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Elasto-anelastic regional structures of the crust and upper mantle beneath the Mediterranean basin derived from uncoupled causal inversion of Rayleigh wave attenuation coefficients and group velocities

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The uncoupled causal inversion of regionalised attenuation coefficients (14–100 s period range) and group velocities (10–80 s period range) of Rayleigh wave fundamental mode permits to obtain regional elasto-anelastic models of the crust and upper mantle beneath the Mediterranean basin. Database consists of path-average group velocity dispersion curves derived from the analysis of a large number of Rayleigh wavetrains corresponding to regional earthquakes recorded in very-broad-band stations installed in the Mediterranean region; and path-average attenuation coefficient curves obtained by the two-station method from teleseismic Rayleigh wavetrains recorded at pairs of stations connected along the same great-circle with the epicentre. The Ditmar-Yanovskaya formulation is applied to derive local attenuation coefficients and group velocities from those path-average values. A data variance analysis (Principal Component Analysis) and a clustering algorithm (Average Linkage) are applied to these local values in order to obtain a regionalization of the Mediterranean basin in terms of its attenuation and dispersion properties. Finally, the inversion of the average curves of attenuation coefficients and group velocities within each region leads to derive the regional elasto-anelastic structures. The main characteristics of the elasto-anelastic models, which include causality effects on the shear-velocity structures, are discussed in terms of the tectonic patterns of the Mediterranean basin.