TEC, L-BAND SCINTILLATION AND ZONAL PLASMA DRIFTS MEASURED BY THE BRAZILIAN GPS RECEIVER NETWORK

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In the present days, a chain of 32 Global Positioning System (GPS) receivers operates in the Brazilian territory. Since September 1997, in a collaborative project involving the Aeronomy group from National Institute for Space Research (INPE) and the Space Plasma Physics group from Cornell University, a network of twelve single-frequency GPS receivers was established for the purpose of monitoring night-time amplitude scintillations at the L1 frequency (1.575 GHz). Also, a network of twenty dual-frequency GPS receivers operated by the Brazilian Institute for Geography and Statistic (IBGE) has been used for total electron content (TEC) measurements. The scintillation monitors (SCINTMON) developed by Cornell University have been in routine operation and have provided an excellent database used as a tool for ionospheric studies, such as, the latitudinal-longitudinal morphology of ionospheric irregularities, their changes and responses due to geomagnetic disturbances and, dynamics of equatorial and low-latitude F region irregularity zonal drifts. The dual-frequency GPS receivers have been used to generate storm time maps of total electron content dynamics. The signatures of ionospheric F region irregularities on TEC measurements and GPS performance degradation investigations have also been performed in the Brazilian region. In this work, the GPS TEC and scintillation receivers network will be described, and some relevant observational results for the past seven years (1998-2005) of operation will be present and discussed. The long-term intention with respect to the scintillation, TEC and ionospheric drifts observations is to characterize its statistical properties, temporal dependence, dynamics and its effects on GPS link performance within the Brazilian longitude sector. It will allow the developing of scintillation models to provide a prediction of scintillation activity and to quantify the potential for navigational degradation, especially during periods of elevated solar activity and geomagnetically disturbed conditions.

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