Using GPS-SCINDA Observations to Study the Correlation Between Scintillation, Total Electron Content Enhancement and Depletions Over the Kenyan Region. (2012).

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Abstract

This paper presents the first results of total electron content (TEC) depletions and enhancement associated with ionospheric irregularities in the low latitude region over Kenya. At the low latitude ionosphere the diurnal behavior of scintillation is driven by the formation of large scale equatorial depletions which are formed by post-sunset plasma instabilities via the Rayleigh–Taylor instability near the magnetic equator. Data from the GPS scintillation receiver (GPS-SCINDA) located at the University of Nairobi (36.8°E, 1.27°S) for March 2011 was used in this study. The TEC depletions have been detected from satellite passes along the line of sight of the signal and the detected depletions have good correspondence with the occurrence of scintillation patches. TEC enhancement has been observed and is not correlated with increases in S4 index and consecutive enhancements and depletions in TEC have also been observed which results into scintillation patches related to TEC depletions. The TEC depletions have been interpreted as plasma irregularities and inhomogeneities in the F region caused by plasma instabilities, while TEC enhancement have been interpreted as the manifestation of plasma density enhancements mainly associated with the equatorial ionization anomaly crest over this region. Occurrence of scintillation does happen at and around the ionization anomaly crest over Kenyan region. The presence of high ambient electron densities and large electron density gradients associated with small scale irregularities in the ionization anomaly regions have been linked to the occurrence of scintillation.

Keywords: Ionization anomaly crest; Ionospheric irregularities; Scintillation; TEC enhancement; TEC depletions

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