

Geophysical Mapping of Anomalies Associated with Sediments of Gwandu Formation Around Argungu and Its Environs NW, Nigeria

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Abstract : This research study is being carried out in accordance with the Gwandu formation's potential exploratory activities in the inland basin of northwest Nigeria. The present research aims to identify and characterize subsurface anomalies within Gwandu formation using electrical resistivity tomography (ERT) and magnetic surveys, providing valuable insights for mineral exploration. The study utilizes various data enhancement techniques like derivatives, upward continuation, and spectral analysis alongside 2D modeling of electrical imaging profiles to analyze subsurface structures and anomalies. Data was collected through ERT and magnetic surveys, with subsequent processing including derivatives, spectral analysis, and 2D modeling. The results indicate significant subsurface structures such as faults, folds, and sedimentary layers. The study area's geoelectric and magnetic sections illustrate the depth and distribution of sedimentary formations, enhancing understanding of the geological framework. Thus, showed that the entire formations of Eocene sediment of Gwandu are overprinted by the study area's Tertiary strata. The NE to SW and E to W cross-profile for the pseudo geoelectric sections beneath the study area were generated using a two-dimensional (2D) electrical resistivity imaging. 2D magnetic modelling, upward continuation, and derivative analysis are used to delineate the signatures of subsurface magnetic anomalies. The results also revealed The sediment thickness by surface depth ranges from ~4.06 km and ~23.31 km. The Moho interface, the lower and upper mantle crusts boundary, and magnetic crust are all located at depths of around ~10.23 km. The vertical distance between the local models of the foundation rocks to the north and south of the Sokoto Group was approximately ~6 to ~8 km and ~4.5 km, respectively.

Keywords : high-resolution aeromagnetic data, electrical resistivity imaging, subsurface anomalies, 2d downward modeling

Conference Title : ICGG 2025 : International Conference on Geology and Geophysics

Conference Location : Ottawa, Canada

Conference Dates : March 24-25, 2025