RESPONSE OF THE SOUTH AMERICAN EQUATORIAL IONIZATION ANOMALY TO AN INTENSE GEOMAGNETIC STORM

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Abstract

The study of the equatorial ionization anomaly (EIA) over the South American sector during the geomagnetic storm that occurred on 21 June 2015 (during the peak of the solar cycle 24) is made. For that, we considered the stations Boa Vista (2.8^0 N; 60.7^0 W) and Tucuman (26.8^0 S; 65.2^0 W), located approximately below the Northern and Southern crests of the EIA respectively, and Jicamarca (12.0^0 S; 65.2^0 W), located near the geomagnetic equator. Also, it is performed a longitudinal analysis of the ionospheric behavior over stations located near the magnetic equator. We considered the ionospheric station Fortaleza (3.7^0 S; 38.5^0 W), which is located near the equator geomagnetic about 30 degrees in longitude from Jicamarca. We considered Total electron content (TEC) data derived from ionosonde at Jicamarca, Boa Vista and Fortaleza, and from a GPS receiver at Tucuman. The main phase remained among 1645 UT on 21 June and 05 UT on 23 June, when Dst reached the minimum value – 204 nT, after which started a slow recovery. The results show a clear increase of TEC with respect to quiet conditions at the beginning of the main phase over Tucuman only. Decreases in TEC can be seen over Tucuman and Jicamarca during the development of the main phase and no significant changes occurred over Boa Vista, which evidently indicates a significant asymmetry of the electron density around the peaks of the EIA. During the first day of the recovery, on 23 June, significant decreases in TEC were observed over the three stations. These decreases were possibly produced by composition changes (decreases in the O/N2 ratio). Longitudinally, in association with the decrease in TEC over Jicamarca during the main phase (12 UT- 16 UT on 22 June), TEC data over Fortaleza presented almost no changes from the quiet conditions. On 23 June Fortaleza also presented a decrease in TEC, which was of minor amplitude than over Jicamarca.

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