

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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PEM032-12

Room:103

Time:May 26 17:15-17:30

VHF radar and ionosonde observations of post-midnight irregularities in Indonesia

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We have been operating a 30.8-MHz radar at Kototabang (0.2°S, 100.3°E; dip latitude 10.4°S), Indonesia since February 2006 to perform continuous observations of the E- and F-region field-aligned irregularities (FAIs) over Indonesia. From the continuous observation of the F-region FAIs from 2006 to 2011, we find that FAIs frequently occur at post-midnight between May and August under low solar activity periods. This seasonal and local time dependence of the FAI occurrence is not consistent with those of plasma bubbles occurring under high solar activity period.

At Kototabang, an ionosonde has been operated. We have compared spread F occurrence with the FAI occurrence and found that most of the post-midnight FAIs coincide with spread F. Furthermore, we have analyzed ionosonde data at Pontianak (0.0°S, 109.3°E), Indonesia on May and August 2009. Pontianak is located approximately 1,000 km east of Kototabang at the almost same latitude of Kototabang. At both Kototabang and Pontianak, spread F frequently occurs at around midnight. From comparison of the spread F occurrence between Kototabang and Pontianak, we find that most of spread F occur simultaneously at both sites, although spread-F occurs more frequently at Pontianak than Kototabang. This result indicates that the post-midnight ionospheric irregularities may be generated simultaneously in a wide area extending more than 1,000 km in zonal direction.

Keywords: equatorial ionosphere, FAI, spread F, ionospheric irregularity, radar