

THE GEOMAGNETIC VARIATIONS  
AT ELEVEN STATIONS IN AFRICA  
ON SELECTED DAYS

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A thesis submitted in part fulfilment for the  
Degree of Master of Science in the  
University of Nairobi

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

Signature *Elizabeth...Shah*

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

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## ABSTRACT

Magnetic data from eleven African geomagnetic observatories covering a latitude range of approximately  $64^{\circ}$  have been used in this study to examine some of the geomagnetic effects of the currents in the low latitude ionosphere and some of the behavioural features of these Sq currents and the electrojet on a number of days for the years 1969, 1970 and 1971.

From this study, it may be concluded that the Sq currents are complex in form. Changes in the shape of the vortices, current intensity and in their relative position with season appears to account, at least partially, for the seasonal difference in the magnetic variations at all latitudes. Day to day variability in the strength and form of Sq currents are also observed.

The equatorial current is found to attain its daily maximum at the mean latitude  $9.0 \pm 0.25^{\circ}$  N. A small day to day shift in the position of the axis is observed.

The range of the horizontal component is very large close to the magnetic equator. It is larger on the average during the spring equinoxes. The relationship between the Sq current system and the electrojet is found not to be a simple one.

Estimated value of the electrojet width ranges from 8-10°. A specific value for the width cannot be quoted since in this study the station coverage varies for the different sets of days.

The current flow pattern was observed by studying the variation of declination. It is found that the northern vortex penetrates well into the southern hemisphere in the June solstice while the southern vortex penetrates as far north as the magnetic equator in the December solstice. The electrojet is thus at times part of only one or other of the current vortices and at other times has contributions from both vortices.

The coastal stations show an increased amplitude of the vertical component on a number of days. The "edge effect" is observed at stations close to the edge of the electrojet.