Aeromagnetic Data Interpretation and Source Body Evaluation Using Standard Euler Deconvolution Technique in Obudu Area, Southeastern Nigeria

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Abstract : In order to interpret the airborne magnetic data and evaluate the approximate location, depth, and geometry of the magnetic sources within Obudu area using the standard Euler deconvolution method, very high-resolution aeromagnetic data over the area was acquired, processed digitally and analyzed using Oasis Montaj 8.5 software. Data analysis and enhancement techniques, including reduction to the equator, horizontal derivative, first and second vertical derivatives, upward continuation and regional-residual separation, were carried out for the purpose of detailed data Interpretation. Standard Euler deconvolution for structural indices of 0, 1, 2, and 3 was also carried out and respective maps were obtained using the Euler deconvolution algorithm. Results show that the total magnetic intensity ranges from -122.9nT to 147.0nT, regional intensity varies between -106.9nT to 137.0nT, while residual intensity ranges between -51.5nT to 44.9nT clearly indicating the masking effect of deep-seated structures over surface and shallow subsurface magnetic materials. Results also indicated that the positive residual anomalies have an NE-SW orientation, which coincides with the trend of major geologic structures in the area. Euler deconvolution for all the considered structural indices has depth to magnetic sources ranging from the surface to more than 2000m. Interpretation of the various structural indices revealed the locations and depths of the source bodies and the existence of geologic models, including sills, dykes, pipes, and spherical structures. This area is characterized by intrusive and very shallow basement materials and represents an excellent prospect for solid mineral exploration and development.

Keywords : Euler deconvolution, horizontal derivative, Obudu, structural indices
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