3-D GRAVITY MODELLING OF ARAGUAINHA IMPACT STRUCTURE CENTRAL PEAK, CENTRAL BRAZIL

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ABSTRACT: Located in central Brazil, at border between states of Mato Grosso and Goiás, the Araguainha Dome is the largest impact structure recognized in South America. It has a diameter of 40 km and is morphologically structured in concentric rings of elevations and depressions composed of sedimentary rocks of Paraná Basin around an uplifted granitic and impact breccias core. Several studies about the crater geology have been conducted, however, the lithotype configuration in subsurface geology remains mostly unknown. A previous 2-D study was conducted, but the results presented shows a negative anomaly at central peak, which don't correspond to observed geology. In order to achieve a better understanding about how the rocks are arranged themselves underneath the central peak, a new gravity study has been developed, by which information of Bouguer anomaly has been obtained. The gravity data was process to residual-regional separation by two methods, polynomial fitting and upward continuation, resulting in a residual Bouguer map, showing anomaly peaks in central uplifted region. The residual anomaly map shows a range between -12.4 mGal and 14.0 mGal, with high values at south and southwest regions. Nevertheless, the anomalies presents no direct correlation with surface geology, suggesting that the spatial configuration of the subsurface geology is different. The observed regional anomaly contains a NE-SW trend, which can be related to basement of the Paraná Basin and the Transbrasiliano lineament. To construct the 3-D model, an inversion to residual data was applied, and as result, two 3D models of the density were obtained, one without constraints and another with 0.25 $g.cm^{-3}$ upper-bound constraint and -0.25 $g.cm^{-3}$ lower-bound constraint. The density levels that have been observed in the first model are far different from the expected values, 2.45 $g.cm^{-3}$ for granitic rocks and 2.1 to 2.3 $g.cm^{-3}$ for sedimentary rocks. However, despite the discrepancy between absolute values, there is a similarity on the geometry shown by the presented bodies of the two models. The results present a lower density block in granitic area, that indicate an intense fractured rock and densities higher than expected in Furnas Formation sandstones, which can means a compacted sandstone or the influence from granitic rocks as basement.

KEYWORDS: ARAGUAINHA, IMPACT STRUCTURE, GRAVITY MODEL