

## Distinguishing Glaciogenic Deposits in Southern Finnish Lapland: Implications for Exploration

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In glaciated terrains, the knowledge of Quaternary geology is essential for successful exploration (Nichol et al., 1992). In Finland, the bedrock is almost completely covered by till of variable composition, thickness and stratigraphy, as well as various types of moraine formations of the recent glaciations. In this study the morphological, stratigraphical and compositional investigations of till and moraines in Finnish Lapland were combined with heavy mineral and geochemical studies to trace mineralized sources in the bedrock.

Till sampling in different types glaciogenic deposits and the interpretation of results are very challenging exercise. The experience from northern Finland shows that the composition and stratigraphy of till cover and the specific characteristics of separate moraine formations must be carefully considered to success in exploration (Sarala & Ojala, 2008). Finnish Lapland was repeatedly in the centre of continental glaciers with related strong changes in glacial dynamics, ice lobation and ice-flow directions. In this environment rapid changes between erosional and depositional conditions have led to variable degree of preservation of earlier deposits and pre-Quaternary regolith, and deposition of complex glaciogenic formations.

In the study area, the glacial morphology is composed of an assemblage of transversal ribbed moraines and longitudinal drumlins and flutings with gently undulating till cover in between. In places, pre-glacial weathered bedrock remnants are preserved beneath the till cover and can be useful sampling media for exploration.

The ribbed moraine ridges are the most favourable moraine type for exploration. Short glacial transportation of debris and boulders in the upper till and surface of the ridges is advantageous for tracing the ore indicators (Sarala, 2005). Local bedrock indication is another aspect that makes sampling easy and minimises costs. In the areas of drumlins, flutings and thin till cover, transport distances are usually long and the possibility of complex glacial transportation increases (Aario & Peuraniemi, 1992). If pre-glacial weathered bedrock material is mixed in the till, it makes interpretation of till geochemical data difficult; background values are usually elevated and anomalous values coming from the fresh bedrock sources might be obscured. However, the sampling of the weathered bedrock provides indications of the local geochemical features in the bedrock.

### References:

Aario, R. & Peuraniemi, V., 1992. *Geomorphology* 6, 9–25.

Nichol et al., 1992. *Exploration and Mining Geology* 1: 4, 305-326.

Sarala, P. 2005. *Applied Geochemistry* 20:9, 1714-1736.

Sarala, P. & Ojala, V.J., 2008. *Geochemistry Research Advances*, Chapter 1. Nova Science Publishers, New York, pp. 1-29.