

A PALEOMAGNETIC STUDY OF VOLCANIC
ROCKS OF NAIROBI AREA.

BY

WILLIAM CHERUIYOT KIRUI

THIS THESIS HAS BEEN ACCEPTED FOR
THE DEGREE OF M.Sc ~~M.A~~ 1989
AND A COPY MAY BE BORROWED IN THE
UNIVERSITY LIBRARY.

A thesis submitted in partial fulfilment of
the requirements for the degree of Master of science
of the University of Nairobi.

1989.

This thesis is my original work and has not been presented for a degree in any other University.

Kirui

KIRUI, W.C.

This thesis has been submitted for examination with my approval as a University Supervisor

J.P. Patel

PROF. J. P. PATEL

ABSTRACT

The thesis presents paleomagnetic results of volcanic rocks of lower Tertiary age from Nairobi area. The rock units sampled for the study are the Limuru trachytes (1.72 my), Nairobi phonolites (5.2 my), Ngong basalts (5.3 my) and Mbagathi phonolitic trachytes (5.7 my). Alternating field demagnetization technique was used in isolating the primary component of the natural remanence of the samples. The cleaned mean directions have been classified as normal, intermediate or reversed. The mean intermediate direction for the Ngong basalts is calculated at declination $D = 84.5^{\circ}$, Inclination $I = 0.8^{\circ}$ ($\alpha_{95} = 23.8^{\circ}$). The Limuru trachytes, the Mbagathi phonolitic trachytes and the Nairobi phonolites each gave mixed directions of intermediate and reversed polarities. The mean intermediate and reversed directions for the Limuru trachytes are calculated at $D = 99.8^{\circ}$, $I = 22.65^{\circ}$ ($\alpha_{95} = 1.2^{\circ}$) and $D = 171.5^{\circ}$, $I = 14.93^{\circ}$ respectively; for the Mbagathi phonolitic trachytes the mean intermediate and reversed directions are calculated at $D = 73.71^{\circ}$, $I = 39.97^{\circ}$ ($\alpha_{95} = 17.3^{\circ}$) and $D = 151.1^{\circ}$, $I = 24.2^{\circ}$ ($\alpha_{95} = 21.0^{\circ}$) respectively while for Nairobi phonolites the mean intermediate and reversed directions are calculated at $D = 251.0^{\circ}$, $I = 0.1^{\circ}$ and $D = 169.6^{\circ}$, $I = 2.5^{\circ}$ ($\alpha_{95} = 9.6^{\circ}$) respectively. The corresponding paleomagnetic poles for all the rock formations have also

been evaluated. The mean paleomagnetic pole for the Ngong basalts is computed at 125.0°E , 0.93°N ($A_{95}=16.2^{\circ}$). The Limuru trachytes gave poles at 114.73°E , 9.82°S ($\delta_m=1.23^{\circ}$, $\delta_p=0.65^{\circ}$) and 88.9°E , 79.3°S from the intermediately and reversely magnetized mean directions; Nairobi phonolites gave 126.49°E , 18.9°S and 127.3°E , 79.6°S ($\delta_m=9.6^{\circ}$, $\delta_p=4.8^{\circ}$) from its intermediate and reversed mean directions while the Mbagathi phonolitic trachytes yielded corresponding poles for the intermediate and reversed mean directions at 102.9°E , 14.4°N ($\delta_m=20.8^{\circ}$, $\delta_p=12.53^{\circ}$) and 104.0°E , 59.2°S ($\delta_m=22.5^{\circ}$, $\delta_p=12.0^{\circ}$) respectively. A tentative magnetostratigraphy of these rocks of Nairobi area, based on their polarity, has been suggested. An attempt has been made to correlate this magnetostratigraphy of Nairobi area with other stratigraphic columns from other areas of Kenya. Optical petrological analysis was also carried out on specimens of various sites of the units. The results indicate that titanomagnetite grains are the principal carrier of the natural remanence. The low coercivity of the natural remanence exhibited by some rock units is believed to be due to the multi-domain nature of the titanomagnetite grains.