



Original Paper

3D Constrained Gravity Inversion and TEM, Seismic Reflection and Drill-Hole Analysis for New Target Generation in the Neves–Corvo VMS Mine Region, Iberian Pyrite Belt

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Located in the Iberian pyrite belt, the Neves–Corvo mine is a world-class massive sulfide deposit and the largest operating mine in Portugal with underground mining down to 1000 m depth focused on massive and stockwork Cu, Zn, Pb rich ores. Gravimetric data have had a leading role in the discovery of the seven known deposits, together with time-domain electromagnetic (TEM) ground data. In this work, we present the results of a 3D constrained gravity inversion carried out with legacy ground gravity data. The 3D gravity inversions were carried out using an updated density database containing approximately 142,000 measurements. A recently constructed 3D geological model based on reprocessed 2D seismic reflection, 3D seismic, TEM and updated geology from detailed surface mapping and drill-hole data, was used to constrain the inversions. The results show multiple high-density anomalies that may indicate the presence of mineralization at depth. These anomalies were therefore cross-checked with holes previously drilled. Approximately 97% of more than 1000 available surface drill-holes located on or at a distance of less than 200 m from the high-density anomalies intersected mineralization. However, gravity anomalies have been drilled in the past and particularly dense black shales or rhyolitic/gabbroic rocks have been intersected. To increase the success of future drilling, gravimetric anomalies have been correlated spatially with high-conductivity TEM zones and strong-amplitude seismic reflections, because igneous rocks usually present weak-to-moderate conductivity and a massive column of black shales presents a seismic signature quite different from that of mineralization. We concluded that some of these locations represent high-quality targets to consider following up with drilling and further exploration.

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