



Vp, Vs, and Vp/Vs distribution in the crust and uppermost mantle beneath Northeastern Japan derived from tomographic inversion of regional data from JMA catalogue

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In this study, we revise the data on local seismicity in the Northeastern Japan area recorded by JMA. We have applied the newest version of the LOTOS-07 algorithm, which includes absolute source location, optimization of the starting 1D velocity model, and iterative tomographic inversion for 3D seismic P, S velocities, Vp/Vs ratio and source parameters. Special attention is paid to verification of the obtained results. In order to estimate the random factors, we have performed the odd\even test, which consist in independent inversion of two data subsets. Comparison of the inversion results demonstrates good correlation for both the P and S models, and demonstrates that the result is rather robust and is almost unaffected by random factors. For investigating the resolution of Vp and Vs anomalies, we have performed horizontal and vertical checkerboard tests. For real and synthetic data, we have estimated the best reference models. We considered a few different starting models and estimated their effect upon the inversion results. As a result of simultaneous inversion of real data we have obtained locations of earthquakes in the study area and distributions of Vp, Vs and Vp/Vs ratio in the crust and the uppermost mantle. Deep seismicity is aligned along the subducted Pacific plate and forms double seismic zone of ~40km thickness. At shallow depths seismicity marks the main regional faults in the crust. P and S velocity models show clear low velocity in the onshore areas and high velocity in the offshore areas, which can be due to compositional differences between continental and oceanic crust. The lowest velocities and highest Vp/Vs ratio are observed beneath zones of recent volcanism. In the uppermost mantle we observe low velocity patterns which link these volcanic zones with deep seismicity clusters.