

Electrical Resistivity Tomography (ERT) and Very Low Frequency (VLF) Electromagnetic Methods of geophysical investigation of mineral occurrences in Usen, Southern Nigeria

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Abstract

Very Low Frequency (VLF) Electromagnetic (EM) and Electrical Resistivity Tomography (ERT) investigation were carried out at two (2) locations at Usen area of Southern Nigeria. This was done with a view to identify the mineral conductive areas in the survey locations. The locations were, Edo State Polytechnic field environment and Edo State Polytechnic Science Laboratory Technology environment located within longitudes East and latitude North. ABEM WADI (EM) instrument was used for the VLF survey. This was done so that points that indicates high conductivity for the VLF surveys were marched with those of ERT survey. The two (2) locations were found to be conductive. Then, 2D resistivity data acquisition was carried out on the two (2) locations. Data were acquired in parallel directions using Wenner Schlumberger electrode configurations with resistivity meter SAS 1000 using electrode separation of $a = 5\text{m}$ and inter spacing of $L = 10\text{m}$ making a total of 60m square grid for the lateral extent. The 2D data set were inverted using RES2DINV software producing 2D models. These models conductive points were then compared with that of the VLF survey which indicates the presences of minerals. The minerals and aggregate that fall within the resistivity range ($17.8\Omega\text{m}$ to $46938\Omega\text{m}$) observed from the models are dolomite, maris, clay, alluvium, moraine, soil 40% clay, soil 20% clay, lateritic soil, sand clay/ clay sand, limonite, quartz, rock salt, lignite, syenite, basalt, schists, marble, conglomerates, and sandstone. The physical properties of lateritic soil, sand, sandstone, shale, clay and dolomite agree with some of the outcrop minerals found in the study area.

Biography:

Enoma Nosakhare has completed his PhD at the age of 40 years from University of Benin, Benin City, Nigeria. He is presently an academic staff with Edo State Polytechnic, Usen, Department of Mineral and Petroleum Resource Engineering.. Tertiary Education Trust Fund (TETFUND) director of the institution, my area of specialization is Exploration Geophysics. He had published many papers in reputed journals. Material Science doctoral program. He has over 20 years' professional experience in the discrete semiconductors field at Motorola-On Semiconductor. He obtained his PhD title in Solid-State Physics at the CINVESTAV-IPN in Mexico City.

Speaker Publications:

1. Enoma Nosakhare. "Pollution and Degradation Challenges for the 21st Century"; Journal of Engineering and Industrial Design/ 1991;2: 1.
2. Enoma Nosakhare. "Population Challenges for Environmental Sustainability"; Journal of the Nigeria Mathematical Physics ;33.
3. Enoma Nosakhare. "4-D Seismic: An Efficient Tool to Optimise Oil Recovery in the Niger Delta"; Journal of the Nigeria Mathematical Physics ;36.

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