

Daytime 150-km echoes observed with Equatorial Atmosphere Radar in Indonesia

Naruhito Mizutani[1]; Yuichi Otsuka[1]; Kazuo Shiokawa[1]; Tatsuhiro Yokoyama[2]; Mamoru Yamamoto[3]; Amit K. Patra[3]; Takashi Maruyama[4]; Mamoru Ishii[4]

[1] STELAB, Nagoya Univ.; [2] Cornell Univ.; [3] RISH, Kyoto Univ.; [4] NICT

Between 130 and 170 km altitude in the daytime equatorial ionosphere, the so-called 150-km FAIs (Field-Aligned Irregularities) have been observed since 1960's with several VHF radars [Basley, 1964], but generation mechanisms of the 150-km FAIs are still unknown.

We report statistical results of the 150-km FAIs observed with the Equatorial Atmosphere Radar (EAR) at Kototabang, Indonesia.

Since August 2007, 150-km FAI measurements have been carried out with the EAR for 5-10 days every month. By analyzing the 150-km FAIs observed with the EAR during a period from August 2007 to September 2008, we have revealed seasonal variation of the 150-km FAIs over Kototabang. We found that occurrence rate of the daytime 150-km FAIs over Kototabang exceeded 80% between a period from August 2007 to February 2008 and between a period from July to August 2008, but that the FAIs were hardly observed between March and June 2008. Such a distinct seasonal variation of the FAI occurrence rate can be seen at Pohnpei [Tsunoda and Ecklund, 2004]. However, maximum occurrence rate of the FAIs over Pohnpei is around the June solstice, and this feature is different from that over Kototabang. On the other hand, Patra and Rao [2006] have reported that occurrence rate of the FAIs at Gadanki, India do not show such a distinct seasonal variation. These results indicate that the 150-km FAIs strongly depend on the location.

We also found that altitude of the 150-km FAIs depended on season. Diurnal variation of the FAI altitude ranged from 145 to 160km in September 2007 and September 2008, and from 150 to 160km in October 2007. In November 2007 and February 2008, the altitude of the 150-km FAIs was invariant at 150-160km during the daytime. In this presentation, we discuss the seasonal variations of the 150-km FAI characteristics.

We investigated the Doppler velocity of 150-km FAIs on the southward beam whose direction is perpendicular to the geomagnetic field. The averaged Doppler velocity in August 2007 increased in the morning, reached a maximum(15m/s) around 12LT, and then decreased in the afternoon. The feature is consistent with the average F region vertical plasma drifts observed by the Jicamarca incoherent scatter radar [Fejer et. al., 1991].