Ionospheric Scale Index Map Based on TEC Data during Magnetic Storm and EPBs

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Abstract:

This study examines the variability of the ionospheric content during the period around the Saint Patrick magnetic storm and when Equatorial Plasma Bubble (EPB) are observed during quiet time over South America. It uses the ionospheric scales index map based on the Disturbance Ionospheric indeX (DIX), as proposed by Denardini et al. (2020a). The results are compared to the traces of the ionograms obtained at three different ionospheric stations (Fortaleza, Campo Grande, and Cachoeira Paulista) in Brazil acquired in the same period and at the same time rate. The index is based on the TEC Map developed at the "Brazilian Studies and Monitoring of Space Weather" (Embrace/INPE). It covers the whole South America (latitudes from 20°N to 60°S and longitudes from 90°W to 30°W) with 0.5x0.5 degrees resolution cells (60x60 km2). Among the results, the DIX Map revealed some patches of "Disturbed" and "Weakly Disturbed" ionospheric conditions during the magnetically quiet time prior to the storm, which were associated with range and frequency Spread-F over the same area as observed in ionograms. Also, the information from the southern portion of the dip equator showed a transition from occurrences of Spread-F prior to sunrise to a condition favorable enough to develop a F3 layer after sunrise, as presented by Denardini et al. (2020b).

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