Relevant aspects of thermospheric dark band structures observed by ground-based optical and radio techniques over the Brazilian low-latitude sector under different solar activity conditions

A.A. Pimenta[1], C.M.N. Candido[1], D.C.M. Amorim[1], Y. Sahai[1,2], J.A. Bittencourt[1], P.R. Fagundes[2], and Gobbi[1]

1: Instituto Nacional de Pesquisas Espaciais (INPE), Sao Jose dos Campos, SP, Brazil
2: Universidade do Vale do Paraíba (Univap), São Jose dos Campos, SP, Brazil

Using ground-based measurements we investigate the occurrence of dark band structures in the OI 630 nm nightglow emission all-sky images in the Brazilian low latitudes region during the periods from January 1990 to December 1990 and from January 2000 to December 2000 (high solar activity period; average 10.7 cm solar cycle flux $>180x10^{-22}Wm^{-2}Hz^{-1}$), January 1995 to December 1996 (low solar activity period; average 10.7cm solar cycle flux $<90x10^{-22}Wm^{-2}Hz^{-1}$) and from January 1997 to December 1999 (ascending solar activity period; average 10.7 cm solar cycle flux from $130x10^{-22}Wm^{-2}Hz^{-1}$ to $170x10^{-22}Wm^{-2}Hz^{-1}$). The OI 630 nm images obtained during these periods show thermospheric Dark Band Structures (DBS) in low latitudes region propagating from southeast to northwest. These dark patches moved with average speed of about 80-250 m/s at an altitude of 220-300 km, which is the typical altitude range of the OI 630.0 nm airglow emission. Also, digisonde observations registered abrupt increases in both the F-layer peak height (h_mF_2) and base height (h'F) when the low intensity band passed over Cachoeira Paulista. During the period studied a strong solar cycle and seasonal variations were noticed in the DBS. Only during low solar activity period (LSA) and ascending solar activity period (ASA) the DBS occurrences were observed in the OI630 nm nightglow emission all-sky images. It should be pointed out that these thermospheric/ionospheric events are not related to geomagnetic disturbed conditions. In this paper we present important features from these set of observations in the nighttime thermosphere/ionosphere under different solar activity conditions. A possible mechanism for generation of these dark band structures is presented.

Using the JULIA dataset to find evidence of preconditioning of ESF in bottom-type layers

H. Pinedo[1], J. L. Chau[1], and D. Hysell[2]

1: Radio Observatorio de Jicamarca, IGP, PERU (hpinedo@jro.igp.gob.pe)
2: Department of Earth and Atmospheric Sciences, Cornell University, USA

Recently Hysell et al. [2005] suggested that the periodic structuring observed in the bottom-type scattering layers might be used to forecast full-blown equatorial spread F (ESF). The seed or precursor waves may be generated by collisional shear instability. Preliminary observations at Jicamarca and ALTAIR have shown that such structures present wavelengths of the order of tens or hundreds of kilometers. At Jicamarca periodic structures have been observed using in-beam radar imaging techniques, however such observations are limited to few days during the last five years. However, the JULIA system at Jicamarca has been doing observations since 1996, using interferometry and dual-beam configurations with very narrow beams. The JULIA dataset is approximately 100 days per year on average. The bottom-type irregularities drift has a relatively constant speed in the westward direction; given that the JULIA beams