

Geochemical indicators in higher plants as an exploration tool

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The ability of some plants to absorb and accumulate metals makes them useful as geochemical indicators. In this study, the trace elements and isotopic content of native plant species such as alder, ash, brambles and hawthorn will be determined above the sub-outcrop of the Navan Zn-Pb deposit (Ireland), currently mined by Boliden Tara Mines Limited. This area represents a sub-outcropping carbonate-hosted base-metal orebody characterised by a large shallow soil Zn-Pb anomaly. Vegetation (trees and shrubs) grows directly above mineralization, which makes it an ideal location for biogeochemical surveys. Biogeochemistry is not a standard exploration methodology, since there are a number of factors to be considered in sampling and analysis, (e.g. phytochemistry, seasonal variations and contamination). Consequently, detailed sampling strategies, including control locations, will be investigated with the aim of demonstrating that the uptake of trace elements and stable metal isotopes in higher plants can be used as an exploration tool. We seek to demonstrate that isotopic ratios differ among plant species and plant material. It is thought that different metal distribution between plant tissues can lead to fractionation of stable metal isotopes. Also, that trees and shrubs grown in soil with metal enrichment exhibit higher metal concentrations than those from control sites. Using dendrochronological records of metal absorption we can distinguish the metal footprint of Zn-Pb mineralization from anthropogenic sources. Using trace elements and stable metal isotopes, we aim to characterise metal sources in European tree and shrub species. This work will be used to develop new criteria for biogeochemical surveys that detect uptake of indicator elements in a vegetation typical of a temperate European climate.

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