Crustal scattering and intrinsic attenuation of S-waves in southern Aegean derived using envelope inversion

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Southern Aegean is the major part of the Eurasian plate overriding the subduction of African plate in eastern Mediterranean region. In this study, shallow depth (< 40 km) events recorded by temporary and permanent seismic networks in southern Aegean are used to study the crustal scattering attenuation ($Q_s^{-1}$) and intrinsic attenuation ($Q_i^{-1}$) of S-waves. The 3 component S-waveforms are filtered in 1-2, 2-4, 4-8, and 8-16 Hz bands and envelopes are calculated by smoothing the root mean square of individual components. The envelopes are modeled using the approximate analytical solution of 3D isotropic radiative transfer equation. The fitting is performed using grid search approach to obtain $Q_s^{-1}$ and then linear inversion is used to calculate $Q_i^{-1}$ for each source-station pair. The results obtained from each source-station pair are assigned to an ellipsoid region and robust mean technique is used to map the results in each 0.20° x 0.20° bin. The final results indicate consistently high $Q_s^{-1}$ in western Crete in all 4 frequency bands. Also, high $Q_i^{-1}$ is observed in western Peloponnese in 1-2 and 2-4 Hz frequency bands. High $Q_i^{-1}$ is observed along the volcanic arc in all 4 frequency bands. Our results compare well with the recent S-wave scattering study in the region. They are also consistent with the geodynamics of southern Aegean subduction zone. Our study provides useful insight about the attenuation in the southern Aegean crust which has implications for ground motion and seismic hazard.