

## Organic Compound Pathfinders in Copper Porphyry Exploration

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Discovering new deposits in covered terrain poses a significant challenge for modern geologists. In areas with thick till sequences, traditional inorganic geochemical signals may be complex and dispersed by ice transport. Organic compounds are a promising and under-researched pathfinder group for non-petroleum based mineral exploration. Organic compound concentrations in soil change in the presence of mineralisation and have the potential to identify targets beneath overburden.

Hydrocarbon anomalies in soil are believed to form over mineral deposits as by-products of microbial metabolism and death phase cell rupture. Microbial processes such as Fe<sup>2+</sup> oxidation and SO<sub>4</sub><sup>2-</sup> reduction are key components of supergene weathering. Such processes produce organic compounds as by-products. These are commonly observed on mine sites as biofilms comprising microorganisms and organic extracellular polymeric substances. Redox gradients generated at the interfaces between ore, host rock, till, water, and air for Cu porphyry deposits are conducive to microbial activity and preservation of dispersed hydrocarbon signals in soils.

In this study, organic compounds in soil samples successfully identified copper porphyry occurrences through glacial till. Straight chained alkane concentrations were highest above and adjacent to mineralised subcrop. Observed hydrocarbon signals in soils are related to mineralisation, major structures and surficial geology. Data analysis aims to discriminate areas with elevated hydrocarbon abundances generated by barren geology or geomorphic changes from those of economic interest.