

Nighttime thermospheric-ionospheric coupling during geomagnetic storms

Fagundes P.R.(1), Muella, M.T.A.H.(2), Bittencourt J.A.(2), Sahai Y.(1), Lima W.L.C.(3), Becker-Guedes F.(1), Pillat V.G.(1)

(1) Universidade do Vale do Paraíba (UNIVAP), São José dos Campos, SP, Brazil. (2) Instituto Nacional de Pesquisas Espaciais (INPE), São José dos Campos, SP, Brazil. (3) Centro Universitário Luterano de Palmas (CEULP), Universidade Luterana do Brasil (ULBRA), Palmas, TO, Brazil.

The electrodynamics of the ionosphere in the tropical region presents various scientific aspects, which remain subject of intensive investigations and debates by the scientific community. During the year 2002, in a joint project between Universidade do Vale do Paraíba (UNIVAP) and Universidade Luterana do Brasil (ULBRA), a chain of three Canadian Digital Ionosondes (CADIs) was established nearly along the geomagnetic meridian direction, for tropical ionospheric studies, such as, the generation and dynamics of ionospheric irregularities, changes and response due to geomagnetic disturbances and thermosphere-ionosphere coupling, in the Brazilian sector. The locations of the three ionosonde stations are São José dos Campos (23.2° S, 45.9° W, dip latitude 17.6° S - under the Equatorial Ionospheric Anomaly), Palmas (10.2° S, 48.2° W, dip latitude 5.5° S - near the magnetic equator) and Manaus (2.9° S, 60.0° W, dip latitude 6.4° N - near the magnetic equator). It should be pointed out that Palmas and Manaus are located on opposite side of the magnetic equator but both are south of the geographic equator. The three CADIs work in time-synchronized mode and obtain ionograms every 5 minutes. This unique configuration of the ionospheric sounding stations allowed us to study the F-region dynamics during disturbed periods in the months of August and September 2002. Then an extension of the servo model was used to infer the magnetic meridional component of the thermospheric neutral winds over the low latitude station. The coefficients of diffusion, recombination and loss rate, required in the servo equations, were calculated using an appropriated atmospheric model (MSIS-90). In this paper we show that the ionospheric parameters h/F , h_pF_2 , F_oF_2 and the inferred meridional wind are strong affected by the geomagnetic storms.