3.2 km/s, implying an Lg passing region with a distinct pattern correlating with the boundary of the Massif. For the central part of the Anatolian plate and the Kırşehir block (indicated by letter A in Figure 2), the M_L velocity is in the range of 2.7 to 3.1 km/s, consistent with an Lg passing region with a small lateral gradient of crustal thickness. The M_L velocity for the Arabian plate is about 3.4 km/s slightly larger than the Anatolian plate. The velocity map clearly shows the Bitlis suture zone separating the Arabian plate from the central Anatolian plate. The M_L velocity map correlates very well with the published Moho depths calculated by receiver function (RF) technique (Vanacore et al., 2013; Tezel et al., 2013). The ML shear velocity map did define borders of different geological terranes and can be used as guideline for further RF studies in the Turkish plateau.

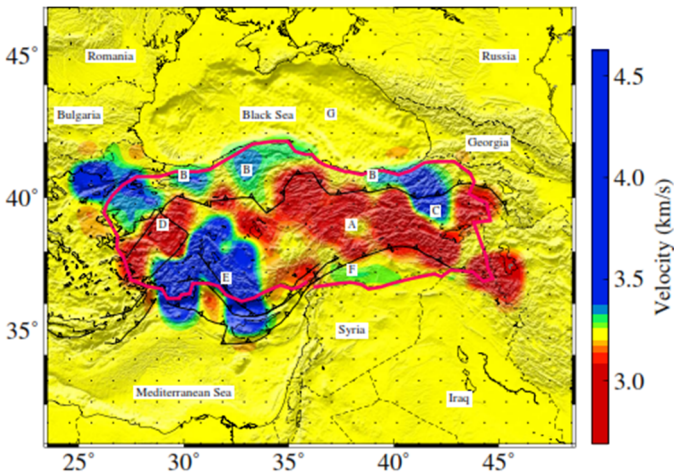

Figure 2. M_L shear wave velocity map superimposed on topography of Turkey. The reliable region of the velocity map is marked by a pink polygon. Sutures are shown by heavy black lines with the polarity of former subduction zones indicated by filled triangles and the dashed lines are political borders. In the regions with high velocities (greater than 3.5 km/s), there are a gradient of lateral crustal variations (C and E blocks). In the region with low velocities (less than 3.5 km/s), there are no significant lateral crustal variations (B, A, D and F blocks).

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