

**Anomalous geochemical responses in  
till above mineralization:  
Application of copper isotopes to  
evaluate sources.**

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Correct interpretation of geochemical responses in near-surface soil developed on till over mineralisation requires consideration of the processes responsible for their formation. Responses are often considered to have been developed by the progressive accumulation of ions that have migrated vertically by various mechanisms from mineralisation at depth.

Based on known fractionation trends, if copper was migrating from a weathering sulphide deposit to the surface it would be expected to show enrichment in <sup>65</sup>Cu and hence positive delta-<sup>65</sup>Cu values.

Selected anomalous copper and background samples from B-horizon soils from over two porphyry and one VMS system were analysed for Cu-isotopes at the PCIGR, UBC. Samples were analysed in triplicate by multi-collector-ICP-MS following hot multi-acid digestion including HF and partial digestion using 0.3N HNO<sub>3</sub>. For anomalous samples, the partial extraction typically recovered <2% of the total Cu, significantly less than the concentration range difference between background and anomalous.

Delta-<sup>65</sup>Cu for both total and partial extractions dominantly lie between 0 to -1 ‰, within the range of magmatic and hydrothermal sulphides, with the partial extractions being marginally heavier. The consistent shift to the heavier signature may indicate mass dependent fractionation during the partial extraction. Fields for anomalous and background samples overlap. The data do not provide evidence for the migration of Cu from mineralisation at depth to the surface. Mineralogical and sequential analysis studies would support the derivation of the Cu-response from mineralised fragments entrained within the till.