

Observation of ionospheric plasma bubble over the Brazilian equatorial region during the solar cycle 24

Agyei-Yeboah, E. [1]; Paulino, I. [1]; Medeiros, A. F. [1]; Buriti, R. A. [1]; Campos, J. A. V. [1]; Takahashi, H.[2]

[1] Universidade Federal de Campina Grande,

R. Aprígio Veloso, 882 – Universitário, Campina Grande, PB - CEP: 58429-900;

[2] Instituto Nacional de Pesquisas Espaciais,

Av. dos Astronautas, 1.758 - Jardim da Granja, São José dos Campos - CEP: 97105-970.

Observations of OI 630.0 nm (OI6300) nightglow emissions were carried out over a period of almost 11 years, spanning September 2000 to December 2010 at São Joao do Cariri (7.4°S; 36.5°W), Brazil using an all-sky imager (ASI) in order to observe equatorial plasma bubble (EPB) in the bottom side of ionospheric F region. In total, there were 1107 nights of observation, and out of these, about 648, representing 58.5%, showed the occurrence of EPBs. Certain characteristics such as onset, disappearance and other visible characteristics of plasma bubbles, such as bifurcation, multiple and single were observed in the monochromatic OI6300 airglow images. The large size of the database made it possible to analyze these characteristics during almost an entire solar cycle period. It showed from the analysis that the months September to April (spring-summer) had the highest occurrence rate of 69.3% and the least occurrence rate of 30.6% was from May to August (winter). The characteristics, except for single, mentioned above have similar seasonal patterns. However, for the months of May, June and July we observed no bifurcations. Single plasma bubbles were the least observed in the analysis and their occurrence is rather random (show no seasonal pattern) with the highest number of 3, occurring in May and 1 occurring in January, March and December for the 11 years of study. Many of the bubbles that occurred during the winter period started late in the evening as opposed to the spring and summer periods which started earlier in the evening. However, the occurrence rate is greater around period of high solar activity (2000-2005) (about 57.3%) compared to period of low solar activity (2006-2010) (42.7%) even though the seasonal variation is similar for those periods.