

A study of intense ionospheric scintillation observed during a quietday in the East African low-latitude region

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Abstract

Ionospheric plasma density irregularities are a common feature of the equatorial and low-latitude ionosphere. These irregularities are known to cause fading and phase fluctuation (scintillation) of L-band radio navigation signals such as those used by Global Navigation Satellite Systems. This study investigates the occurrence of intense ionospheric scintillation in the postsunset period during a geomagnetically quiet day on 8 April 2011. In particular, we use Global Positioning System (GPS) derived observations, i.e., total electron content (TEC) and amplitude scintillation intensity index, S₄, to examine the occurrence of intense scintillations at two low-latitude stations in the East African sector, a region with limited studies. Deep TEC depletions, in some cases roughly 40 TECU, are observed consistently with the occurrence of intense scintillations. In addition, we compare the GPS-based observations to the Communication/Navigation Outage Forecasting System (C/NOFS) satellite plasma data. The intense scintillation events also correspond well with plasma depletion structures present on the C/NOFS observations and can be attributed to strong plasma bubble activity. The C/NOFS data also provide evidence of strong upward drift velocities (> 60 m/s) associated with the depletions, which may have contributed to the generation of the strong irregularities.