

Till geochemistry and indicator minerals in the interpretation of the thick till sequence at Muhos, central western Finland

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Introduction

Quaternary sediment cover is exceptionally thick in the area of unmetamorphosed Neoproterozoic Muhos siltstone formation, central western Finland (Fig. 1). Recent core drilling near Muhos village revealed a 54.5 m thick sedimentary sequence consisting of four till units and interlayers of sand and silt (Figs. 2 and 3). Petrography of the pebble and gravel fraction was defined (Fig. 3) and geochemistry of the fine fraction (-0.06 mm) and heavy minerals of the sand fraction were studied from four till units that are thought to have been deposited during the Saalian and the Weichselian glaciations. The fine fraction was separated with dry-sieving and analyzed chemically by XRF and AAS. The heavy fraction was separated by using Na-heteropolytungstate ($d = 2.82 \text{ g/ml}$). Mineralogical composition of the heavy fraction was studied by SEM+EDS.

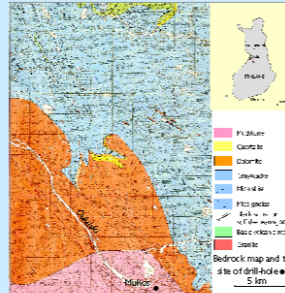


Fig. 1. Bedrock map of the study area and the location of the Muhos drill-hole.



Fig. 2. Drill core samples of the Muhos drill hole.

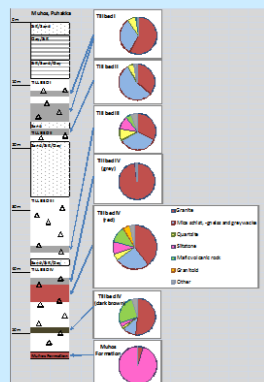


Fig. 3. Drill core log and petrography of pebble and gravel fraction.

Results

The main results of petrography, mineral and chemical composition are listed in Figs. 3 - 6.

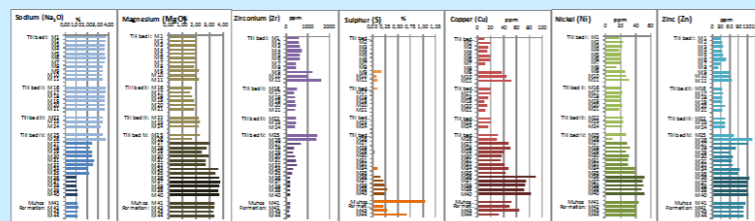


Fig. 4. Chemical composition of till beds I - IV and the Muhos siltstone formation.

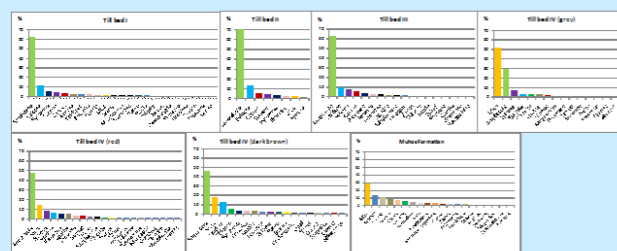


Fig. 5. Mineralogical composition of the heavy sand fraction of till beds I - IV and Muhos Formation.

Conclusions

- Till bed I contains more reworked material (e.g. pyrite) from older beds than till beds II - IV.
- Based on the chemical and mineralogical results, the provenance of till bed IV is in part from the Muhos Formation and in part from the schist area.
- Petrography and chemical composition of till bed IV suggests that the ice flow direction was from the northwest during its deposition while till beds I - III were deposited by more western ice flow directions.
- Provenance of baryte, pyrite and chalcopyrite in till bed IV could be:
 1. northwestern schist area (unknown sulphide mineralization).
 2. Muhos Formation (unknown sulphide mineralization).

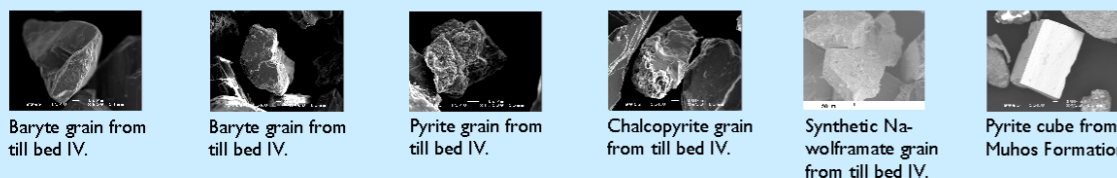


Fig. 6. Examples of baryte, pyrite and chalcopyrite grains from till bed IV and a pyrite grain from the Muhos Formation.