

Suppression mechanisms of the pre-reversal enhancement related with the pre-sunset counter electrojet

Jyunpei Uemoto[1]; Takashi Maruyama[2]; Mamoru Ishii[2]; Susumu Saito[3]; Reiko Yoshimura[4]
[1] NICT; [2] NICT; [3] ENRI; [4] Kitasato U

At the equatorial latitudes, it is well known that the reversal of the dayside eastward electric field to westward around sunset is often accompanied by a strengthened eastward electric field called as the pre-reversal enhancement (PRE). A mechanism of PRE has been investigated with numerical techniques, and the F-region dynamo has been considered as the primary origin of PRE. However, detailed physical processes connecting the F-region dynamo and PRE appear to be complicated, and the day-to-day variability of PRE has been an open issue. Understanding the physical processes is important from the point of view of the space weather because PRE is considered to be the primary process acting on the equatorial spread-F onsets that causes severe disturbances for various satellite communication and navigation systems.

Analyzing magnetometer and ionosonde data in Southeast Asia during the period from November 2007 to October 2008, we found that both the height increases and ESF onsets were suppressed when the integrated electrojet (EEJ) ground strength was negative, namely, the counter electrojet (CEJ) developed for the period from 1 to 2 h prior to sunset. One of the possible explanations for the relationship can be considered as a connection through the modification of plasma density distribution in the equatorial F-region around sunset by the zonal electric field generated in the pre-sunset E-region dynamo. To verify the mechanism above, we analyzed ionosonde data obtained at Chiang Mai (18.8N, 98.9E; 13.1N magnetic latitude), Chumphon (10.7N, 99.4E; 3.3N magnetic latitude) and Kototabang (0.2S, 100.3E; 10.0S magnetic latitude), and compared them with the pre-sunset EEJ ground strength. All the measurements were obtained in the same meridional plane. In this presentation, we discuss the preliminary analysis results.