

Characteristics of airglow and aurora with a visible spectrometer ISS-IMAP/VISI

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The ISS-IMAP is a science mission which observes the thermosphere, ionosphere and plasmasphere from the international space station (ISS) at an altitude of 400 km. This was launched successfully on July 21, 2012 with HTV3 (Konotori), and installed on the exposed facility (EF) of the Japanese experiment module (JEM) of ISS. The ISS-IMAP/VISI is a visible imaging spectrometer which measures three nightglow emissions; O (630 nm, altitude 250 km), OH Meinel band (730 nm, altitude 87km), and O₂ (0-0) atmospheric band (762 nm, altitude 95 km) with the two field-of-views (+/-45 deg. to nadir) to make a stereoscopic measurement of the airglow and aurora to subtract background contaminations from clouds and ground structures. Each field-of-view is faced perpendicular to the orbital plane, and its width is about 550 km mapping to an altitude of 100 km. We will obtain a continuous line-scanning image for all emissions line from + 51 deg to -51 deg. in geographic latitude by the successive exposure cycle with a time interval of 1-several s.

After the successful launch on July 21, we carried out the initial check out of VISI on August 11-14, and confirmed its function working satisfactorily. We started nominal operation from the middle of October. Since then, VISI measures airglow and auroral emissions continuously in the nightside hemisphere on about 10 orbits every day. We found a number of events showing meso-scale (~50 km) wave pattern of airglow emission at O₂ 762 nm (~95 km alt.). In addition, in the equatorial anomaly region we often measured meso-scale dark filament pattern, i.e., plasma bubble, in the uniform O 630 emission. Further, during geomagnetically disturbed period we measured auroral emissions at O₂ 762 (~120 km alt.) and O 630 nm (~250 km alt.) at high-latitudes. In this presentation, we report the meso-scale properties and spatial characteristics of gravity waves, plasma bubbles and aurora obtained with VISI.

Keywords: IMAP, VISI, ISS, airglow, aurora