Investigation of the relationship between equatorial electro-jet, pre-reversal enhancement and post-sunset equatorial spread-F

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http://wdc.nict.go.jp/IONO/index.html

Equatorial spread F (ESF) consists of various scale size of irregularities from the order of cm to km, so that it causes crucial errors for various communication and navigation systems. ESF results from non-linear evolution of gravitational Rayleigh-Taylor instability, it is then important to clarify the condition of the instability growth and seeding.

Recently, it is reported that the diurnal strength of the equatorial electro-jet (EEJ) correlates with the post sunset virtual height of the bottom side F-layer (h'F) over the magnetic equator strongly affected by the pre-reversal enhancement (PRE) strength and the ESF onset. The relationship is worthy to be investigated in more detail for predictions of ESF onsets, because the diurnal EEJ can be observed prior to ESF onsets.

To investigate the relationship between EEJ, PRE and ESF, we analyzed ionograms, GPS-TEC data obtained at Chumphon (geographic latitude 10.7N, geographic longitude 99.4E, and magnetic latitude 3.2N), and magnetometer data at Phuket (8.1N, 98.3E, and 0.1N) and Kototabang (0.2, 100.3E and 10.1S). The analysis period is from November 2007 to October 2008. To derive the diurnal variation of EEJ, the difference between the H-components at PKT and KTB during the local time period from 21 LT to 03 LT was minimized, and then the H-component at KTB was subtracted from that at PKT. We excluded the days from analysis when the nocturnal H-component differs fairly for each other in spite of minimizing. The PRE strength was derived by analyzing h'F at 2.52 MHz on ionograms every 15 minutes during the local time period from 18 LT to 21 LT. ESF onsets were checked by analyzing both the ionograms and GPS-TEC data.

In this presentation, we discuss the preliminary analysis results.