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Full Length Research Paper

Measurement of Magnetic Susceptibility of some Rocks samples in Dede and Kubwa in Bwari Area Council of the Federal Capital Territory Abuja

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ABSTRACT

Mineral composition of rocks and other properties such as magnetic susceptibility and density, determine the property of rocks. In this paper, the magnetic susceptibility of some rocks samples in Dede and Kubwa in Bwari Area Council of the Federal Capital Territory, Abuja were studied and the results obtained presented.The average magnetic susceptibility for the studied samples o frocks from Dede and Kubwa were found to be 8.10×10^{-5} and 4.54×10^{-5} repectively.

Key words: *Abuja, Dede , Kubwa, Magnetic susceptibility*

INTRODUCTION

Geological maps of an area offer general information about the type of formation or rock units that exist in the area. The comprehensive nature of this depends on the scale of the map. However, there is a limit to the type of information that can be extracted from geological maps because of the complex mechanisms of geomorphology (Okwueze etal,1995).

Hence, for detail study of an area especially with the view to producing scientifically based data for provision of social infrastructures, additional methods like drilling and geophysical techniques are necessary and complementary because they pick up other details which are usually not available in geophysical maps (Dobrin, 1976 and Aboh, H.O. etal). Rocks are the hard materials that make up the earth crust. These include igneous rocks, metamorphic rocks and sedimentary rocks. Rocks generally consist of magnetic properties which are measured by an instrument called magnetometer. Due to these magnetic properties, rocks are mostly susceptible to be magnetized. Susceptibility is the degree to which a rock sample is magnetized. Magnetic anomalies are caused by magnetic minerals mainly magnetite and pyrrhotite contained in the rocks.

Studies of the magnetic history of the earth crust shows that the earth's field has varied in magnitude and has reversed its polarity a couple of times (Lowerrt, 1997)

Magnetic susceptibility is the measure of the ease with which a particular rock sample is magnetized when subjected to magnetic field. The ease of magnetization is related to the concentration and composition (size, shape and mineralogy) of the magnetisable mineral content of the rock sample.

Magnetite for example, account for most of the susceptibility observed in rocks. Thus the measurement of susceptibility can be done before magnetic survey take place to determine which rock will be detectable magnetically and to what extent. The measurement can be performed in the field on outcrop or on samples in laboratory.

Magnetism is a vector quantity whose magnetic anomaly is produced by the contrast between the intensity and direction of magnetization of the disturbing mass and that of the surrounding rock material. Magnetization is composed of induced and remnant vector. The former depends on the susceptibility of the magnetic material present and the strength of the ambient geomagnetic field. The later is of permanent nature and depends on the type and amount of magnetic material present in the rock and on its magnetic history (Pal and Rao, 1976)

METHODOLOGY

The rock samples were obtained from two quarries namely DEEMARK QUARRY located at Dede and ZEBERCED QUARRY located at Kubwa. Fresh outcrops of the samples were obtained by driving a chisel into the rock using a hammer.

Five samples of the rocks were obtained at Dede and four samples obtained at Kubwa. These samples were analyzed at the National Geosciences Research Laboratories Centre Kaduna using an instrument called FUGRO GMS – 2 Magnetic Susceptibility Metre.

The FUGRO GMS – 2 Magnetic Susceptibility Metre is placed such that the sensitive part is in contact with the rock sample. Readings were taken when the metre was stable. The procedure was repeated for all the nine samples of the rocks obtained from Dede and Kubwa.

RESULTS

After the above procedure was performed, results obtained from Dede and Kubwa were the tabulated as shown in table 1 and 2 respectively

Table 1. Susceptibility of rock sample in Dede

	Name of rock sample	Susceptibility (S.I Unit)
1	Slightly granitize amphibolites with a quartzofeldspathic vein intrusion	1515×10^{-5}
2	Granite gnesis	702×10^{-5}
3	Granite gnesis	206×10^{-5}
4	Amphibolites	1453×10^{-5}
5	Granite gnesis	210×10^{-5}

Table 2. Susceptibility of rock samples in Kubwa.

	Name of rock sample	Susceptibility (S.I Unit)
1	Granite gnesis	142×10^{-5}
2	Amphibolites	1789×10^{-5}
3	Granite gnesis	140×10^{-5}
4	Amphibolites homogenized into granitic material	1677×10^{-5}

DISCUSSION

From the results obtained, it was found that the Granite gnesis which are light coloured has low susceptibility. The low susceptibility in these samples is as a result of the presence of Felsic materials found in the rocks which are silica – rich with small amount of the oxides of Calcium, Magnesium and Iron . These rocks samples are known as Leucocratic rocks. It was also found that the amphibolites which are dark in colour to the presence of a large amount of iron and Magnesium in these rocks samples.

CONCLUSION

In this paper, we found that the average Magnetic Susceptibility for the samples of rocks from Dede is 8.10 X 10^{-3} and that from Kubwa is 4.54 X 10^{-3}. This results shows that rocks samples in Dede are more susceptible to magnetism that those in Kubwa.

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