VMS Targeting Challenges: Rethinking the World-class IPB Province

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The Iberian Pyrite Belt (IPB) is a world-class VMS metallogenic district. The energy transition and the demand for critical raw elements such as Cu-Zn have led to renewed exploration campaigns in the IPB. The historical track record shows that improvements and changes in conceptual models, along with advances in geophysical methods, 3D geological modelling and a detailed geochemistry approach were critical for recent discoveries such as La Magdalena (2013, Spain) and Sesmarias (Portugal, 2014). The Albernoa exploration license is a greenfield project on the IPB that is located near Aljustrel (Cu-Zn active mine in Portugal), which has been the focus of some studies by several companies during the last years. Within the Albernoa exploration license, new methodologies recently developed for IPB have been tested to drive the exploration campaign. The combination of high resolution geological, mineralogical, geochemical and geophysical data allowed the identification of some anomalies in depth that are currently being tested by drill-holes. Airborne ZTEM and ground-based fixed loop SQUID TEM data identified EM responses with similar amplitudes to known massive sulfide accumulations in active mines, and which were not yet tested by drilling. Compilation of new and historical geophysical data and reprocessing and modelling using state-of-the-art techniques, such as 3D inversion of electromagnetic data, will yield better and more focused geophysical targets than previously available. For the Albernoa area, specific Alteration (AI) and Mineralization Indexes were developed based on micro-analytical studies. Metapelites record values of (Cu+Zn+Pb)/Sc and (As+Sb)/Sc > 10, which allow to separate barren from altered/mineralized sequences. The same is observed for metavolcanics where AI_{major} (Fe_2O_3+MgO+MnO/Fe_2O_3+MgO+MnO+K_2O+Na_2O) varies between 0.25 to 1 and AI_{trace} (Zn+Cu+As+Sn/Zn+Cu+As+Sn+Rb+Ba) > 0.4, suggesting hydrothermal alteration and mineralization. VMS targeting is a challenge and for new discoveries it is crucial to gather and model from macro to nanoscale.