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Space-borne imaging observation of the Earth's upper atmosphere

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Space-borne observation of the Earth's upper atmosphere has been planned for the global observation of the ionosphere, mesosphere, thermosphere and plasmasphere by a Japanese scientist group. An observation from the international space station will be carried out from 2012. The mission is called ISS-IMAP. It uses two imagers, visible-light and infrared spectrum imager (VISI) and extra ultraviolet imager (EUVI). VISI will observe the airglow of 730nm (OH, Alt. 85km), 762nm (O2, Alt 95km), 630nm(O, Alt.250km) in the Nadir direction. EUVI will measure the resonant scattering of 30.4nm [He+] and 83.4nm [O+]. Its field-of-view is 15 degrees, and points the limb of the Earth to observe the vertical distribution of the ions. The altitude and inclination angle of the Orbital plane of ISS is around 350km and 51 degrees, respectively. Therefore the target of ISS-IMAP is the phenomena in the low- and mid-latitude regions. Another plan of the space-borne imaging observation of the upper atmosphere is the observation using a small satellite in the geo-transfer orbit. It combines the in-situ measurement, such as the Langmuir probe, imaging instruments, such as VISI, EUVI and FUV imager, and a GNSS receiver. The observation of this small satellite can fill the gap of our knowledge, and integrate the fragmentized information of the Earth's upper atmospheres.

Keywords: small-satellite, ionosphere, mesosphere, plasmasphere, thermosphere, imager