

Seasonal and solar flux dependence of pre and post-midnight equatorial plasma irregularities as studied using ground based radio experiments

S. Sripathi

Indian Institute of Geomagnetism, Plot-5, Sector-18, New Panvel, Navi Mumbai, India

Email of corresponding author: ssripathi.iig@gmail.com

Abstract.

The characteristics of quiet time equatorial plasma irregularities during pre and post-midnight sectors under different solar flux conditions and the role of Pre-Reversal Enhancement (PRE) on irregularity occurrence using chain of ionosondes and GPS receivers are investigated. The observations suggest that while stronger and longer duration of equatorial plasma irregularities occur in the post-sunset sector during equinoxes and winter, they occur mostly in the post-midnight sector during summer, while being weaker in strength and shorter in duration. Further, the post-sunset spread F occurs first at the equator followed by their occurrence at low latitudes during equinoxes and winter, while the post-midnight spread F during summer are found to be stronger and earlier at low latitudes followed by their occurrence at the equator. While plasma irregularities are observed by both the ionosondes and GPS receivers during both equinoxes and winter, it is observed mostly by the ionosondes during summer. The results further strengthen the view that while post-sunset spread F in equinoxes and winter are generated by the equatorial processes, post-midnight spread F in the summer may be linked to the non-equatorial processes. The results also re-emphasize the asymmetric distribution of plasma irregularities or scintillations during equinoxes wherein vernal (autumn) equinox shows more intense plasma irregularities than autumn (vernal) equinox during certain years. The role of evening vertical $E \times B$ drift, Integrated Pederson conductivity of the E and F region, gravity wave seeding and meridional neutral winds on the generation of plasma irregularities are investigated during few events.