

Data Integration Applied for Geologic Mapping and Exploration in the Tapajós Gold Province Using SAR Imagery and Airborne Geophysics

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The Tapajós Mineral Province lies within the Archaean Amazonian Craton, northern Brazil, and stands as one of the largest gold-producing provinces of the country. The geological framework of the Tapajós region, mapped at 1:250,000 scale, comprises an assemblage of Archaean to Phanerozoic rocks, where numerous gold-rich placers of Quaternary alluvium provenance have been exploited and a few primary deposits are known. No large primary deposit has been discovered so far.

Radar imagery (C-band Canadian RADARSAT; L-band Japanese JERS-1) and airborne geophysics (Magnetics; Gamma-Ray) were integrated to generate a more comprehensive geological map and to provide better clues for targeting potential primary gold mineralization in the Tapajós Mineral Province.

Preliminary results showed that both SAR systems have valuable textural (lithologic) and structural information. The total count magnetic field image was particularly useful for the delineating important regional structural features and for identifying distinct domains within the Archaean basement unit, which is presently shown on existing geologic contour maps as undifferentiated. The analysis of the radioelement signature of the rocks was conducted using gamma-ray spectrometric data. Th and K signatures were most useful as an aid for lithologic mapping, showing good correlation with the previously recognized units. This study has provided key preliminary results, which can be of importance to gold exploration efforts. These include newly defined lithologic domains or facies within the basement unit, which will be studied in conjunction with known gold occurrences, and the presence of brittle structures that appear to be spatially correlated with known primary gold occurrences.