

Geothermal Energy Evaluation of Lower Benue Trough Using Spectral Analysis of Aeromagnetic Data

Authors : Stella C. Okenu, Stephen O. Adikwu, Martins E. Okoro

Abstract : The geothermal energy resource potential of the Lower Benue Trough (LBT) in Nigeria was evaluated in this study using spectral analysis of high-resolution aeromagnetic (HRAM) data. The reduced to the equator aeromagnetic data was divided into sixteen (16) overlapping blocks, and each of the blocks was analyzed to obtain the radial averaged power spectrum which enabled the computation of the top and centroid depths to magnetic sources. The values were then used to assess the Curie Point Depth (CPD), geothermal gradients, and heat flow variations in the study area. Results showed that CPD varies from 7.03 to 18.23 km, with an average of 12.26 km; geothermal gradient values vary between 31.82 and 82.50°C/km, with an average of 51.21°C/km, while heat flow variations range from 79.54 to 206.26 mW/m², with an average of 128.02 mW/m². Shallow CPD zones that run from the eastern through the western and southwestern parts of the study area correspond to zones of high geothermal gradient values and high subsurface heat flow distributions. These areas signify zones associated with anomalous subsurface thermal conditions and are therefore recommended for detailed geothermal energy exploration studies.

Keywords : geothermal energy, curie-point depth, geothermal gradient, heat flow, aeromagnetic data, LBT

Conference Title : ICAGNR 2024 : International Conference on Applied Geophysics and Natural Resources

Conference Location : Vancouver, Canada

Conference Dates : August 05-06, 2024