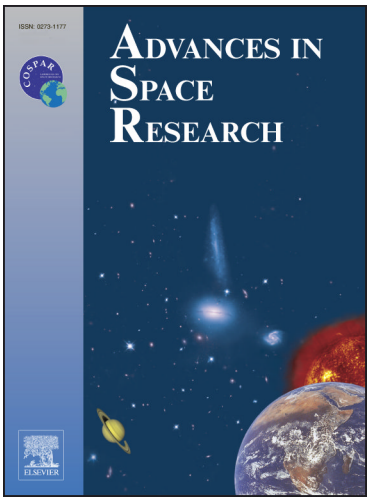

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Equatorial ionospheric disturbances over the East African sector during the 2015 St. Patrick's Day storm

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Abstract

During solar cycle 24, the St. Patrick's Day storm on 17 March, 2015 was one of the most severe geomagnetic storms. Several research investigations have been done and are still ongoing about this storm since the dynamics of this storm differs on a global scale from one sector to another. This study examines the response of the equatorial ionosphere to the storm in the East African sector. Total electron content (TEC) data from ground stations are used to investigate the evolution of the Equatorial Ionization Anomaly (EIA) during the storm. The TEC observations show a reduced EIA during 18-20 March 2015, consistent with previous studies at other longitudes. Analyses of ground magnetometer data and the thermospheric composition data from the NASA/TIMED satellite reveal that the reduced EIA during the storm can arise from the combined effect of the disturbance dynamo and composition change.

1.0 Introduction

The equatorial and low latitude ionosphere is characterized by the existence of the daytime Equatorial Ionization Anomaly (EIA) and post-sunset formation of equatorial plasma bubbles. The EIA is produced by the equatorial ionospheric fountain effect at the dip equator which is formed by daytime eastward electric fields [Appleton, 1946; Rishbeth, 2000]. The eastward electric fields together with the almost horizontal north-ward directed B-field produce an upward