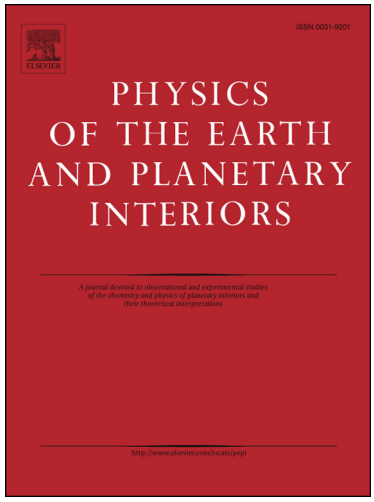

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Investigation of Mantle Kinematics beneath the Hellenic-Subduction Zone with Teleseismic Direct Shear Waves

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Abstract

The subduction and roll-back of the African plate beneath the Eurasian plate along the arcuate Hellenic trench is the dominant geodynamic process in the Aegean and western Anatolia. Mantle flow and lithospheric kinematics in this region can potentially be understood better by mapping seismic anisotropy. This study uses direct shear-wave splitting measurements based on the Reference Station Technique in the southern Aegean Sea to reveal seismic anisotropy in the mantle. The technique overcomes possible contamination from source-side anisotropy on direct S-wave signals recorded at a station pair by maximizing the correlation between the seismic traces at reference and target stations after correcting the reference stations for known receiver-side anisotropy and the target stations for arbitrary splitting parameters probed via a grid search. We obtained splitting parameters at 35 stations with good-quality S-wave signals extracted from 81 teleseismic events. Employing direct S-waves enabled more stable and reliable splitting measurements than previously possible, based on sparse SKS data at temporary stations, with one to five events for local SKS studies, compared with an average of 12 events for each station in this study. The fast polarization directions mostly show NNE-SSW orientation with splitting time delays between 1.15 s and

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