

Correlation analysis between equatorial electrojet, pre-reversal enhancement and equatorial spread F in Southeast Asia

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At the equatorial latitudes, the reversal of dayside eastward electric field to westward around sunset is often accompanied by a strengthened eastward electric field. The strengthened eastward electric field is called as the pre-reversal enhancement (PRE). PRE is considered to be the primary process acting on the equatorial spread F (ESF) onsets. Relationships between PRE strength, ESF onsets, and equatorial electrojet (EEJ) strength have been investigated by using ionosonde observation and magnetometer observation. Uemoto et al. (2010) found that PRE strength and ESF onsets are suppressed when pre-sunset integrated EEJ from 2 hours to 1 hour prior to sunset is negative owing to the evening counter electrojet, by statistical analysis of observations in the Southeast Asia low-latitude ionospheric network (SEALION). Their analyzing period is from November 2007 to October 2008. The period is in solar minimum phase.

We use SEALION data from 2007 to 2013. Therefore, our analyzing period covers not only solar minimum phase but also solar maximum phase. Statistical analyses for each year are conducted. Further, detailed case study is conducted. Significant day-to-day variations of EEJ strength, PRE strength, and ESF onsets are picked up from these seven years data. Then, we investigate how and to what extent day-to-day variations of EEJ strength relate to the day-to-day variations of PRE strength and ESF onsets. The magnetometer data in our study were obtained at Phuket (geographic lat. 8.09N, geographic long. 98.32E, dip lat. -0.2) and Kototabang (0.20S, 100.32E, dip lat. -10.1). The ionosonde data in our study were obtained at Chumphon (10.72N, 99.37E, dip lat. 3.0), Chiang Mai (18.76N, 98.93E, dip lat. 12.7), and Kototabang (0.20S, 100.32E, dip lat. -10.1).

Reference

Uemoto J., T. Maruyama, S. Saito, M. Ishii, and R. Yoshimura, Relationships between pre-sunset electrojet strength, pre-reversal enhancement and equatorial spread-F onset, *Ann. Geophys.*, vol. 28, pp. 449-454, 2010.

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Keywords: electrojet, equatorial spread F, day-to-day variation, SEALION