

Visible airglow observation by VISI on ISS-IMAP: Current status of development and simulation of airglow measurement

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We have been conducting the ISS-IMAP mission which is a part of International Space Station (ISS) Japanese Experiment Module (JEM) 2nd stage plan. This will be launched in 2011 or 2012, and perform measurements of thermosphere/mesosphere and plasmasphere by an optical remote-sensing in VIS-NIR and EUV ranges. The purpose of the mission 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 ISS-IMAP will make an imaging spectroscopic observation of airglows. The targets of airglow emissions are 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 adopt a bright (F/0.9), wide-angle (field-of-view 90 degrees) as the objective lens. To extract background ground and cloud albedo, airglow spectra in 45 deg forward and 45 deg backward directions are obtained using the two slits. Each slit corresponds to ~550 km x 6 km mapping to an altitude of 100 km. The phase velocity of airglow wave structure is also estimated from the difference between forward and backward data. The exposure time will be in the range from 1 - several sec depending on airglow intensity and a required spatial resolution. From the simulation of airglow observation, the variation of airglow pattern, that is, wave structure, can be measured for the three emissions by using a CCD binning method. For OH 730 nm and O₂ 762 nm airglows, the spatial resolution will be 15 km, and the estimated S/N are 4.4 and 2.1, respectively. For the variation of O 630 nm airglow, the spatial resolution will be 25 km with S/N of 1.9. In this presentation, the current status of instrumental development, observation plan, and simulation of airglow observations will be reported.