

Relationship between Latitudinal Extension of Scintillation and Pre-reversal Enhancement in the Southeast Asian Region

ABADI, Prayitno^{1*} ; OTSUKA, Yuichi² ; HUSIN, Asnawi¹ ; JIYO, Jiyo¹ ; YAMAMOTO, Mamoru³ ; TSUDA, Toshitaka³

¹National Institute of Aeronautics and Space (LAPAN), ²STEL, Ngoya University, ³RISH, Kyoto University

We have investigated the relationship between the maximum latitude extension of observed scintillations (L_{max}) and the maximum altitude of the equatorial F-region bottomside ($h'F_{max}$), peak of eastward electric field (E_{max}), and time duration of eastward electric field (TE) during PRE period in the equatorial region. We used three GPS receivers installed in Kototabang (0.2S, 100.3E; 10.0N magnetic latitude), Pontianak (0.02S, 109.3E; 8.9S magnetic latitude), and Bandung (6.9S, 107.6E; 17.5S magnetic latitude), Indonesia for observing scintillation activity in period 18.00-22.00 LT (LT=UT+7h) and two frequency modulated-continues wave (FM-CW) ionosondes installed near equator magnetic, Chumphon (10.7N, 99.4E; 3.3N magnetic latitude), Thailand and Bac Lieu (9.3N, 105.7E; 1.7N magnetic latitude), Vietnam for measuring PRE parameters, such as $h'F$, vertical drift ($dh'F/dt$) which indicates eastward electric field, and TE. Our observation period is during equinox months (March, April, September, and October) in 2010, 2011, and 2012. We divide the relationships into two groups; 1) the relationships between PRE parameters obtained from Chumphon ionosonde and L_{max} observed by Kototabang and Bandung GPS receivers and 2) PRE parameters obtained from Bac Lieu ionosonde and L_{max} observed by Pontianak and Bandung GPS receivers. The following table is to show the coefficient correlation (R) of the relationships for each group. The results indicate that duration of eastward electric field does not play an important role for extension of the plasma bubble or latitudinal extension of scintillation, and that the peak of $h'F$ and magnitude of E at the initial phase of plasma bubble generation (PRE period) is a primary factor for the plasma bubble extension. Therefore, the maximum latitude of scintillation is determined at the initial phase of plasma bubble generation (PRE period) in the equatorial region.

Relationship	R (group 1)	R (group 2)
--------------	-------------	-------------

$h'F_{max}$ vs L_{max}	0.596	0.471
--------------------------	-------	-------

E_{max} vs L_{max}	0.489	0.270
------------------------	-------	-------

TE vs L_{max}	0.054	0.090
-----------------	-------	-------

Keywords: Ionosphere, Scintillation, Pre-reversal enhancement