

The bottom-side F region irregularities observed from the São Luís radar

E. R. de Paula, E. Alam Kherani, M.A. Abdu, L. A. P. de Camargo
INPE-DAE Av. dos Astronautas 1758 12.227-010 São José dos Campos
São Paulo Brasil - Email: eurico@dae.inpe.br

The São Luís radar is the 30 MHz coherent scatter radar that consists of four zonally separated 4x4 Yaggi antenna arrays. It is located near the magnetic equator and covers the equator owing to its wide beam width. This radar is being employed to study the 5 meter equatorial ionospheric irregularities. The intensity, Doppler velocity and zonal velocity of ionospheric irregularities can be estimated in a fraction of second time interval.

The irregularities of different scale sizes ranging from hundred of kilometers to centimeters are often present during evening-nighttime in the F region and they are known as Equatorial Spread F (ESF). The presence of this phenomena poses serious threat to the radio wave transmission and navigation system. Most spectacular event in the ESF are the upwelling density depleted structures or bubble which can cover the whole F region from bottom-side to the 1500 km. They are the first to be generated and trigger the hierarchy of plasma instability process to generate the small meter scale. However, sometime the ESF is observed without the bubbles. The presence of meter scale irregularities without bubble is an enigma and needs intensive investigation. We present the 5 year statistics of such events from the São Luís radar. These events are characterized as a thin layer of 50-100 km vertical size located in the 300-400 km altitude region and lasted till mid-night. These events mainly occur during April-May months. The presence of such layer indicates that the meter size irregularities can be present in the medium without having bubble. Based on the recent numerical simulations, different possibilities are discussed to understand the formation of such layers and meter scale irregularities.