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Magnetic and gamma-ray spectrometric signatures of the Curral Novo do Piauí iron deposit (NE- Brazil).

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Introduction

The iron deposit is located in the São Pedro Terrane of the Borborema Province, controlled by the Itaizinho-Baixio shear zone. The ore is hosted in metamafic-ultramafic rocks of the Granjeiro Complex (3.535 Ga), associated with syn- and post-deformational hydrothermal processes. The geological context, in which the mineralizations are found, together with the set of textural, mineralogical and chemical features, suggests that the tectonic-controlled iron deposits with associated sulfides belong genetically to the Fe-Cu-Au (IOCG) type.

Methods

Aeromagnetic and gamma-ray spectrometric data from the Centro Sudoeste do Ceará Aerogeophysical Project, contracted by the Geological Survey of Brazil, with flight lines at a height of 100 m, spaced 500 m apart in the N-S direction were used. To assist in the interpretation of the three-dimensional characterization of the Fe deposit, modeling of the magnetic data implemented the methods of 3D Euler Deconvolution and Magnetization Vector Inversion (MVI).

Results and Conclusions

Banded iron formations commonly outcrop in ENE-WSW trending hills along a 30 km long geological trend. The outcrops of Fe occurrences correlated with low K- and eTh- and eU-contents. Two similar radiometric signatures located east of the main body suggest that other outcrops of metamafic-metaultramafic rocks may occur.

The main magnetic signatures of the Fe occurrences of the deposit are elongated lineaments in the NE-SW direction, sometimes curved to NW-SE. Their best correlations are shear zones, iron formations, metamafic-ultramafic rocks and orthogneisses-migmatitic rocks of the Granjeiro Complex. The Fe occurrences are associated with an elongated ellipsoidal anomaly in the ENE-WSW direction, amplitude up to 2,800 nT and wavelength of approximately 3 km. This magnetic pattern is consistent with shallow and narrow bodies.

The 3D Euler solutions outline an elongated, elliptical magnetic body with an ENE-WSW direction and a maximum depth of around 4 km. The magnetic susceptibility voxel showed as a longitudinal vertical section revealed deep magnetic bodies associated with the Fe deposit. The magnetic susceptibility isosurface outlines a body in the subsurface with an intensity greater than 0.05 SI and low-intensity remanence vectors. Vertical sections of the magnetic susceptibility voxel were made with spacing between them varying between 600 and 800 m, and in each section boundaries with susceptibility between 0.01 SI at the edge of the section and 0.15 SI at the center of the section were interpreted. The integration of all sections revealed the interpreted 3D shape of the magnetic body hosting the mineralizations.