3D Magnetotelluric Model of AQW2 IOCG Deposit Located in the Aquiri Region, NW Portion of Carajás Mineral Province

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Situated in the southwestern portion of the Amazon Craton, the Carajás Mineral Province (CMP) displays a diversity of mineral deposits from world-class, such as iron oxide copper-gold (IOCG), to minor occurrences, especially in the Carajás Domain. In the Aquiri Region, western CMP, the AQW2 target is characterized by a group of intense and reverse magnetic anomalies, named Infill, Deep, and Priscilinha. This area is known for hosting important targets for Cu and Au exploration, such as the IOCG deposit within the Infill magnetic anomaly. Geophysical data displays a zone of high density, U enrichment, summed to spots of high K concentration, as well as high chargeability values. Petrophysical data demonstrates a good spatial correlation between the high Cu and Au concentrations and peaks in magnetic susceptibility and density. The mineralization in the Infill target appears in mafic rocks, especially gabbros, and has three main types of hydrothermal alteration: sodic (Na) represented by albite; calcium-potassic (Ca-Na+K) composed of biotite and scapolite; and ferric (Fe) has with two stages of alteration, the first with almandine and grunerite and the second with magnetite. The latter contains the highest concentration of Cu-Au mineralization. The Euler Deconvolution applied to magnetic field data displayed a source between 100 and 200 m coinciding with zones of ferric alteration observed in the petrophysical data. All these factors support the argument for an IOCG-type deposit.

Audio-magnetotelluric (AMT) data comprises two transverse profiles (LT1000 NW and LT500SE) collected in the Infill target. The dimensionality analyses had skew (β) values greater than |3|, indicating a tridimensional geoelectric distribution in the region of interest, between periods of 0.01 and 0.001 s. Therefore, a 3D inversion of the AMT data was performed and revealed a region with high conductivity coinciding with the magnetic and gravimetric anomalies and with the localization of the IOCG deposit identified in the petrophysical and geochemical data. Furthermore, the model demonstrated that this high conductive zone persists at depth, indicating the potential for additional Cu-Au mineralization.