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Comparison of Dipole-Dipole and Pole-Dipole Array applied in Bom Jardim de Goias Deposit

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Introduction

The Bom Jardim de Goiás region has been under investigation since 1972, during the aerogeophysical survey of the Iporá Project, when potassic radiometric anomalies were observed at the western edge of the Serra Negra granite, exhibiting a semi-circular structure (Costa *et al*., 1979).

Initial research involved geological mapping and regional stream sediment geochemistry, which led to the definition of the Bom Jardim de Goiás Metavolcanosedimentary Sequence. After defining the targets for further investigation, geological mapping, soil geochemistry, and E-W oriented magnetometry and VLF geophysical surveys were carried out at a 1:20,000 scale. This led to a new research phase with additional magnetometry, VLF, and IP geophysical surveys, as well as the execution of 18 diamond drill holes in two targets (Costa *et al*., 1979).

In 2024, in partnership with the University of Brasília (UnB), test surveys were carried out in the deposit area to select the best array for future surveys. This study is part of the geophysical investigation demand for geological characterization and prospecting of the study area. This work will allow for qualitative and quantitative considerations of the geological, geophysical, and prospective characteristics that define the region.

The technique was chosen for the targets to characterize high chargeability anomalies in the mineralized zone (sulfidation associated with pyrite, chalcopyrite, bornite, and pyrrhotite). The results from the induced polarization survey, acquired in the time domain for this study, will enable extrapolation to the rest of the deposit.

Method and/or Theory

Induced Polarization (IP) is a geophysical method that studies the ability of materials to store electrical potential, meaning they behave as electrical capacitors, thus being characterized as conductors, semiconductors, and insulators (Fig. 3). The method's principle involves injecting artificial currents through two metallic electrodes and measuring potential differences with a pair of non-metallic (non-polarizable) electrodes (Reynolds, 2011).

When an electrical current is applied to the ground, the voltage doesn't instantly decay to zero after the current is switched off. In fact, the voltage drops more sharply in the initial moments after current cutoff and then gradually declines. The voltage value immediately after this sharp drop is symbolized by Vs. This effect also occurs in the initial moments right after the current is switched on; that is, the voltage gradually rises until it stabilizes at its maximum value (Reynolds, 1997).

These situations occur due to the Induced Polarization effect in rocks. Measuring the IP effect in the time domain involves analyzing the temporal decay of the voltage generated after the current pulses injected into the ground are switched off. A simple way to measure the polarization effect is to determine the ratio between the primary voltage (Vp) and the observed voltage (Vs) at the instant after the electrical current is switched off. This parameter is called Apparent Polarizability (Reynolds, 1997).

Results

Figures 1 and 2 present the results, focusing mainly on the anomalies that were previously drilled, along with the geology and copper grade of the boreholes.

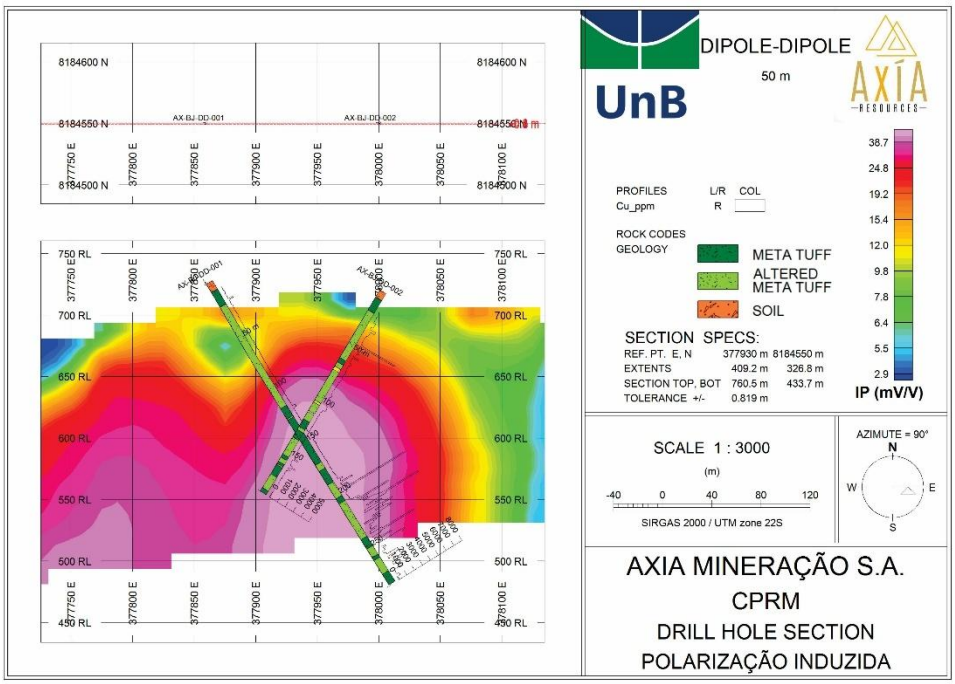

Figure 1: dipole-dipole section with geology and copper grade.

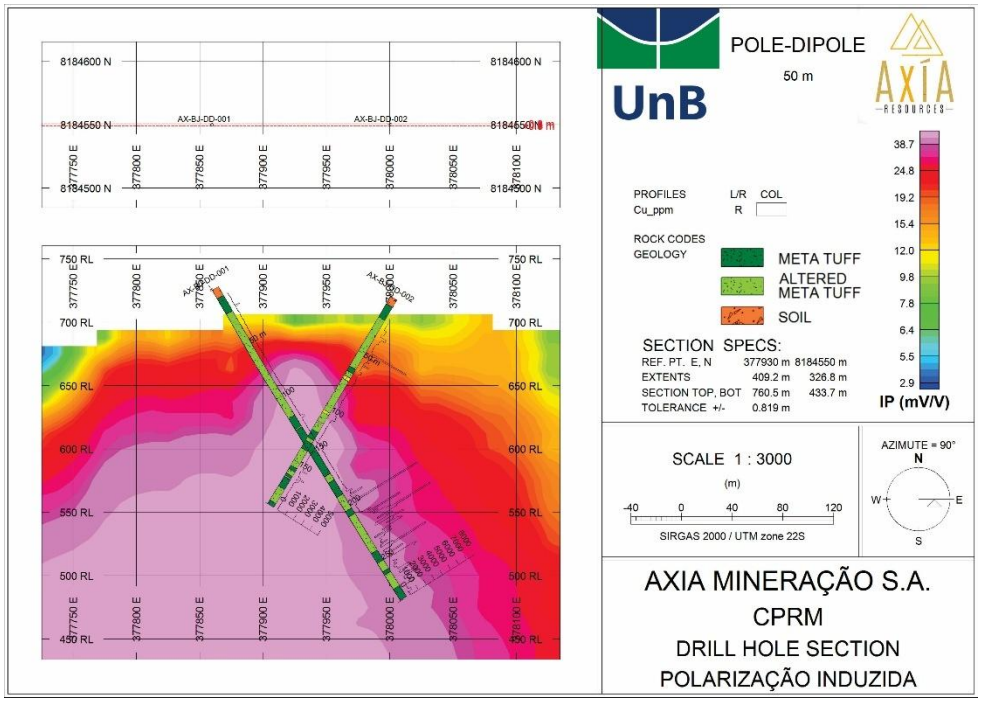

Figure 2: pole-dipole array with geology and copper grade.

Conclusions

The anomalous body investigated by the method yielded distinct results for each array. The pole-dipole array presented a single anomalous body, indicating that the best geochemical results are located at its edge. It also showed that borehole 2 terminated before reaching the core of this anomaly.

Conversely, the dipole-dipole array revealed a clear division into two anomalous bodies. Borehole AX-BJ-DD-001 intercepted the core of the eastern body, with grades increasing with depth. Borehole AX-BJ-DD-002 showed an anomalous value at the beginning of the hole, coinciding with the anomaly's onset, and reached the valley between the anomalies as depth increased.

It's important to note that borehole AX-BJ-DD-002 was interrupted due to encountering a fault at depth, associated with the Serra Negra fault. This could explain the division into two anomalous bodies observed with the dipole-dipole array and the shape of the anomaly from the pole-dipole array.

The study concludes that for the target in question, the **dipole-dipole array** is the most suitable for future line acquisitions due to its superior resolution.

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References

Costa, S.A.G, P.R.P., Fragomeni, E.C., Campos, W.J. Almeida, 1979, Projeto Bom Jardim de Goiás. Relatório final de pesquisa para Cu-Pb-Zn no município de Bom Jardim de Goiás. Goiânia: CPRM, 3 v.

Reynolds, J. M., 2011, An introduction to applied and environmental geophysics. 2. ed. Chichester: John Wiley & Sons.