

630-nm airglow imaging observations of plasma bubbles from the International Space Station

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Under the Ionosphere, Mesosphere, upper Atmosphere, and Plasmasphere mapping (IMAP) mission, imaging observations of airglow in the upper atmosphere from International Space Station has been conducted with Visible and Infrared Spectral Imager (VISI) since October 2012. We have analyzed images of the 630.0-nm airglow obtained by the Visual and Infrared Spectral Imager. We have succeeded to detect equatorial anomaly, and plasma bubbles. In the 630-nm airglow image observed by IMAP/VISI on ISS passing over Thailand on October 28, 2012, airglow depletion elongated in the north-south direction was observed. Simultaneously, field-Aligned Irregularity (FAI) echo was observed by the EAR in Indonesia. In order to compare spatial structure of the airglow depletion and FAI, we have mapped the FAI echo region onto the northern hemisphere along the magnetic field lines. We have found that the FAI echo region coincides with the airglow depletion observed by IMAP/VISI, indicating the airglow depletion is caused by a plasma bubble. We have carried out statistical analysis of plasma bubble, and found that plasma bubble most frequently occurs in spring and autumn equinoxes at African longitudinal sector. We have also measured zonal spacing of plasma bubbles and found that the spacing depends on longitude, suggesting that atmospheric gravity waves may seed plasma bubbles.

Keywords: airglow, ionosphere, international space station, plasma bubble, IMAP, VISI