

Neutral wind effects on equatorial plasma bubbles simulated by High-Resolution Bubble model

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Equatorial plasma bubble (EPB) is a well-known phenomenon in the equatorial ionospheric F region. As it causes severe scintillation in the amplitude and phase of radio signals, it is important to understand and forecast the occurrence of EPB from a space weather point of view. EPBs are generated in the bottomside of the F region, where the ionospheric plasma is strongly coupled with the thermospheric neutral wind. The ambient neutral wind controls F-region dynamo and prereversal enhancement of the vertical plasma drift in the dusk sector. A seeding of EPBs may be related with atmospheric gravity waves propagated from the lower atmosphere. The day-to-day variability of EPB occurrence, which is one of the most important topics in this field, may be explained by the variation of neutral wind. In order to simulate the instability in the equatorial ionosphere, a 3D high-resolution bubble (HIRB) model with a grid spacing of less than 1 km has been developed. Changing the neutral wind velocity in the model based on global atmospheric modeling and satellite observations, the neutral wind effects on the generation of EPBs can be evaluated. Simulation results of EPB generation under various neutral wind conditions and seeding factors will be discussed.

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