JOINT INVERSION OF TELESEISMIC P-WAVEFORMS AND GROUP VELOCITIES OF SURFACE WAVES EXTRACTED FROM AMBIENT SEISMIC NOISE

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We have collected two data sets: (i) waveforms from distant earthquakes occurring in the time period 2001-2009, recorded by 41 broad-band and 38 short-period seismic stations operated on the territory of Bohemian Massif; (ii) table of group velocities of Rayleigh and Love surface waves gained from fictitious seismograms obtained by long-term cross-correlating seismic noise measured at the same set of seismic stations and covering the same time period.

Both data sets represent rather big amount of information. We tried to perform single and joint inversions. All inversions were based on using 1D layered isotropic model defined by P/S propagation velocities, densities and thickness's of distinct layers. Such models were constructed individually for each seismic station position. P-waveform inversion was based on using a set of 271 well-recorded teleseismic events from the 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 searched for optimum layered velocity model, which correctly projected measured radial to measured vertical components (or vice versa, deconvolution i.e. spectral division was no more needed). Regarding second source of data, both Rayleigh and Love surface waves were extracted from seismic noise by using cross-correlation which provided 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 (in both individual and joint mode) were just group velocity dispersion curves.

Remarkable result of our computations are indicative horizons just above MOHO in the lower crust below some stations where low-velocity S-wave channel is needed in order to ensure correct modelling of measured data. This indication follows both from individual and joint inversions. Inversions required extensive computations. We used HPC cluster nemo.ig.cas.cz and ANNI inversion software, capable to run in parallel regime.