

ARVELA Tiago (2016): Geophysical and geochemical survey the Braçal mine area (Portugal)

Abstract

The Braçal mine is located in northern Portugal, in the district of Aveiro. This mine was considered as one of the most important ones of the country until it closed in the 1960s.

In terms of geology, this mine is located in the tectonic structure of the Central Iberian Zone. This subdivision is known for its important magmatic intrusions due to the Variscan orogeny. These intrusions have caused hydrothermal circulation allowing particular mineralization to precipitate. Various studies have been made about the origin and depositional processes of these minerals in this tectonic unit, some of them concerning the ore found in Braçal. In terms of lode found in Braçal, they are mostly concentrated in certain vein-rich areas, but very little information is available about this subject. The exploitation of ore was only done underground and the strategy employed for the mining seemed to have been based on underground observable features. Today, the mine is sealed and little knowledge about the possible extent of the mineralization exists.

This project aims to do a first assessment of the possible extent of mineralization and to determine if the smaller mining sites in the Braçal area (“Mina do Coval da Mó” and “Mina da Malhada”) exploit the same mineralization as Braçal. In order to do this, practices from several disciplines were utilized (mainly geophysics and geochemistry). Geophysical data from different methods (time-domain electromagnetics, frequency domain electromagnetics, magnetism, gravimetry and GPR) was used and/or acquired. The geochemical results came from soil samples taken from various locations of the site.

Concerning the results, several geophysical anomalies were noticed with different methods. Some of which correlate with each other, which is really promising. Distinct anomalous responses were spotted (with magnetic and gravity methods), along with low resistivity areas (TEM). Some of these features can be considered as typical of sulfide mineral deposits.

Geochemical analyses reported significant correlation between metals of interest (Pb, Zn and Cu), Mn and Mg. The correlation between Mn and metals of interest is understandable since Mn has moderate chalcophile tendencies, but their relation with Mg is not well known. Ni shows significant correlation with Zn and Cu, but it shows no correlation with Pb. No answer about this curious relationship could be found during this research. In terms of spatial distribution, high concentration zones of these elements were detected in areas close to the old mines, but not new area of interest was detected.

Possible deposits were found in this study, this report is a good start on the characterization of the deposits of Braçal area. Further studies could use these results as a basis for future advanced exploration project in the area.