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# The high-resolution tomography of the upper mantle beneath the southern Bohemian Massif and its surroundings

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We present a new velocity-perturbation model of the upper mantle down to 300 km retrieved by teleseismic tomography beneath the southern part of the Bohemian Massif (BM). The model results from data of passive experiment BOHEMA III (Babuska et al., SGG 2005) and the northern part of the ALPASS array (Mitterbauer et al., Tectonophysics 2011). A new semi-automatic picker was applied for measuring P-wave arrival times from correlated extremes of waveforms recorded at 65 temporary seismic stations and 57 permanent observatories during 2005-2006. To calculate P-velocity perturbations, we selected 168 events from epicentral distances between 25° and 95° with magnitudes higher than 4.5. Before the travel-time inversion, we analysed carefully the time stability of relative P-wave residuals and cleaned them from outliers. To eliminate leakage of crustal effects into the upper mantle velocity images, we corrected the observed travel-times according to 3D models of the BM and Eastern Alpine crust (Karousova et al., SGG 2012; Behm et al., GJI 2007). To remove effects originated outside of the volume studied (e.g., due to mislocations or heterogeneities in the lower mantle), we normalized the travel time residuals by subtracting the event residual means. After testing several model parameterizations we selected horizontal and vertical spacing of 40 km and 30 km, the latter increasing with a depth up to 50 km.

Thought the upper mantle beneath the BM appears as a large-scale low-velocity heterogeneity in global tomography of Europe (e.g., Amaru, 2007), the regional studies based on data from passive seismic experiments reveal also smaller-scale features (Plomerova et al., GJI 2007; Karousova et al., Tectonophysics 2012). In the presented tomographic images, focused on the southern part of the BM, the most distinct low-velocity perturbations concentrate along the Eger Rift down to ∼200 km, while velocities at greater depths beneath this rift show positive velocity-perturbations relative to the overall low-velocity character of the BM mantle. Two significant high-velocity heterogeneities dominate the tomography images at all depths. The most distinct and extensive one, south of the BM, we associate with the Eastern Alpine root (Mitterbauer et al., 2011; Dando et al., GJI 2011). The second one can be traced in horizontal slices down to 215 km beneath the central part of the BM. The heterogeneity seems to shift from the south-western part of the massif at shallower depths to the north-eastern part of the BM at greater depths. This high-velocity heterogeneity can reflect the lithosphere thickening resulting from the collision of the BM with the Brunovistulian micro-plate from the east and the following underthrusting of the Brunovistulian beneath the Moldanubian part of the BM (Babuska and Plomerova, Gondwana Res. 2012).

High-resolution tomography from regional dense temporary networks reveals isotropic velocity perturbations at scales of ∼30 km kilometres. To achieve a comprehensive image of the upper mantle beneath the whole BM we will combine data from all other field measurements, incorporate travel times of shear waves, and last but not least, to modify the code to be capable to consider anisotropic wave propagation within the upper mantle.