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# Study on latitudinal profile of TEC and its relationship with plasma irregularity occurrence over Southeast Asia

Michi Nishioka[1*], Yuichi Otsuka[1], Kazuo Shiokawa[1], Takuya Tsugawa[2], Patrick. A. Roddy[3]

[1]STEL, Nagoya University, [2]NICT, [3]Air Force Laboratory, MA, USA

Latitudinal profile of Total Electron Content (TEC) was investigated with ground-based GPS receiver network Southeast Asia. Development of Equatorial Ionization Anomaly (EIA) was compared with occurrence characteristics of plasma irregularity, which is observed with C/NOFS satellite. EIA, which appears around 10-15 geomagnetic latitude as the high plasma density area, is generated through the plasma fountain effect in the ionosphere caused by eastward electric field around the dip equator and diffusion of plasma along the geomagnetic field line. Since the eastward electric field is related to formation of plasma irregularity, plasma irregularity often appears when EIA is well-developed. During solar minimum period, many plasma irregularities have been observed around midnight in June solstice seasons. The occurrence characteristics of the plasma irregularity is different from that of plasma bubble. It has not been understood whether the midnight irregularity is related to plasma bubble or Traveling Ionospheric Disturbance (TID). In this study, we investigated relationship between EIA development and occurrence of the plasma irregularities. In Southeast Asia, several ground-based GPS receivers were operated by several institutes, such as Solar-Terrestrial Environment Laboratory (STEL), National Institute of Information and Communications Technology (NICT), and International GNSS Service (IGS). In order to clarify the latitudinal profile of Total Electron Content (TEC), data of ground-based GPS receivers around 100E meridian was used in this study; KUNM (IGS: 103E, 24N), CMU (NICT: 99E, 18N), CUSV (IGS: 101E, 13N), KMI (NICT: 101E, 13N), CPN(NICT: 99E, 10N), SAMP (IGS: 99E, 3N), NTUS (IGS: 104E, 1N), KTB2 (STEL: 100E, 0N), XMIS (IGS: 106E, 10S), COCO (IGS: 97E, 12S). It was found that EIA was more developed during equinoxes than during solstice seasons. Relationship between EIA development and plasma irregularity occurrence was studied for two sets of three consecutive days; 26-28 February and 4-6 June, 2010. For detection of the plasma irregularities, data of a Planar Langmuir Probe (PLP) on a low-inclination satellite, the C/NOFS satellite, was used. Plasma bubble was observed on 27 Feb while it was not observed on 26 and 28 Feb. Midnight irregularity was observed on 4 and 6 June while it was not observed on 5 June. EIA was more developed on 27 Feb. when plasma bubble was observed than on 26 and 28 Feb. when plasma bubble was not observed by the C/NOFS satellite. On the other hand, EIA was less developed on 4 and 6 June 2010 when midnight irregularity was observed than on 5 June when the midnight irregularity was not observed. It suggests the relationship between EIA and plasma irregularity occurrence was different between plasma bubble and midnight irregularity.

Keywords: Total Electron Content, latitudinal profile, Equatorial Ionization Anomaly, ionospheric irregularity, plasma bubble