



Preliminary Interpretation of the Structural Framework of the Catolé-São Julião Basin, Piauí, Brazil.

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Abstract

Sedimentary basins have great economic importance once they have presented favorable conditions for the concentration of mineral resources. In the Borborema Province (BP), Northeastern Brazil, there are several basins of Cambro-Ordovician age. They are characterized by presenting a strong structural control, an intense hydrothermal alteration, as well as the presence of disseminated sulfides, leading different authors to classify such mineralization as similar to a world-class IOCG deposits. However, despite the seeming importance, many of these basins do not have information regarding the geological-structural framework. The aim of this work is to contribute to the knowledge of the subsurface geology of the Catolé-São Julião Basin based on information from aeromagnetic data. This Basin is located in the Rio Grande do Norte Domain, close to the Parnaíba Basin. The magnetic data used in this work is related to the Center-Southwestern of Ceará project (Code No. 1101), made available by the Geological Survey of Brazil - CPRM. Initially, the data were organized and interpolated into regular square meshes with a 125-meter cell using the bi-directional method to produce the map of magnetic anomalies (MA). Then, enhancement techniques were applied, enabling a qualitative analysis, as well as Euler's Deconvolution, aiming to estimate the depth of the magnetic sources (quantitative analysis). The magnetic lineaments were interpreted through the Tilt Angle of the Total Horizontal Derivative (TAHG), reflecting a main NE-SW direction. Based on these lineaments and the magnetic variation presented by the Analytic Signal Amplitude (ASA) it was possible to divide the area into four Magnetic Domains (MDs). The MD1 is located in the N-NE portion of the area and is represented by lineaments of main direction N68°E, high values of amplitude, and predominance of Euler's solutions of up to 500m. This domain is defined by the rocks of the Orós Group. MD2 is located in the center-west portion of the area and shows a predominance of low to intermediate magnetic values ($< \sim 0.50$ nT/m), with no significant variations, lineaments oriented to N80°E, and scarce Euler's solutions with low depth (< 500 m). They correspond, in particular, to Granite Mandacaru. MD3 is in the southeastern portion of the area and has a heterogeneous character, with intermediate values ($< \sim 0.80$ nT/m), lineaments in the N55°E direction, and low depth for Euler's solutions (in the order of 200m). This domain is associated with gneissic rocks of the São Nicolau Complex. MD4 occurs in the western portion of the area, with a predominance of low values ($< \sim 0.040$ nT/m), lineaments in the N70°E direction, and Euler's solutions with high depth (maximum in the order of 1,580 m). In this domain, there are rocks of the Serra Grande Group (Parnaíba Basin), the sedimentary units of the Catolé-São Julião Basin, and a small portion of the Mandacaru Granite. The use of magnetic data was fundamental for a preliminary recognition of the geological-structural framework of the study area and as a basis for the next stage, which consists of terrestrial gravimetric profiles acquisition.

Keywords: Magnetometry; Euler Deconvolution; Lineaments; Catolé-São Julião Basin.