SAIP2023



Contribution ID: 91

Type: Oral Presentation

A study of EIA behavior during geomagnetic storms

Tuesday, 4 July 2023 14:40 (20 minutes)

This research study investigates the behavior of equatorial ionization anomaly (EIA) during geomagnetic storms over the African sector (40° S – 50° N and 20° E - 40° E) using a global navigation satellite systems (GNSS) derived total electron content (TEC) within the period of 2008 to 2013. To identify the geomagnetic storms, the criteria of the disturbance storm time, Dst \leq -30 nT, and the planetary K Kp \geq 4 indices are used in the study. To establish the behavior of EIA, the two - dimensional maps of TEC derived from GNSS data are generated during geomagnetic storm periods.

This study also focuses on investigating the role of electrodynamics (vertical E × B drift magnitude) in EIA's variability especially its expansion beyond the crest of about \pm 15° towards mid-latitudes during geomagnetic storms. Due to the absence of observed vertical E × B drift data over the longitude sector of interest, we have utilized the equatorial electrojet (EEJ) from ground-based observations based on the well-established differential magnetometer approach. The differential magnetometer approach is used to derive the difference in changes in the horizontal component of the Earth's magnetic field (Δ H) using a magnetometer located at the equator and another one approximately 6° to 9° away from the equator. Specifically for this study, Δ H is derived from a pair of magnetometers at Addis Ababa (0.18°N, 110.47°E, geomagnetic) and Adigrat (6.0°N, 111.06°E, geomagnetic) in Ethiopia.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award; (Hons, MSc, PhD, N/A)?

PhD

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Session Classification: Astrophysics & Space Science

Track Classification: Track D2 - Space Science