



New seismic Vp- and Vp/Vs- models of HUKKA 2007 wide-angle reflection and refraction profile in northern Fennoscandian Shield

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We study the block structure within accretionary orogens. We present an example from northern part of the Fennoscandian Shield transected by deep seismic sounding profile HUKKA 2007. The 455 km long profile runs in NNW-SSE direction from Kittilä in northwestern Finnish Lapland to Kostamush in Russia near central part of the border between Finland and Russia.

We present 2-D seismic velocity model (Vp and Vp/Vs ratio in the crust, depth to the Moho and depth to the intracrustal reflectors) along HUKKA 2007 wide-angle reflection and refraction profile in northern Finland. Commercial and military chemical explosions at 7 shot points were used as sources of the seismic energy. The shots were recorded by 115 recording stations deployed along the profile with an average station spacing of 3.45 km. The field recordings were cut and sorted into shot gathers. The 2-D velocity model of the HUKKA 2007 profile was developed by SEIS83 forward raytracing package using arrivals of major refracted and reflected P- and S-wave phases.

In general the velocities vary in the upper crust between 5.8 and 6.1 km/s. Interesting features are three high P wave velocity (6.30-6.35 km/s) bodies in the upper crust. Two small bodies lie close to surface at first 100 km and the third one can be followed from 200 to 350 km along the profile reaching depth of 5-10 km. The central part of the profile (between 120 and 220 km) has a zone of low (lower than 6 km/s) P-wave velocity in the uppermost crust. This zone is about 4 km thick.

In addition, the velocity model along the HUKKA 2007 profile shows significant difference in crustal velocity structure between the northern (up to 120 km) and southern parts of the profile. The differences in P-wave velocities and Vp/Vs ratio can be followed throughout the crust down to the Moho boundary. This suggests that the HUKKA 2007 profile transects a major terrane boundary. However, the position of this boundary with respect to major crustal units is controversial. It may be the boundary that separates the pristine parts of the Archean Karelian craton from those parts reworked in the Paleoproterozoic. Alternatively, it can be the boundary that separates the Karelian craton from the Belomorian mobile belt.