

Trace element and isotope analyses of sulphide minerals in mineral deposit fingerprinting: A case study from Petäjäselkä Au occurrence, northern Finland

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Geochemical and indicator mineral research methods are widely used in mineral exploration in the glaciated terrains. Transported cover sediments such as unconsolidated till and upper soils are typically used in targeting the source areas and detecting mineralizations under transported cover. Composition of heavy minerals such as sulphides in till can be potentially used to fingerprint mineral deposits. The LA-ICP-MS analytical techniques allows extremely detailed analyses of trace elements and isotopes from individual mineral grains down to a few tens of micrometres in size. In this study, we present preliminary results from in-situ trace element and S isotope compositions of pyrite in heavy mineral separates collected from the Petäjäselkä area, in the Central Lapland Greenstone Belt, northern Finland. The results are compared against pyrite compositions from the Petäjäselkä Au occurrences in order to trace the source rocks and fingerprinting capabilities. The study is a part of first author's PhD project within the EIT Raw Materials funded Enhanced use of heavy mineral chemistry in exploration targeting (MinExTarget) project. The goal of project is to develop effective fingerprinting techniques using various minerals in tills which can be used in the greenfield exploration stages. Furthermore, the project develops a new service for mineral exploration by a novel combination of the available technologies of automated mineralogy and mass spectroscopy.