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Magnetic Lineaments and Structural Trends of the Metavolcano-Sedimentary Sequence of Bom Jardim de Goiás

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Introduction

The study area comprises the metavolcano-sedimentary sequence of Bom Jardim de Goiás and the western portion of the Serra Negra Intrusion. It is located approximately 30 km south of the town of Bom Jardim de Goiás. These geological units lie within the tectonic domain of the Tocantins Province, in the westernmost segment of the Brasília Belt. This Neoproterozoic sequence is in contact with fault systems and shear zones that define the Transbrasiliano Lineament, as well as the boundary between the Brasília and Paraguay belts, locally represented by the Serra Negra Fault. The mentioned sequence has potential for copper deposits, such as the well-known Bom Jardim de Goiás deposit, but still lacks regional semi-detailed geophysical studies that could contribute to a better understanding of the structural controls associated with the sequence and, consequently, with potential mineralization. Therefore, the objective of this study was to extract the main magnetic lineaments from publicly available aeromagnetic data in order to better understand the main structural trends of the sequence.

Method and/or Theory

Magnetic data are widely used in structural investigations, as the concentration of magnetic minerals is directly associated with various geological processes and features. In this work, magnetometric data from the Arenópolis Magmatic Arc – Juscelândia Sequence Project (Project 3064), carried out by CPRM (2004), were used. The data acquisition consisted of flight lines spaced 500 meters apart and a nominal flight altitude of 100 meters.

The Anomalous Magnetic Field grid was generated using Multi-Trend interpolation, a technique that enhances linear features typically associated with geological structures. The resulting grid was interpolated with 125-meter cells, equivalent to ¼ of the flight line spacing. The anomaly data were subjected to gradient calculations through partial derivatives, such as the first vertical derivative (Dz) and the tilt derivative (Analytic Signal Inclination – ISA), aiming to enhance variations associated with shallow magnetic sources.

Lineaments were interpreted graphically through the extraction of inflection zones between points of maximum and minimum amplitude, as well as abrupt lateral variations in the magnetic phase. Then, the lineaments were displayed in a rose diagram and compared with the main structures mapped in regional geological maps to verify the consistency of the extracted data.

Results and Conclusions

The extraction of lineaments and their representation in the rose diagram revealed four preferential structural directions. The N-S and N30E trends are consistent with the main shear zones near the study area, represented by the Serra Negra and Aldeia faults, reflecting the behavior of the Transbrasiliano Lineament and its reactivations. The N70E trend correlates with the extensional structure of the Grande Fault, which exhibits NE to E-W orientation and is associated with subordinate dyke swarms that reinforce this direction. The N50W trend is considered anomalous, as it is not prominently represented in regional geological maps; however, it appears to truncate and/or crosscut the other lineaments. These are, therefore, the four main structural trends identified in the study área.