Occurrence of ESF During Geomagnetically Disturbed Periods - Can It Be Predicted from EIA Parameters?

Mridula.N¹, Sudha Ravindran¹, Lijo Jose¹, Tarun Kumar Pant¹, Smitha.V.Thampi²

¹Space Physics Laboratory, Vikram Sarabhai Space Centre, Trivandrum - 695 022, Kerala, India. ²Research Institute for Sustainable Humanosphere, Kyoto University, Japan.

n_mridula@vssc.gov.in

The equatorial ionosphere and thermosphere constitute a coupled system, with its electro dynamical and plasma physical processes being responsible for a variety of ionospheric phenomenon peculiar to the equatorial region. The most important of these phenomena are: the Equatorial Electro Jet (EEJ), the Equatorial Ionization Anomaly (EIA), and the Equatorial Spread F (ESF). The ESF refers to the turbulent plasma density irregularities generated in night time ionosphere. Prediction of ESF is important because of the scintillations it produces in GPS signals and its effects on satellite based communication and navigation systems. The EIA strength and asymmetries are known to influence the development of ESF. The 'C parameter' based on EIA strength and asymmetry from CRABEX data was shown to be more than 90% successful in predicting the occurrence of ESF during quiet days. In the present study we have extended it to disturbed days to find out how the EIA parameters can be effectively used for predicting ESF during geomagnetically disturbed times. We have studied the effect of EIA parameters on ESF generation during the quiet and disturbed periods of April 2006 where four moderately disturbed periods with Dst index around -100nT was present. Under CAWSES campaign extensive data has been collected during this period using ground based and satellite based instruments like GPS and CRABEX receivers, magnetometers, ionosonde etc.We have used TEC measurements from GPS and CRABEX receivers along 77 degree east longitude chain. Results from this study will be presented.

Key words: EIA, ESF, EIA parameters.