Ionospheric and plasmaspheric observation plan by an EUV imaging on the ISS-IMAP mission

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The ISS-IMAP (International Space Station - Ionosphere, Mesosphere, upper Atmosphere, and Plasmasphere mapping) mission starts as a part of ISS/JEM (Japanese Experiment Module) 2nd stage plan, and plans an imaging observation of the upper atmospheric region from the low earth orbit with a small package of instruments during the next solar maximum period. The airglow imaging observation on the ground base in the late 1990s revealed the structures and propagation characteristics of the atmospheric gravity waves in the mesosphere and the traveling structures of the ionized atmosphere in the ionosphere. However for the limitations of the ground-based observations, such as the numbers of the observational sites and the narrow field-of-view observation, the whole features of the characteristics cannot be detected. So the global imaging of the airglow from ISS/JEM is expected to provide the observational evidences that cannot be achieved by the ground-based observations. Two imagers for the ISS-IMAP mission obtain imageries of the airglow and the ionosphere/plasmasphere in the visible and extreme ultraviolet wavelength regions.

The EUVI (Extreme Ultra-Violet Imager) for the ISS-IMAP mission is now under development. The imager has two components. One observes resonantly-scatted light from He^+ ions (W/L 30.4 nm) and the other observes resonantly-scatted light from O^+ ions (W/L 83.4 nm) in the ionosphere and plasmasphere. The prime-focus method is adopted as the optics of both components. Each camera has a multi-layer coated mirror, a thin metal band-pass filter, and an MCPs detector with a Cesium Iodide (CsI) cathode. Both cameras require high sensitivity in order to archive high time resolution (1 minute for He^+ ions, 10 minutes for O^+ ions). The imagers look in the direction of the earth's limb and take images of the distribution of those ions in the ionosphere and plasmasphere over the limb. They can make long-term (more than half year) and steady observations of the vertical and horizontal structures of the ionosphere and plasmasphere by using EUV light. Thus two imagers for the ISS-IMAP mission will make up the interactions of the ionosphere/plasmasphere and the atmosphere/mesosphere. The current status of the instrumental design and development, and the observation plan will be reported and discussed.