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Hemispheric asymmetries in the ionosphere response observed during the high-speed solar wind streams of the 24-28 August 2010

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ABSTRACT

This paper presents the geomagnetic and ionospheric responses to a high speed solar wind stream (HSS) impacting the magnetosphere on 24 August 2010. We focus our study on the interhemispheric conjugated behavior. The solar wind speed remained very high during 5 days from 24 to 28 August 2010. By using magnetometer and ground-based GPS data from various approximately conjugated magnetic observatories and GPS stations, we studied the hemispheric asymmetries in the magnetic signature, Vertical Total Electron Content (VTEC) and scintillation activity during this HSS event. Geomagnetic activity reveals larger disturbances in amplitude in the Northern Hemisphere (NH) than in the southern Hemisphere (SH), and stronger asymmetries at higher latitudes, than at lower latitudes, between the conjugate observatories. VTEC variations reveal large increases in amplitude in the NH; while these effects are less pronounced in the SH. We investigate also the GPS scintillation activities occurring in the conjugated polar regions under HSSs conditions. At auroral latitudes, our results show a good correlation between the rate of VTEC index (ROTI) and auroral Al index, with more intense phase fluctuations in the NH.

Keywords: hemispheric asymmetries, High speed solar wind, Ionosphere, ground magnetic variations, VTEC

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