Ionospheric studies using a low-latitude ionospheric model (LION-model) and ground-based ionosonde observations.

Pillat, V.G.(1), Bittencourt, J.A.(2) and Fagundes, P.R.(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 (fagundes@univap.br)

Ionospheric observations made with ionosondes of the type CADI, at São José dos Campos (23.2^{o}S, 45.9^{o}W; dip latitude 17.6^{o}S) and at Palmas (10.2^{o}S, 48.2^{o}W; dip latitude 5.7^{o}S), Brazil, under conditions of high and low solar activity, are presented and compared with ionospheric results obtained from a realistic fully time-dependent Low-Latitude Ionosphere Model, denominated LION model, which simulates the dynamic behavior of the low-latitude ionosphere. In the LION model, the time evolution and spatial distribution of the ionospheric particle densities and velocities are computed by numerically solving the time-dependent, coupled, nonlinear system of continuity and momentum equations for the ions O^+, O_2^+, NO^+, N_2^+ and N^+, taking into account photoionization of the atmospheric species by the solar extreme ultraviolet radiation, chemical and ionic production and loss reactions, and plasma transport processes, including the ionospheric effects of thermospheric neutral winds, plasma diffusion and electromagnetic **E x B** plasma drift. The Earth's magnetic field is represented by a tilted centered magnetic dipole. This set of coupled nonlinear equations is solved along a given magnetic field line in a frame of reference moving vertically, in the magnetic meridian plane, with the electromagnetic plasma drift velocity. The model results reproduce adequately the main characteristics and dynamic behavior of the low-latitude ionosphere under quiet magnetic conditions, for high and low solar activity. Details of the comparison of the ionospheric observations, with the model results, are presented and discussed.