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GEOPHYSICAL-GEOLOGICAL MODEL OF THE Cu-Au AQW2 DEPOSIT, IN THE AQUIRI REGION, NORTHWEST PORTION OF CARAJÁS MINERAL PROVINCE

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ABSTRACT: Integrating several geophysical methodologies associated with petrophysical data and other geological information is fundamental to establishing exploratory models of mineral deposits. IOCG-type deposits have been widely explored through geophysical methods due to large amounts of iron oxides and sulfides, producing significant responses in the magnetic and gravity fields, and in electric properties. The Carajás Mineral Province has one of the highest tonnage Cu-Au deposits in the world and regions with large exploratory potential, like the Aquiri area in the western part of the Carajás Domain. This region is a greenfield area with active exploration by VALE S.A. and hosts several Cu-Au deposits, such as the AQW2 target, the object of this project. Hence, this research aims to build a geophysical-geological exploratory model for the AQW2 target by integrating several geophysical, petrophysical, and geological data. Such a model will support a deeper comprehension of the genesis and the potential of exploration of the AQW2. This target is subdivided into smaller targets: Infill, Deep, and Priscilinha. The Infill target, already extensively evaluated, exhibits an IOCG-type deposit. On the other hand, the Deep and Prisiclinha targets still lack testing and represent a potential deposit to be investigated. AQW2 target presents complex and reverse magnetic anomalies, high density values, uranium enrichment, reaching up to 400 ppm in the Infill target. Infill target is hosted in mafic rocks, mainly represented by gabbros. It presents zones of hydrothermal alteration with scapolite-actinolite-grunerite-biotite-granada-magnetite and chlorite-carbonate-amphibole-hematite. The Cu-Au mineralization is directly associated with magnetite, and occurs in a system of breccias and veins. Data modeling of magnetic began with the Infill target, which has been studied and has the largest number of petrophysical data. The initial model was developed through a number of constraints, such as magnetic susceptibility, density, direction, and dip of the source. In addition, methods like MaxMin and Euler Deconvolution were carried out to determine the direction of the total magnetization and depth of the source, respectively. Data inversion was performed using the stage inversion approach, varying determined parameters simultaneously. The resulting model of the source of the Infill magnetic anomaly has a low rms and is in agreement with geophysical models of other IOCG deposits around the world. The geological, geophysical, and petrophysical data collected from the Infill target will serve as a reference for comparative analysis with the Deep and Priscilinha anomalies. This analysis aims to identify potential IOCG-systems within these target areas.

KEY-WORDS: GEOPHYSICAL METHODS, IOCG-DEPOSITS, HYDROTHERMAL ALTERATION, CU-AU MINERALIZATION, PETROPHYSICS DATA