

Response of nighttime equatorial and low latitude F-region to the geomagnetic storm of August 18, 2003, in the Brazilian sector

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This paper presents an investigation of geomagnetic storm effects in the equatorial and low latitude F-region in the Brazilian sector during the intense geomagnetic storm on 18 August 2003 (SSC 14:21 UT on 17/08; $\Sigma Kp=52+$; $A_p=108$; $|Dst|_{max}=168$ at 1600 UT on 18/08). Simultaneous ionospheric sounding measurements from two stations, viz., Palmas (10.2°S, 48.2°W; dip latitude 5.7°S) and São José dos Campos (23.2°S, 45.9°W; dip latitude 17.6°S), Brazil, are presented for the nights of 16-17, 17-18, 18-19, 19-20 August 2003 (quiet, disturbed and recovery phases). Both stations are equipped with the Canadian Advanced Digital Ionosonde (CADI). Quiet and disturbed conditions of the F-region ionosphere are compared using data collected from the two stations. The relationship between magnetospheric disturbance and low-latitude ionospheric dynamics and generation of ionospheric irregularities will be discussed. The GPS data available from several stations in “Rede Brasileira de Monitoramento Contínuo de GPS (Brazilian Network for Continuous GPS Monitoring)” are used to obtain the vertical total electron content (VTEC) and the rate of change of TEC per minute on UT days 18 and 19 August 2003. During the disturbed nights the low latitude station S. J. Campos showed strong positive phase, whereas the near equatorial station Palmas showed strong uplifting of the F-layer. Normally during the winter months (May to August) in the Brazilian sector, large-scale ionospheric irregularities in form of plasma bubbles are rarely observed. On the night of 18-19 August 2003, plasma bubbles were observed as the storm recovery phase started. Several global ionospheric TEC maps from the worldwide network of GPS receivers are presented, showing widespread longitudinal TEC changes during the different phases of the storm.