

Integration of surface regolith mapping and soil field measurements with geochemistry in a till-covered terrain, Lara volcanogenic massive sulphide deposit, Southern Vancouver Island

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Regolith landscape mapping, field measurements of soil properties and B horizon sampling was undertaken at the Lara Zn-Cu-Pb VMS deposit to identify processes that control trace element dispersion in the surface environment including the formation of false positive and false negative responses. Upper B horizon soil was collected and analysed by inductively coupled plasma mass spectrometry (ICP-MS) following aqua regia digestion of the 180 μm fraction. The research area is covered by basal till with erosional gullies upslope and alluvial and fluvial deposits at the base of slope. Soil sample locations were adjusted following mapping to reduce variability and avoid anthropogenic disturbances. In situ measurements of soil profile moisture and pH demonstrate a decrease in moisture and acidity with profile depth. Slurry-based measurements of pH outlined neutral domains with greater surface water residence time. Aqua regia ICP-MS data shows that anomalous Cu, Zn, Tl, Co, Te and Se exist in soil over mineralization. Elevated values away from mineralization are generally proximal to drainages and may relate to metal scavenging by Fe-Mn oxides. Continued research will integrate soil hydrocarbon, self-potential, oxidation-reduction potential, non-traditional stable isotope analysis of Cu and Zn, and vegetation sampling. This will identify metal source and pathway to develop a process-based model of controls on trace element dispersion in till over a buried massive sulphide deposit.