Data analysis of pXRF measurements on soil samples from the Brouzils Sb deposit (France)

Bruno Lemiere, Jérémie Melleton, Pascal Auger

Data analysis of pXRF measurements on soil samples from the Brouzils Sb deposit (France)

Bruno LEMIERE, Jeremie MELLETON, Pascal AUGER (BRGM, 45060 ORLEANS, FRANCE)

Aachen International Mining Symposia 2019

The UpDeep project aims at developing low footprint strategies, in order to facilitate exploration programs in either populated areas or environmentally sensitive areas, especially in Europe where the social acceptance of mining is particularly low. The impact of weak leach soil and plants analysis is much smaller than classical drilling or trenching programs. Dynamic sampling and on-site decision making on survey orientation using pXRF soil surveys achieve also the objective of low footprint and minimise sample collection. Field work was performed both in Nordic countries and in France, the present study at the Les Brouzils antimony deposit, a critical element.

The Brouzils vein field occurs in was detected by bedrock Sb geochemistry and electromagnetic survey. This site was briefly mined and is considered as a potential Sb resource.

For UpDeep, 146 soil samples were analysed by pXRF. They belong to Ah and B soil horizons at five Sb prospects, spread on six profiles. Results were processed as independent data sets in order to identify independently geochemical trends and spatial patterns. pXRF data sets are usually consistent with quasi-linear relationships with laboratory analyses. The most significant variables and their relations (Sb-As-Mn association) were deduced from a general PCA and CA factor analysis.

Data were then converted to centered log ratios. This separates clearly one lithology-related group (Rb, K, Ti, Sr, Th, Zr) and a mineralisation-related group (Sb, As) which includes Mn and Fe in heat map format. A second group (S, Pb, Ba) seems to be unrelated with (Sb, As, Mn) and closer to the lithology group. Similar but slightly different element associations and enrichment factors were observed on Ah and B data.

Spatial Sb and As anomalies on profiles are well resolved, located closeby the known position of vein occurrence and of mine workings, with little or no anomalies recorded in the host formations. Mn anomalies are slightly broader.

High density pXRF measurements can be successfully used for precise location of anomalies and for optimisation of laboratory analyses.