Current status of ISS-IMAP/VISI: the observation plan of visible airglow distributions in the wide-range

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The ISS-IMAP mission is a part of International Space Station (ISS) Japanese Experiment Module (JEM) 2nd stage plan, which will be launched in 2011/2012 at the present schedule. The mission purpose is to clarify the energy and physical transfer processes in the boundary region between earth's atmosphere and space. The visible imaging spectrometer instrument VISI on board ISS-IMAP will perform an image-scanning spectroscopic observation of following airglow 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). We have designed an extremely bright, wide-angle distortion-free optics as the objective lens of VISI (F/0.9, f=6.6 mm, 90 deg. field-of-view). To extract continuous background and airglow reflection at could top, VISI has a two-line slit at the first focal plane corresponding to +/-45 deg forward/backward field-of-views. This enables us to carry out the stereo measurement of airglow distribution by obtaining airglow spectra in the two directions. Then, we can distinguish airglow distributions from backgrounds according to the difference in those altitudes. Each slit has the rectangle-shape with a FOV of 90 deg. (perpendicular to an orbital plane) x 0.1 deg. (orbital plane), which corresponds to ˜550 km x 0.6 km mapping to an altitude of 100 km. The electrical-cooled 1k x 1k CCD is adopted as a detector, and the wavelength resolution and sensitivity at present design are 1 nm and 0.06 el/R/sec/pix (TBR), respectively. To gain SNR, an on-chip binning is performed according to the appropriate spatial scale of airglow structure. The exposure time is in the range from 1 to a few sec. From the simulation with realistic airglow structures, intensities, instrumental parameters including noises, it is found that we can obtain the airglow variations of O630, OH, and O2 satisfactorily even in the weak intensity cases at middle-latitudes. In this presentation, the current status of observation plan, instrumental design, and simulation results will be reported.