Relation between the sequential occurrence of plasma bubble and the pre-reversal enhancement of eastward electric field

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We analyze the 3-m ionospheric irregularities and the height variation of equatorial F-region observed by the Equatorial Atmosphere Radar (EAR) at Kototabang (100.3E, 0.2S, dip. Lat.: 10.1S) in Indonesia and ionosondes at Chumphon (99.3E, 10.7N, dip. Lat.: 3N) in Thailand and at Bac Lieu (105.7E, 9.3N, dip. Lat.; 1.5N) in Vietnam, respectively, during March-April from 2011 to 2014 to investigate the relation between the sequential occurrence of the equatorial plasma bubble (EPB) in the period of 19-22 LT and pre-reversal enhancement (PRE) of evening eastward electric field. Our initial findings can be summarized as follows: (1) the zonal spacing of two EPBs ranges from less than 100 km up to 1000 km with a maximum occurrence around 100-300 km, and this result is consistent with the previous study [e.g. Makela et al., 2010]; (2) the probability of the sequential occurrence of the EPB enhances with the increase of PRE strength; (3) the zonal spacing of the sequential occurrence of the EPB is less than 300 km for the weaker PRE (lower than 30 m/s), whereas the zonal spacing is more varied for the stronger PRE (higher than 30 m/s). We note that the PRE strength is an important factor for the sequential occurrence of the EPB. Though we also consider another factor, that is the zonal structure of seed perturbation, and the zonal spacing of the EPBs may fit with the wavelength of the zonal structure of seed perturbation. We particularly attribute the result (3) to the effects of PRE and seed perturbation on the sequential occurrence of the EPB, that is, we suggest that the weaker PRE could cause the sequential occurrence of the EPB when the zonal structure of seed perturbation has a shorter wavelength. For further investigation, we will analyze the zonal structure of seed perturbations using a network of GPS receivers in the western part of Southeast Asia. We will analyze the zonal wavy structure in the TEC as a manifestation of the seed perturbations.