

Day-to-day variation of pre-reversal enhancement in the equatorial ionosphere based on GAIA model

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Plasma bubble is a localized plasma density depletion occurring at magnetic equator through the Rayleigh-Taylor instability. Eastward electric field plays an important role for the Rayleigh-Taylor instability, so that the plasma bubbles tend to occur more frequently when Pre-Reversal Enhancement (PRE) of the eastward electric field is intense. However, mechanisms for day-to-day variation of the PRE is not still unknown. Using Ground-to-Topside Model of Atmosphere and Ionosphere for Aeronomy (GAIA), we have aimed to find parameters which control day-to-day variation of PRE. With respect to the day-to-day variation, cross-correlation coefficients of PRE with zonal electric current density, electron density, and neutral winds between the E and F regions are investigated. We have found that the cross-correlation coefficient between PRE and eastward current density in the E and F regions are approximately 0.5 and 0.8, respectively. We have also found that the cross-correlation coefficient between PRE and eastward electric current density is largest at 17 LT (pre-sunset) than at other local time. This result suggests that the equatorial electro-jet at pre-sunset is closely related to development of PRE. This result is consistent with previous observation of equatorial electro-jet by Uemoto et al. (2010).

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