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Integrated geophysical study of the Keurusselkä impact structure and Keuruu diabase dykes, central Finland.

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The deeply eroded Mesoproterozoic Keurusselkä impact structure and Keuruu diabase dykes are situated in Proterozoic crystalline basement in central Finland. Keurusselkä is one of the recently found impact structures in northern Europe and it yields a central uplift with in-situ shatter cones. Estimation for the original diameter of the structure is approx. 30 km.

My PhD-project concentrates on the very first investigation of the Keurusselkä impact structure by integrating different geophysical methods. The impact origin was successfully confirmed in 2010 with shock metamorphic features in quartz grains. Petrophysical and rock magnetic properties of impact rocks and modelling of the aeromagnetic and gravity data form the main part of this research, as rocks in the central uplift area are characterized by increased magnetization. Special emphasis is given to the Vilppula drill cores situated in the central uplift of the structure. Monomictic breccia was found from the drill core samples and thin section analysis showed wide hydrothermal alteration in minerals related to the post-impact processes.

Paleomagnetism brings also an important aspect to this investigation as mafic diabase dykes, such as Keuruu diabase (1880 Ma) situated in the impact region, and impact rocks (shatter cones) can preserve a stable record of ancient magnetic fields and are therefore important time markers. The remanent magnetization in impact rocks and in Keuruu diabase possibly shows the age of the impact event. Paleomagnetic results combined with modelling are used to examine the evolution of the Keurusselkä impact structure.