Stream sediment survey as mineral exploration technique in the Vähäkurkkio area, in Enontekiö

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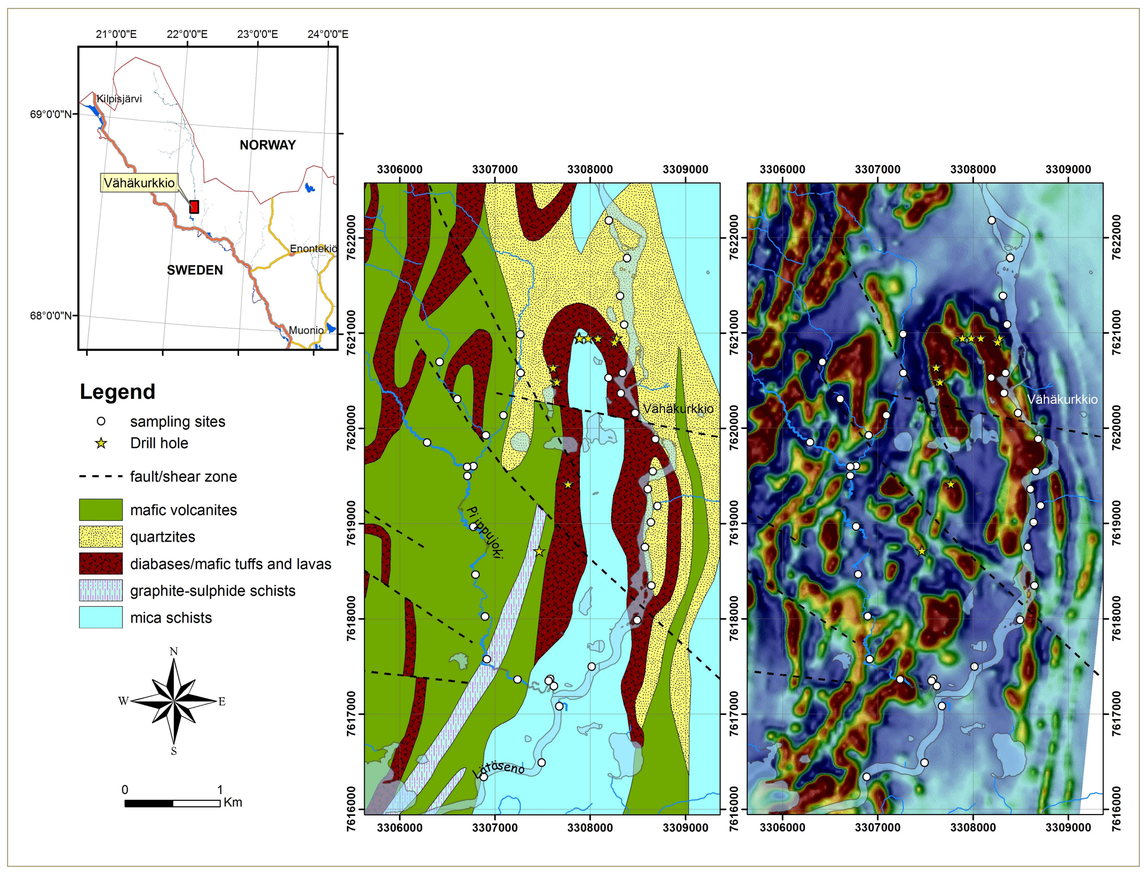
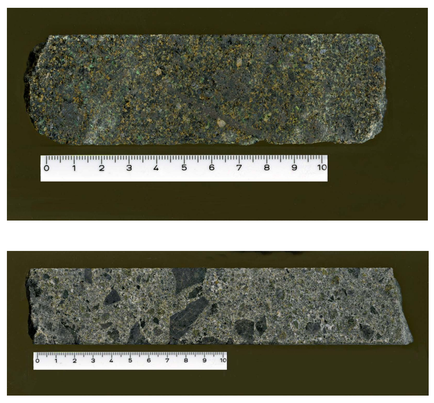
Nowadays environmental issues play an important role in the mineral exploration. The demand for more sensitive methods in mineral exploration has promoted development of new techniques as well as the revival of past methods and updating them to present day requirements. Thus, inorganic stream sediment, heavy minerals and water were selected as sampling media in this study. The study was designed to test their ability to reflect the underlying lithology and possible mineral occurrences. Vähäkurkkio study area in the Lätäseno Greenstone belt was selected as a testing site from the municipality of Enontekiö. The stream sediment sampling survey consisted of 38 sampling sites along the Lätäseno and Piippujoki Rivers.



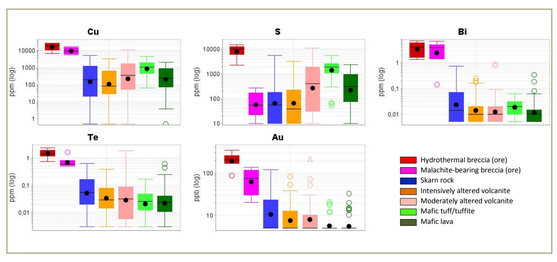
The sampling sites and the drill holes are presented on the bedrock map of DigiKP and on the aeromagnetic map. The bedrock is composed of Paleoproterozoic mafic metavolcanic, metadiabases and metasedimentary rocks. The major structural feature is a fold structure which is seen as a highly magnetic zone.

Preliminary diamond drilling in 2011-2012 revealed an iron oxide-copper-gold type (IOCG) of mineralization in northern part of the study area and on the western limb of the interpreted fold structure. The mineralized sections consist of two different types of breccias with some disseminated metallic copper. The main alteration is skarn formation and disseminated chalcopyrite occurs widely in the host rocks. The results from the stream sediment survey show an almost 2.5 km long Cu-Co-S±Au anomaly along the Lätäseno River. The preliminary results from the heavy minerals support the stream sediment results.

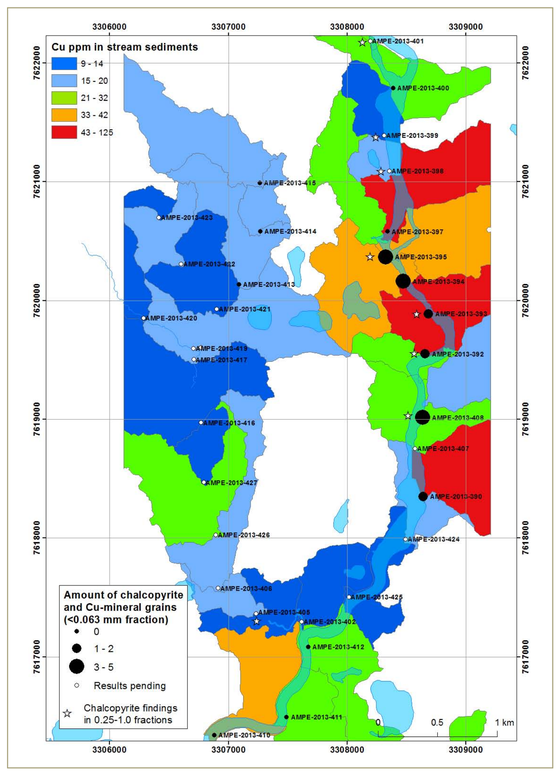


The mineralized sections consist of malachite rich skarn breccias (upper figure) and chalcopyrite-bornite-magnetite -bearing carbonate-rich hydrothermal breccias (lower figure). Photos: Reijo Lampela.

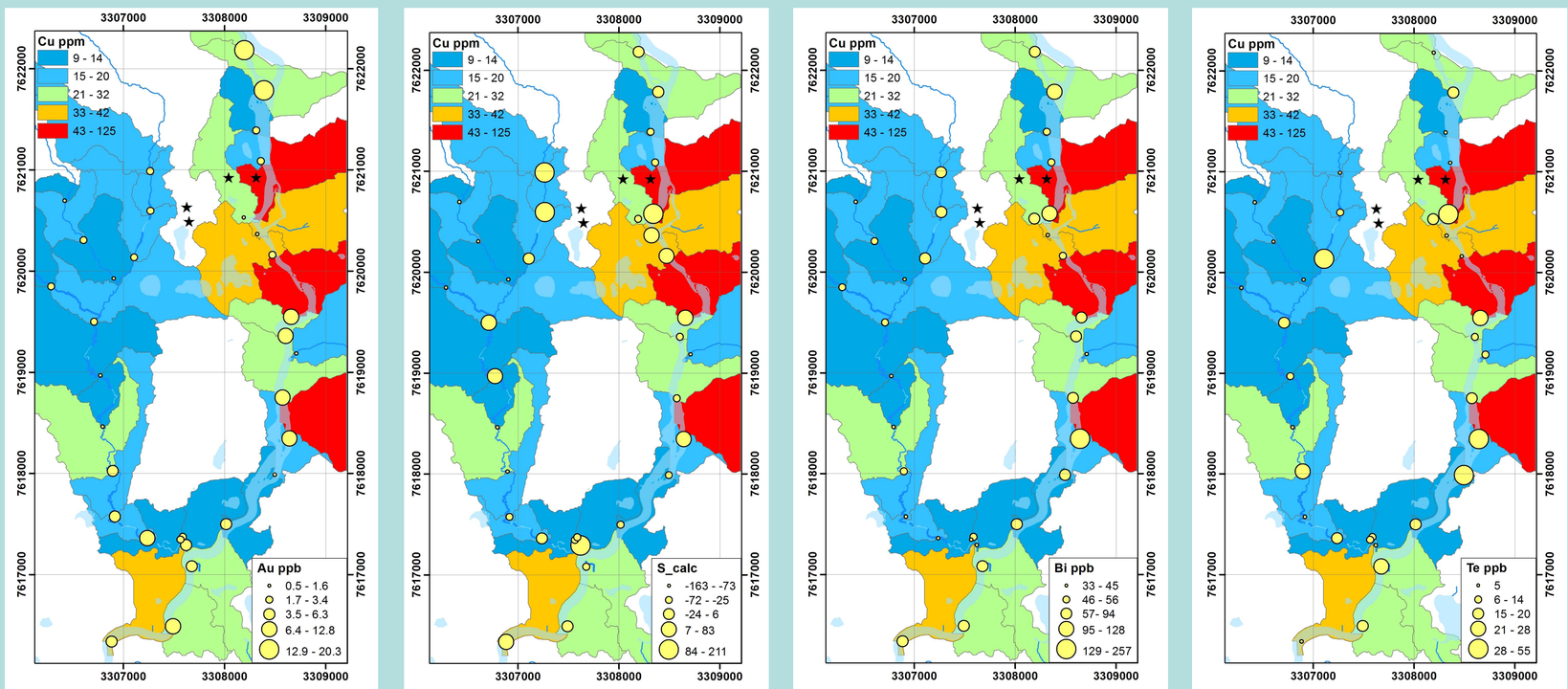
Water, inorganic stream sediment and heavy mineral samples were collected along rivers. The size of mineral samples varied from 2,5 l to 5 l and the samples were sieved on the field. The samples were collected from the active stream sediment with a ladle and bucket.



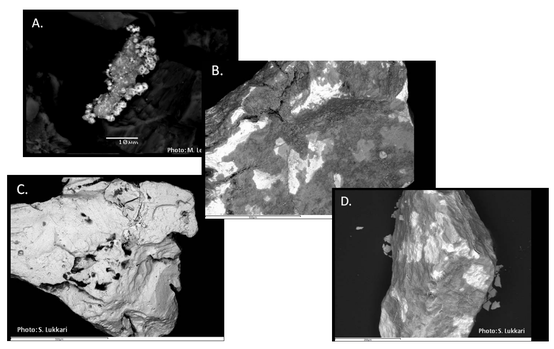
The geochemistry of drill core shows that in addition to Cu, Fe and Au, elevated levels of Bi, Te, U, S and Co and in some cases also Se, Ba and Ca are related to the mineralized zones. Only some selected boxplots of uni-element data is shown.



Heavy minerals were studied in three different fractions: <0.063 mm, 0.25-0.5 mm and 0.5-1.0 mm. About 3000 minerals from the finest fraction was studied with SEM-EDS and the two other fractions visually under a binocular microscope. The preliminary results of heavy minerals show the occurrence of chalcopyrite and other Cu-minerals in the same area with the high Cu contents.



Au, S (residual values), Bi and Te content of stream sediments are shown on the catchment basin map which is colored according to Cu content in stream sediments. An almost 2.5 km long Cu-Co-S±Au anomaly along the Lätäseno River includes elevated Bi and Te contents. The Cu-Co-S anomaly reflects the widespread feature of the sulphide disseminated host rocks of the area. Mineralized sites are shown as black stars.



BSE-images of the found Cu-minerals in the heavy mineral samples: A) An unidentified Cu-Ni-mineral in the sample 408. B) A grain composed of Fe-oxide, goethite and chalcopyrite in the sample 393, chalcopyrite is seen as bright patches. C) A rather pristine grain of chalcopyrite was found in the sample 395. D) Bright chalcopyrite as inclusions in the Fe-oxide grain in the sample 405.

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