

Disturbances in the Mesosphere and the Ionosphere Elucidated by Airglow Imaging Observation from the International Space Station

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Imaging observations of the airglow in the Mesosphere and the Ionosphere enable to capture two-dimensional structures of the disturbances in the Earth's upper atmosphere. Large number of ground-based all-sky imagers have been widely used, and a few space-borne imagers have been deployed in these decades. Space-borne imagers have an advantage to capture the airglow structures globally even over clouds that prevent optical measurement from ground. Visible-light and infrared spectrum imager (VISI) of Ionosphere, Mesosphere, upper Atmosphere, and Plasmasphere mapping (ISS-IMAP) mission was an airglow/aurora imager installed on the Exposed Facility of Japanese Experiment Module of the International Space Station. It carried out the mesospheric and ionospheric observations between 2012 and 2015 below about 55 degrees of the geographic latitude. It mainly observed the airglow from the molecular oxygen in 762nm wavelength and from the atomic oxygen in 630nm wavelength [Sakanoi et al., 2011]. The typical altitude of the 762nm emission layer is 95km altitude in the Mesosphere, and that of the 630nm emission layer is 250km altitude in the Ionosphere. ISS-IMAP/VISI revealed the occurrence of the concentric wave structures generated by atmospheric gravity waves in the Mesosphere [Akiya et al., 2014; Perwitasari et al., 2015; Perwitasari et al., 2016]. The high occurrence rate of the structures at midlatitudes was firstly revealed by these observations. The global distribution of the mesospheric bores that are generated by the temperature inversion layer on the top of the Mesosphere is also firstly elucidated by the VISI observation [Hozumi et al., 2018; Hozumi et al. 2019]. These structures in the Mesosphere are results of the vertical atmospheric coupling from the Troposphere to the Thermosphere. The ionospheric structures, plasma bubbles, on the bottom side of the F-region Ionosphere were investigated by Nakata et al. [2018]. The disturbances in the Mesosphere and the Ionosphere, and the coupling process to generate the disturbances will be discussed in the presentation.

References

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