Searching for Tin and Tungsten in Cornwall, UK: Insights from Geochemistry and Geological Mapping

Gabriel Smith
Camborne School of Mines - University of Exeter, Penryn, United Kingdom

Tin and Tungsten are metals of increasing value due to their speciality use within developing industries including AI, battery technologies, defense, and space industries. The distribution of these resources means their supply has potential for disruption, deemed 'critical minerals' by many countries, including the US, UK, and the EU. Cornwall was once the largest global tin producer, with many of its shallow deposits having been extracted. Early miners did not have access to sophisticated modern day exploration techniques, thus deposits at depth or under thick cover may still be present. However, despite its prospective geologic setting, modern greenfield exploration has been limited, with drilling focused on brownfield sites.

Developing a camp-scale geologic model from geochemical, structural, and petrological data is critical for exploration of these deeper deposits. Cornwall has multiple granitic intrusions, which host polymetallic Sn, W, Cu, As, Ni, Pb, and Zn mineralisation. A recent field campaign conducted near a satellite pluton has confirmed the presence of multiple unmapped felsic intrusives, with vein-hosted base metal and Sn-W mineralisation observed at surface. A reassessment of the role of felsic intrusives within the SW England polymetallic ore field has subsequently been undertaken combining field and geochemical data.

During fieldwork, alteration zones, structural features, and lithological variations were mapped and in situ outcrop samples collected. The rock samples obtained were analysed to determine mineralogical and geochemical relationships. Integration of optical microscopy, ICP-MS, and pXRF have been used to determine the ore mineralogy, alteration signatures, and paragenesis. Granitic composition has been compared with data from proximal intrusions to determine the geochemical variations. Interpretation of the results alongside field data has produced a new camp-scale geologic model of the area. The results will be used to inform subsequent exploration within the area, targeting lithological and structural features delineated during the study.