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## Finite difference forward modelling across the Tyrrhenian basin

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Strong lateral variations in medium properties affect the response of seismic wavefields. The Tyrrhenian Sea is ideally suited to explore these effects in a mixed continental-oceanic crust that comprises magmatic systems. The study aims at investigating the effects of crustal thinning and sedimentary layers on wave propagation, especially the reverberating (e.g., Lg) phases, across the oceanic basin. We model regional seismograms (600-800 km) using the software tool OpenSWPC (Maeda et al., 2017, EPS) based on the finite difference simulation of the wave equation. The code simulates the seismic wave propagation in heterogeneous viscoelastic media including the statistical velocity fluctuations as well as heterogeneous topography, typical of mixed settings. This approach allows to evaluate the role of interfaces and layer thicknesses on phase arrivals and direct and coda attenuation measurements. The results are compared with previous simulations of the radiative-transfer equations. They provide an improved understanding of the complex wave attenuation and energy leakage in the mantle characterizing the southern part of the Tyrrhenian Sea and the Italian peninsula. The forward modelling is to be embedded in future applications of attenuation, absorption and scattering tomography performed with MuRAT (the Multi-Resolution Attenuation Tomography code - De Siena et al. 2014, JVGR) available at <https://github.com/LucaDeSiena/MuRAT>.