

VHF Radar Observations of Field-Aligned Irregularities in Indonesia

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We report continuous observations of E- and F-region field-aligned irregularities (FAIs) over Indonesia. A VHF radar with operating frequency of 30.8 MHz and peak power of 20 kW has been operated at Kototabang (0.20°S, 100.32°E; dip latitude 10.4°S), Indonesia since February 2006. Five beams were allocated between ± 54 in azimuth around geographic south. We found that F-region FAIs appeared frequently at pre-midnight between March and May and at post-midnight between May and August. The pre-midnight FAIs coincided well with GPS scintillation observed at the same site. Seasonal and local time variations of the pre-midnight FAI occurrence are consistent with those of equatorial plasma bubbles reported in previous studies. These results indicate that the pre-midnight FAIs could be associated with the equatorial plasma bubbles. On the other hand, seasonal and local time variations of the post-midnight FAIs were inconsistent with those of the plasma bubbles. The features of the post-midnight FAIs can be summarized as follows: (1) The post-midnight FAIs are not accompanied by GPS scintillations. (2) Most of the post-midnight FAI regions do not show propagation, but some of them propagate westward. (3) Echo intensity of the post-midnight FAIs was weaker than that of the pre-midnight FAIs. These features are similar to those of the FAI echoes that have been observed at mid-latitude. We also investigate seasonal and local time variations of the E region FAIs. The results can be summarized as follows: (1) Signal-to-noise ratio is high at 07-12 and 18-24 LT. (2) Zonal drift velocity of the FAIs above 94 km (below 94 km) is westward (eastward) during daytime and eastward (westward) during nighttime.