

A Comparative Study of Plasma Irregularities Development Between Ionosonde and Equatorial Atmosphere Radar

Dyah Martiningrum[1]; Mamoru Yamamoto[1]; Tatsuhiro Yokoyama[2]; Prayitno Abadi[3]
[1] RISH, Kyoto Univ.; [2] NICT; [3] ISEE, Nagoya Univ.

Under favourable conditions ionospheric plasma at the bottomside of the F-region can become unstable. Plasma irregularities in several scales produced by Rayleigh-Taylor Instability mechanism. The recombination process at the E-region after sunset causing the bottom side F-region electron density gradient become steep. At the same time the eastward electric field intensified just before it reverses to the westward electric field causing the peak of the F region rise known as evening prereversal enhancement. The relationship between onset time of field aligned irregularities related to ESF observed by Equatorial Atmosphere Radar during 2010-2012 with F layer height rise observed by ionosondes near geomagnetic equator, Chumphon (10.7 N; 99.4 E; 0.86 N) and Bac Lieu (9.3 N; 105.7 E; 0.62 N) is discussed in correspondence with growth rate of Rayleigh Taylor instability development. The field aligned irregularities onset time associated with equatorial spread F observed into two different cases, first case where the EPB/ESF onset time concurrent with the peak of virtual height of F region - ($h'F$) time. Second case where the EPB/ESF onset time happened with delay of more than 30 minutes, with reference to the peak of virtual height of F region - ($h'F$) time. Based on growth rate of Rayleigh Taylor instability formulation, furthermore we study development of plasma irregularities between ionosonde and Equatorial Atmosphere Radar.