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Crustal structure of the Bohemian Massif in the light of seismic refraction data

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The Bohemian Massif is one of the largest stable outcrops of pre-Permian rocks in Central and Western Europe. It forms the easternmost part of the Variscan Belt, which developed approximately between 500 and 250 Ma during a stage of large-scale crustal convergence, collision of continental plates and microplates, and possibly also subduction. It consists mainly of low- to high-grade metamorphic and plutonic Palaeozoic rocks. The area of the Bohemian Massif can be subdivided into various tectonostratigraphic units separated by faults, shear zones or thrusts trending roughly in a SW-NE direction, and reflecting varying influence of the Cadomian and Variscan orogenies: the Saxothuringian, Teplá-Barrandian, Moldanubian and Moravo-Silesian. Geographically, it comprises the area of the Czech Republic, partly Austria, Germany and Poland. While the post-collisional history of the Variscan Bohemian Massif is relatively clear, the kinematics of plate movements before and during collision is still subject of debates.

To investigate such a complex structure, the Bohemian Massif has been covered by a network of seismic experiments as a result of a massive international cooperative effort in central Europe. Detailed analyses of the data from the main profiles of the CELEBRATION 2000, ALP 2002, and SUDETES 2003 refraction and wide-angle reflection seismic experiments show crustal and uppermost mantle structure of the massif and delimit the continuation of various tectonic units in depth. The differences in seismic velocities reflect, to some extent, the structural variances and give some indications for tracing of crust-forming processes during individual tectonic events. Lower crust in the Saxothuringian exhibits complicated structure, ranging from a highly reflective lower crustal layer above Moho with a strong velocity contrast at the top of this layer. Another possible explanation can be a double Moho or the Moho with some lateral topography. This complicated lower crust extends in a depth range of 26-35 km and is characteristic for the Saxothuringian unit, which was subject to the eastward subduction. The Moldanubian in the central part usually seen as the root of the Bohemian Massif is characterized by the deepest (39 km) and the most pronounced Moho within the whole massif with a strong velocity contrast. The lower crust at the eastern margin of the Bohemian Massif is characterized by elevated velocities and high velocity gradient, which seems to be a characteristic feature of the Moravo-Silesian.

References

Hrubcová, P., and W. H. Geissler. The Crust-Mantle Transition and the Moho beneath the Vogtland/West Bohemian Region in the Light of Different Seismic Methods, Stud. Geophys. Geod., 53, 275[U+F02D]-294, 2009

Hrubcová P., P. Środa, and CELEBRATION 2000 Working Group, Crustal structure at the easternmost termination of the Variscan belt based on CELEBRATION 2000 and ALP 2002 data, Tectonophysics, 460, 55-75, doi:10.1016/j.tecto.2008.07.009, 2008

Hrubcová P., P. Środa, A. Špičák, A. Guterch, M. Grad, R. Keller, E. Brückl and H. Thybo, Crustal and uppermost mantle structure of the Bohemian Massif based on data from CELEBRATION 2000 Experiment, J. Geophys. Res., 110, B11305, doi:10.1029/2004JB003080, 2005

Hrubcová, P., P. Środa, M. Grad, W.H. Geissler, A. Guterch, J. Vozár, E. Hegedűs, and Sudetes 2003 Working Group. From the Variscan to the Alpine Orogeny – crustal structure of the Bohemian Massif and Western Carpathians in the light of the SUDETES 2003 seismic data, GJI, submitted