

Variability in Occurrence of Ionospheric Irregularities over Sub-Saharan Africa

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ABSTRACT

The equatorial and low latitude ionosphere is distinguished by the presence of the Equatorial Ionization Anomaly (EIA) making this region to be prone to series of ionospheric plasma irregularities that manifests in diverse ways depending on the type of measurement used. This research takes advantage of the available ground based GNSS data for the period of 2008, 2011 and 2014 to characterize the occurrence of ionospheric plasma irregularities over the EIA region of the Sub-Saharan Africa. Four stations: nklg (0.21°N, 9.40°E, modip: -26.37) in Gabon; bjco (6.23°N, 2.27°E, modip: -13.73), in Benin; in the west, mal2 (2.59°S, 40.11°E, modip: -23.50), Ethiopia; and adis (9.02°N, 38.46°E, modip: 1.73) Ethiopia, in the east were used in this research. Irregularities in the ionosphere have been studied using the rate of change of TEC (ROT) index ROTI, it was observed that ionospheric irregularities displays diurnal, monthly, yearly, solar cycle and geographical variability. The result showed that occurrence of ionospheric plasma irregularities extends from the hours of 1900 LT-0200 LT. Generally, irregularities occurrence were observed to be more frequent during the equinoxes and the least during solstices. Irregularities are also more prevalent under the crest of the EIA, during high solar activity and along the west of the African longitude. The findings of this work validate essentially the results of other authors that have used mainly other parameters to describe the behaviour of ionospheric irregularities

Keywords Equatorial Ionization Anomaly, equatorial ionosphere, Ionospheric irregularities, ROTI