ABSTRACT

The subject of the thesis is to compile a three-dimensional model of the crust of the Bohemian Massif and, subsequently, to test its effects on velocity images of the upper mantle seismic tomography. Data for models of the crust were acquired from results of deep seismic sounding measurements, both reflective and refractive methods, from results of converted phases (receiver functions) and partly also from dispersion of surface waves. A disagreement attaining 5 km was found in depths of the Moho derived by different methods. For this reason, the dataset has been divided into four parts, from which four different crustal models were built. The velocities of the P waves in nodes were derived by method of the linear interpolation and the nearest neighbour. Although individual parameters differ in all parts of the models of the Bohemian Massif crust, a Moho deepening south- and southeast-ward appears as a general feature characterizing all the models.

Three synthetic tests were performed in order to analyze the effect of the models of the crust on velocity images in seismic tomography of the upper mantle. The configurations of seismic stations of the passive experiment BOHEMA II and of the recorded events were used for the tomography of the upper mantle. The first test proved an ability of the seismic network to model simple velocity structures in the upper mantle down to 300 km. The other tests were performed to analyze the leakage of velocity perturbations from the crust to the upper mantle in the tomography image. The effect of perturbations leaking from the crust into the upper mantle is prominent down to depths of about 100 km. It turned out that retrieving and interpretation of tomographic images of velocity perturbations in the upper mantle can be considerably influenced if the crustal corrections are ignored or an inadequate model of the crust is applied.