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A low-velocity mantle beneath SW Anatolia imaged from surface waves : hint of a wide slab tear?

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In the Aegean-Anatolian domain, one of the key questions is the mantle structure between the Hellenic arc and Eastern Anatolia. The SIMBAAD temporary seismic experiment was designed to address this question and image the diffuse boundary between the Aegean and Anatolian plates. Deployed during 2 years, the SIMBAAD experiment is a dense seismic broadband network over continental Greece, the Aegean, South Bulgaria and Western Turkey, arranged to fill-in the gaps between permanent broadband stations. The database includes continuous records of 146 true broadband (cut-off period $\geq$ 90s) seismic stations, both temporary and permanent, with a spacing of about 80km. This study uses records of 400 teleseismic events of magnitude $\geq$ 6. We present results of fundamental mode Rayleigh wave travel-time tomography in the entire region [20-40°E; 35-42°N]. We apply semi-automatic time-frequency filtering to encompass the amount of data and retrieve the fundamental mode Rayleigh waves. The time-delay inversion method includes paraxial ray tracing and allows for non-planar incoming wave-fronts. This inversion produces phase velocity maps for periods between 30 and 180s. In this period range, the phase velocity is retrieved with an a posteriori error smaller than 1.25%. The a posteriori error varies with station density, the amount of data and the strength of the a priori constraints at each period. The most prominent feature is a broad slow-velocity anomaly under Southwestern Anatolia extending from Rhodos Island to the East of Isparta Angle. Its continuity is remarkable between 80 and 180s of period. This structure appears to separate the continuous Hellenic slab from a NNW-oriented fast-velocity structure between 30 and 35°E well defined from 110 to 180s of period. We aim at providing a high resolution (100-300km) 3D S-velocity model of the mantle by inverting the phase velocity data.

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