CELEBRATION 2000: P-WAVE VELOCITY MODEL OF THE BOHEMIAN
MASSIF
(CEL 9)

CELEBRATION Working Group (Reporter P. Hrubcová)

*Geophysical Institute, Academy of Sciences of the Czech Republic, Bocni II/1401, 142 00
Prague 4, Czech Republic; pavla@ig.cas.cz*

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In the framework of Celebration 2000 seismic refraction project, an international scientific
experiment aimed at investigation of deep lithospheric structure of Central Europe, regions
with different tectonic development such as Precambrian East European Craton, Trans-
European Suture Zone, Carpathian Belt, Bohemian Massif and Pannonian basin was studied.
The fieldwork for the project was completed in June 2000, when 147 shots were fired along
most of the recording profiles with total length of about 8900 km, which resulted in obtaining
of 160,000 seismic records.

The region of the Bohemian Massif BM was studied along two refraction profiles, CEL09
that traverses the whole massif in the NW-SE direction and CEL10 that extends along its
eastern edge perpendicularly to CEL09. The respective seismic sections on the profiles in the
BM show good quality recordings with clear first arrivals of crustal and mantle phases, Pg
and Pn waves resp., usually up to the distance of 250 km. The Pg waves are observed at
offsets to about 150 km with apparent velocity 5.9 km/s with slightly higher gradient in NW
part of the BM. At larger offsets, Pn waves can usually be observed with apparent velocity of
8.0 to 8.1 km/s. In some sections, higher attenuation of energy of Pg phase is visible at
distances between 90 – 130 km, which may be connected with a specific upper crustal
structure (low velocity gradient zone). PmP waves as reflections from Moho are well visible
in the central part of the BM – Moldanubian, which suggests well defined Moho in that part,
and not so clear Moho with smaller velocity contrast in other parts of BM.

For interpretation, the tomographic inversion routine of Hole (1992) was used as an
efficient tool to determine the seismic P-wave velocity distribution in the crust using first
arrivals. The tomographic models were verified by forward ray tracing modelling, where apart
from first arrivals also further phases were included. This method was based on well-

2-D velocity model of first arrivals and reflected phases shows high P-wave velocity gradient zone reaching the depth of 5-7 km followed by small gradient and laterally homogeneous P-wave velocity in the lower crust. Position of Moho discontinuity ranging from 32 km to 40 km and reflectors within the crust complements the P-wave velocity distribution. Differences in the character of velocity distribution not only in the upper crust but also in lower crust delimits central part - Moldanubian and related tectonic units within the BM.

References: