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# Interpretation of wide-angle reflection and refraction recordings of Vibroseis signals and 3D gravity modelling along FIRE4 profile, northern Finland

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We present the results of the interpretation of wide-angle measurement of Vibroseis signals along the FIRE4 profile and 3-D density modelling of the area around the profile. The Finnish Reflection Experiment (FIRE) was a deep CMP reflection seismic survey made by Vibroseis technique along four profiles in Finland during 2001 – 2003. During the experiment thirteen recording stations were deployed along the FIRE4 profile for the purpose of recording wide-angle signal from vibrator sources. Using those measurements, we obtained a P-wave velocity model of the uppermost crust with both forward raytrace modelling and inversion. The major geological units along the profile, Archean granitoids, Peräpohja Schist Belt, and Central Lapland Granitoid Complex (LCGC), can be seen in the model as horizontal variations in the P-wave velocity. An interesting feature in the velocity model is a zone of high P-wave velocity inside the CLGC. The area is marked also by a high reflectivity on FIRE4 reflection section and a large-scale maximum of the Bouguer anomaly is observed above this area. In order to constrain the depth of this feature and explain it in terms of rock composition, we applied modelling and inversion of Bouguer anomaly and calculated a 3D density model of the uppermost crust for the area around the profile. The modelling showed that the source of this anomaly is a body located at the depth of about 2.5 km. These results could indicate that the CLCG is underlayed by a highly deformed and folded

structure composed of rocks with contrasting elastic properties.