The unusual backward behavior of the ionospheric irregularity velocities over Cachoeira Paulista – Brazil

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Abstract

The ionosphere over Brazilian sector presents peculiar features due to several factors, among them, the geomagnetic characteristics, action of neutral winds, disturbance dynamos, and the occurrence of Equatorial Plasma Bubbles (EPB). These EPBs are large structures of depleted plasma which decay into successive smaller ones under a cascade process, giving rise to Fresnel structures of the 100-300 m order. Such structures impose scintillations on the satellite signals, degrading the information contained within them, and, in most intense events, the loss of lock of the satellite, when the power on the receiver is too low. The present study intends to analyze the drift of the Fresnel structures over Cachoeira Paulista station with emphasis on the geomagnetic westward velocity observation, once the usual direction is the eastward (geomagnetic) one. The period of study comprises the October 2023 – March 2024 interval, and it is present two possible explanations for the observed phenomenon.