INTEGRATING AEROMAGNETIC AND REMOTE SENSING DATA FOR MINERAL POTENTIAL ASSESSMENT IN PARTS OF BENIN-ARM, ANAMBRA BASIN, NIGERIA

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18PCE02034

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BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POST GRADUATE STUDIES OF COVENANT UNIVERSITY, OTA, OGUN STATE, NIGERIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE (M.Sc) DEGREE IN INDUSTRIAL PHYSICS (APPLIED GEOPHYSICS), IN THE DEPARTMENT OF PHYSICS, COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT UNIVERSITY, OTA.

JUNE 2021

ACCEPTANCE

This is to attest that this dissertation is accepted in partial fulfilment of the requirements for the award of the degree of Master of Science in Industrial Physics (Applied Geophysics) in the Department of Physics, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria.

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DECLARATION

I, **ONI OLUBUKOLA AINA (18PCE02034)** declare that this research was carried out by me under the supervision of Prof. Ahzegbobor P. Aizebeokhai of the Department of Physics College of Science and Technology, Covenant University, Ota, Nigeria. I attest that this dissertation has not been presented either wholly or partly for the award of any degree anywhere else. Also, I declare that all sources of data and scholarly information used in the dissertation are duly acknowledged.

ONI OLUBUKOLA AINA ______________________________

Signature and Date

CERTIFICATION

We certify that this dissertation titled **"INTEGRATING AEROMAGNETIC AND REMOTE SENSING DATA FOR MINERAL POTENTIAL ASSESSMENT IN PARTS OF BENIN-ARM, ANAMBRA BASIN, NIGERIA"** is an original research work carried out by **ONI OLUBUKOLA AINA (18PCE02034)** in the Department of Physics (Applied Geophysics), College of Science and Technology, Covenant University, Ota, Nigeria under the supervision of **Prof. Ahzegbobor P. Aizebeokhai**. We have examined and found this work acceptable as part of the requirements for the award of Master (M.Sc) degree in Industrial Physics (Applied Geophysics).

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DEDICATION

This project is dedicated to the Almighty God, the author and finisher of my faith, the one who made it possible for me to complete this work.

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ABSTRACT

The need for mineral resources for economic development is key in both developing and developed countries. However, miners usually resort to random excavation of mineral deposits without proper investigation to identify structures of interest in target areas; this usually leads to land depletion and abandonment. The aim of this study is to assess the mineral resources potential of part of the Benin-arm of Anambra basin by investigating the geophysical characteristics of the area using remote sensing and aeromagnetic data. Surface and subsurface regional structures, including intrusive bodies, contacts, faults and mineralisation, were mapped by integrating aeromagnetic and remote sensing data. The mineral bearing zones that show high prospects of mineral deposit in the region were identified. Rose diagram revealed that the surface lineament mainly aligned in the NNW-SSE direction. The orientations of the subsurface lineaments are quite similar to those of the surface lineaments; they aligned mostly in the NE-SW, N-S and E-W directions. The magnetic intensity ranged between - 431.38 nT and 399.82 nT, while reduction-to-pole magnetic intensity ranged from –416 - 664.45 nT. The first vertical derivative showed magnetic intensity which ranged from –0.5863 - 0.9060 nT/km^2. The total horizontal derivative magnetic intensity ranged from –0.00031 - 0.762691 nT/km^2, while the analytic signal showed magnetic intensity ranging from 14.0664 - 394,607.3438 nT/cm^2. The windowed Euler deconvolution depth to magnetic source showed depth range of < 20 m to 2000 m. Many of the features delineated in the study area are at shallow magnetic source depths (< 500 m); this is a common characteristic of basement complex terrains. Deeper magnetic source depths (> 1000 m) are observed in the sedimentary terrain. Mineral exploration should be focused in areas with high lineament concentration due to the facts that lineaments are potential conduits for economics minerals deposition.

Keywords: Mineral potential, Aeromagnetic data, Remote sensing, Benin-arm