STUDY OF IONOSPHERIC DISTURBANCES PRODUCED BY SOLAR WIND VARIATIONS IMPLEMENTING GNSS OBSERVATIONS (VTEC)

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Abstract:

The solar wind includes the interplanetary magnetic field (IMF) and plasma particle flow. It has an important influence on magnetospheric convection. The IMF and solar wind dynamic pressures (PSW) variations can change the magnetospheric electric field. Therefore, the mid-latitude and low-latitude ionosphere could be affected by the penetration process. Huang et al. (2002) analyzed quasiperiodic ionospheric disturbances using Millstone Hill radar measurements, they proposed that the penetration of magnetospheric electric fields produces electron density variations. We study the behavior of the ionosphere during two oscillatory transient events. In the first event, the IMF oscillates between southward and northward with 2 hours period and presents a stable dynamic solar wind pressure (PSW). The second event has a PSW that oscillates with a period of 1 hour, and the IMF remained northward and stable. In our work, we will use observations from the incoherent radars: Millstone Hill, Sondrestrom, and Irkutsk, and vertical total electronic content (VTEC) obtained from GNSS measurements.

Our preliminary results show that both events trigger quasiperiodic variations in VTEC at permanent stations near Millstone Hill. Therefore, ionospheric disturbances obtained are very similar to those obtained by radar measurements. In this context, the global coverage of GNSS observations will allow us to analyze the extent of the penetration of magnetospheric electric fields at different longitudes and latitudes, calculating the VTEC in permanent geodetic stations distributed globally.

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