

# Understanding future metal resources: geochemistry, ore genesis and crustal evolution of the Estonian Precambrian basement

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## Summary

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*The metallogenesis of the crystalline basement of Estonia has been historically assessed, but modern analysis of ore mineral occurrences is lacking. The PhD project will produce novel, state-of-art information about these Precambrian formations, metallogenic regions, its origin, source and evolutionary peculiarities of metal ores.*

Research field:	Physical Sciences
Supervisors:	Rutt Hints Alvar Soesoo
Availability:	This position is available.
Offered by:	School of Science Department of Geology
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

## Description

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The crystalline basement of Estonia consists of Palaeoproterozoic high-grade metamorphic (amphibolite to granulite facies) and igneous rocks that are covered by 100–700 meters of Palaeozoic sediments. Thus, the geological information on the crystalline basement in Estonia comes mostly from studies of drill core material and geophysical measurements. During the last 30 years, practically no research has been conducted on the metallogeny and geochronology of mineralisation of Estonian Precambrian rocks. However, there are several locations of mineral resources known: for instance (1) Jõhvi area with iron and sulphide mineralisation (including manganese and other battery elements), (2) Uljaste area with sidero-chalcophilic anomalies and elsewhere with sulphide-graphite-bearing (Zn, Pb, Cu, Ag and others) complexes.

The objective of the PhD project is to investigate ore minerals, type and age of ore mineralisation, general geochemistry of ore formations, and compare those mineralisations with those in the Bergslagen microcontinent. The secondary objective is to model mineralisation processes and deliver statistical analysis of metallogenesis. The project involves collaboration with the Estonian Geological Survey, the Department of Geology, University of Tartu and foreign cooperation partners.

### **The specific tasks include:**

- collecting samples, preparation for lab study;
- performing ore microscopy, SEM, conducting XRD, XRF and ICP-MS analyses;
- establishing origin, source and evolutionary peculiarities of metal ores in the crystalline basement;
- compiling Fennoscandian – Baltica scale geological correlation of ore formation and geochronology;
- providing anomalies' interpretations, quantification, comparison with Bergslagen and other sulphide-rich ore regions of southern Fennoscandia;
- statistical prospectivity analyses.

### **Applicants should fulfil the following requirements:**

- MSc Degree in Earth Sciences or related discipline;
- Highly motivated in pursuing applied research in geochemistry and economic geology;
- Knowledge of geochemistry, mineralogy, ore geology and interest in analytical techniques (ICP-MS, SEM-EDS, XRF, XRD);
- Knowledge of Precambrian geology, mineralogy and petrology of crystalline rocks;
- Relevant experience in geochemical laboratory studies, mineralogy and geochemistry of metamorphic and igneous rocks;

- Readiness to work in multinational working group on multidisciplinary research problems, good communication skills, using personal initiative for problem solving.



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