

## **Lithospheric studies along seismic profile KOKKY, between Gulf of Bothnia and Gulf of Finland, Baltic Shield**

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Controlled source seismology is one of the main tools used in Earth imaging, especially when aiming towards the middle and lower crust structures, Moho shape and upper mantle. Data for such studies are acquired during wide-angle reflection and refraction (WARR) profiles, which are hundreds of kilometers long and require strong explosive sources like e.g. TNT. Given the cost of such experiments, difficult logistics, and the strict regulation on experiments involving explosives in the ground, an attempt was made to register quarry blasts along the set profile. Quarries consume tons of explosive material per week and their utility in crustal studies was already tested during HUKKA experiment in 2007.

Profile KOKKY begins on the coast of Bothnian Bay and runs south-east towards Sankt Petersburg in Russia. It crosses three main geological units of southern Finland, Pohjanmaa area, Central Finland Granitoid Complex, and Saimaa area, all represented by Late Proterozoic rocks. Two summer acquisition campaigns resulted in nearly 500 km long profile, crossing southern Finland. Numerous explosions from quarries were recorded, resulting in 63 usable seismic sections. Average distance between shots and the profile was 14 km.

The velocity model has high P wave velocities across the entire profile. Upper crust, reaching depths of 22 km, is characterized by velocities from 5.9-6.2 km/s near surface down to 6.25-6.4 km/s. Middle crust is thinning from 30 km at NW, down to 14 km in the central part of the profile, thickening again to 20 km at SE, and has uniformed velocities 6.6-6.8 km/s. High, homogeneous velocities in lower crust, up to 7.4 km/s. Layer is thickening from 4 km in SE part of the profile, reaching 18 km in its central part corresponding to CFGC, and then thinning again to about 12 km in NW part. Moho depth varies from 54 km near the Gulf of Bothnia to 63 km in the middle of the profile, and up to 43 km in Saimaa area. Velocities below the crust are 8.2-8.25 km/s. Good quality of the data allowed to compute S velocity model and  $V_p/V_s$  ratio.

This profile crosses two pre-existing WARR profiles, SVEKA and BALTIC. New model supports previous interpretations. Velocities, depth to the Moho, and other major boundaries are similar in profile crossing points. However, unlike in perpendicular profiles, no elongated and thin low velocity zones were distinguished along the entire profile. This study was a good lesson for future cost effective DSS profiles and points out key issues.