



A seismic discontinuity in the uppermost mantle of the West Carpathians - reflectivity characteristics and 3-D modelling based on CELEBRATION'2000 data

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The models of the crustal structure in the West Carpathians, obtained from CELEBRATION'2000 seismic dataset, revealed a prominent inclined reflecting discontinuity in the upper mantle. It is located at 40-70 km depth and dips to the north. It is well constrained thanks to the very good quality of the reflections, observed on several profiles (CEL01, CEL04 and CEL05) and therefore modelled with high confidence. Moreover, the phases originating at the reflector are correlated also on off-line recordings. The dip of the reflector is opposited to the direction of presumed Carpathian subduction. Therefore it may be interpreted as a shear zone or set of shear zones, originated in a compressional stress regime during collision of the continental lithospheric plates. In this study, recordings from in-line and off-line shots from transcarpathian profiles were used in order to constrain the 3-D geometry of the reflector, using raytracing-based 3-D inversion of the reflected traveltimes. Also, the analysis of the reflection amplitudes was performed using full-waveform modelling in 2-D in order to obtain constraints for the magnitude of the V_p contrasts and scale of the inhomogeneity at the reflector. The results indicated that reflections from a single dipping reflecting discontinuity can be satisfactorily modelled in terms of amplitude for far-offset shots, but for short offsets from the shot point the amplitude and the wavefield characteristics do not fit the observed reflections. Therefore, more advanced solutions of the reflector's structure were tested.