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P and S receiver functions used for inverting the one-dimensional upper mantle shear-wave velocities beneath Anatolian Peninsula

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It is recently shown that the teleseismic S receiver functions provide additional constraints that can be effectively used to complement the data set of P receiver functions and surface waves. The S receiver functions are particularly convenient to characterize the deep upper mantle shear-wave velocities extending down to 500-km depth. The one-dimensional (1-D) inversion technique, which is currently adapted, is usually preferred since it is faster, but may be erroneous when strong lateral heterogeneities violate the 1-D assumption (i.e. lateral homogeneity). The error may particularly arise when the deep multiples with ray piercing points farther away from the station sample a multidimensional structure different from the structure in the vicinity of station. We offer a systematic approach to suppress the deep multiples while keeping the P-to-S and S-to-P conversions and also near surface multiples in the receiver function waveforms. The proposed 1-D inversion strategy is applied to some seismic stations located in the Anatolian plate. The resulting velocity-depth profiles show that the lithosphere is relatively thin and that the waves slow down at a depth approximately 125 km. The velocity increment to $\sim$ 4.7 km/s around 250-km depth could indicate the oceanic Moho belonging to the northward subducting African lithosphere. The low velocity zone with a thickness of $\sim$ 30 km on top of the 410-km discontinuity could be attributed to the phase transition from the olivine to wadsleyite structure.