



Geomagnetic Variations over Africa and Their Technological Impacts in Benin: A Regional Perspective

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Abstract

Geomagnetic variations have been observed to influence technological systems in various regions of Africa, including Benin. In particular, these variations can affect navigation and communication technologies that rely on magnetic field data. The methodology involves a systematic review of published literature, including observational data from magnetometers and satellite observations. A quantitative analysis will be conducted using statistical models to evaluate the impact of geomagnetic variations on local technologies. Recent studies have identified significant fluctuations in the geomagnetic field direction over Benin, with changes exceeding $\pm 0.5^\circ$ in some regions during solar activity cycles. The review underscores the importance of understanding geomagnetic variability for ensuring reliable technological operations in remote areas of Africa. Future research should focus on developing more robust models to predict and mitigate geomagnetic-induced disruptions. Investigate the development of adaptive technologies that can automatically adjust to geomagnetic changes, thereby maintaining the accuracy of navigation systems and communication devices. The empirical specification follows $Y = \beta_{0+\beta} \vec{p} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geomagnetic Field Variations, African Magnetosphere, Solar Wind Influences, Ionospheric Perturbations, Techno-Social Dynamics, Space Weather Effects, Terrestrial Magnetism*

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