Ionospheric response, over the Brazilian sector, to the geomagnetic storms of 15 and 16 April 2025

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Abstract

Two successive geomagnetic storms of weak (Dstmin = -33 nT) and strong (Dstmin = -138 nT) intensities occurred on 15 and 16 April 2025. The main purpose of this study is to investigate the ionospheric F-region responses induced by these geomagnetic storms over the Brazilian stations. Global Navigation Satellite System (GNSS) from different receiving positions in the equatorial and low latitude have been used to calculate the Vertical Total Electron Content (VTEC) and phase fluctuations. In addition, the digisonde data of height (F-layer virtual height, h'F, and peak height of the F-region, hmF2) and frequency (F-layer critical frequency, foF2) from the equatorial sector of Belém (1.4ºS, 48.5ºW) and the low latitude of Cachoeira Paulista (22.7ºS, 45ºW) are also analyzed. Furthermore, the nighttime OI 135.6 nm emissions measured by Global-scale Observation of the Limb and Disk (GOLD) have been utilized in this study. The results reveal anomalous ionospheric F-region responses to these storms, including (a) both positive and negative ionospheric storms, and (b) the formation of plasma bubbles. Additional notable features observed will also be presented and discussed in the conference.