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Joint inversion of P-waveforms from teleseismic events and surface waves group velocities from ambient seismic noise in Bohemian Massif

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Joint inversion of P-waveforms from distant earthquakes recorded by 41 broadband seismic stations located on the territory of Bohemian Massif and Rayleigh/Love group velocities gained by using cross-correlation technique applied to seismic noise recorded by the same set of broadband stations has been performed. Together with joint inversion also individual inversions using single data sets have been carried out. All computations were arranged inside isotropic, locally 1D layered models. Remarkable result is indication of horizons just above MOHO in the lower crust below some stations where low-velocity S-wave channel is needed in order to ensure correct modeling of measured events. This indication follows both from individual and joint inversions.
P-waveform inversion is based on using a set of 271 well-recorded teleseismic events from epicentral distances 3000-10000 km. The inversion was originally based on the popular 'receiver function' methodology, but due to the instability of needed deconvolution it was modified. We search for optimum layered velocity model, which correctly projects radial to vertical components (and vice versa, deconvolution is no more needed).
Regarding second source of data, both Rayleigh and Love surface waves were extracted from seismic noise by using cross-correlation. Long time series covering the period 2001-2009 were processed. Such measurements provide group velocities between arbitrary pairs of stations. Local group velocity dispersion curves were computed by using 2D tomography-like approach for periods 4-20 s. The subject of inversion (both individual and joint) were just group velocity dispersion curves.
Inversion required exhaustive computations. We used HPC cluster nemo.ig.cas.cz and ANNI inversion software, capable to run in parallel regime.