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Crustal structure of the Eastern Alps and their foreland along the CEL10/ALP04 seismic profile

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CEL10/ALP04 is one of the main profiles of the 3D wide angle reflection and refraction experiments CELEBRATION 2000 and ALP 2002. A P-wave velocity-model has been generated by interactive ray tracing for the southern part of this profile, which starts in the Moravo-Silesian unit of the Bohemian Massif, crosses the Molasse Basin and the Eastern Alps in NE-SW direction, and ends in the Southern Alps. During CELEBRATION 2000 89 receivers were deployed along this part of the profile, and during ALP 2002 the number of receivers was 89. The recordings of 9 seismic shots located at or near to the profile were used for the interpretation.

In the upper crust the P-wave velocity cross section clearly shows the accretionary wedge of the Eastern Alps which overthrusts the Molasse und Flysch units. At mid-crustal level (20 km depth) a thin high velocity reflector extends from the southern Bohemian Massif to central range of the Eastern Alps. A stack of several reflectors has been resolved in the southern part of the profile. High velocity lower crust exists below the Bohemian Massif. The Moho discontinuity slightly dips from NE to SW with an average depth of 40 km.

At the Periadriatic line the profiles ALP01 and ALP02 intersect CEL10/ALP04 and supply additional constraints for the interpretation. The CEL10/ALP04 P-wave velocity model has been compared with an existing 3D model of the area which has been derived by applying stacking techniques to the CELEBRATION 2000 and ALP 2002 data. A good agreement of the large-scale structures is found.

In the southern part of CEL10/ALP04 PmP phases are reflected from the Moho of the Pannonian fragment, a tectonic unit revealed by the 3D-model and the profile ALP02. Strong S-wave phases are identified on several record sections of CEL10/AL04, and Vp/Vs ratios from 1.68 – 1.73 have been derived for the crystalline basement and the lower crust. There is also good agreement with S-wave velocity data derived by the 3D stacking technique.