

CRM hotspot mapping of Irish geochemical soil datasets to locate potential Volcanic Hosted Massive Sulphide mineralisation.

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Tellus is a national airborne geophysics and ground geochemical survey conducted by Geological Survey Ireland (GSI). It is designed to merge with the Tellus data of Northern Ireland, previously published by GSNI/BGS. Tellus geochemical survey includes soil sampling at two depth horizons, stream water and stream sediment sampling. Soil sampling is on a 2km grid in rural areas and 500m in urban areas. In NI soil sampling was on a 1km grid. Soils are analysed by ICP AR, XRF and for pH and LOI. When complete there will be a multielement soil dataset of c. 30,000 sample points per horizon with c.120,000 analyses resulting in nearly 6 million determinands. c.75% of the island of Ireland is now published.

Ireland has a long history of mining, and there are current active exploration projects for lead, zinc, gold and lithium. Within the 2024 EU Critical Raw Materials Act, member states are mandated to deliver a National Exploration Programme for Critical and Strategic Raw Materials. Tellus data puts Geological Survey Ireland in a strong position to explore for CRMs in Ireland that have not recently been targeted by the private sector.

An underexplored 100km stretch of Lower Palaeozoic sediments and volcanics between two significant historic copper mines was chosen for a pilot study. Univariate statistical approaches have been undertaken to locate CRM anomalies in the emerging soil datasets that may be associated with Volcanic Hosted Massive Sulphide deposits. Hot spot mapping (using a Getis-Ord G_i^* index) has identified several preliminary areas of interest with co-incident Cu, As, Au, Ag hotspots. These areas also lie close to buried magnetic anomalies and along strike from known VHMS deposits.

Further multivariate analysis, local studies and mapping over the areas is planned and will eventually feed into a National Exploration Program. Higher density industry regional soil datasets will also be studied. It is hoped that the areas identified will eventually be taken under Exploration Licences by industry to further explore or develop the CRM potential in Ireland.