

## Relationship between mesospheric airglow disturbance and occurrence of equatorial plasma bubbles

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762 nm airglow data observed by Ionosphere, Mesosphere, upper Atmosphere and Plasmasphere mapping mission from the ISS / Visible and near Infrared Spectral Imager (ISS-IMAP/VISI) to investigate relationship between mesospheric gravity waves and the occurrence of Equatorial Plasma Bubbles (EPBs). EPBs are depletion of electron density in the equatorial ionosphere. According to the previous study EPBs can be generated through the Rayleigh-Taylor (R-T) instability in the ionosphere. Medium-scale gravity waves with horizontal scales of a few hundred kilometers in the bottom side of the F region have been frequently suggested to play a key role in EPBs seeding. Gravity wave occurrence may depend on seasonal and longitudinal variation and may have oscillation whose period is few days. This several days oscillation of gravity wave may affect the variation of EPBs occurrence that can not be explained only by the R-T growth rate. Previous research of concentric gravity waves (CGWs) using observed by ISS-IMAP/VISI shows more mesospheric CGW events occur in the west side of the African continent than the east side of the African continent. It indicates occurrence of CGWs is different between nearby areas. Objective of this study is to elucidate relationship between mesospheric gravity waves and longitudinal dependence of EPB occurrences. ISS-IMAP/VISI was operated for three years from September 2012 to August 2015. ISS-IMAP/VISI observed the airglow in the nadir direction on the nightside with two FOVs facing 45 degrees in the forward and backward of the orbital direction. We analyzed 762nm airglow data and compared with occurrence rate of EPBs and Growth rate of R-T instability. Occurrence rate of EPBs using Rate of TEC Index (ROTI) that is standard deviation of differential of GPS-TEC. Growth rate of R-T instability was calculated by using parameters from Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy (GAIA). In this study, we investigated relationship between occurrence of EPBs observed by GPS-TEC data, linear growth rate of the R-T instability in the ionosphere obtained with GAIA, and mesospheric gravity wave activities observed by ISS-IMAP/VISI.

Keywords: Equatorial Plasma Bubbles, Airglow