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Analysis of the airglow structures using the simultaneous observations by ISS-IMAP and all-sky imagers

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The spatial structure of the atmospheric gravity waves in the mesosphere was analyzed using the simultaneous observational data of ISS-IMAP and the all-sky imager at Hawaii. There are a plenty of ground-based observations of the atmospheric gravity waves in the mesosphere and the thermosphere. The problem of the ground-based observation is that it cannot distinguish spatial variations from temporal variations for the structures whose scale size is larger than its field-of-view. ISS-IMAP was launched on July 21, 2012 to observe the atmospheric gravity waves whose scale size is larger than 100 km. The altitude of the International Space Station (ISS) flies around 400 km altitude, and its orbital inclination angle is 51.6 degrees. ISS-IMAP/VISI (Visible-light and infrared Spectrum Imager) observes the airglow in the mesosphere and the ionosphere. The spatial resolution of the VISI imaging observation is from 10 km to 25 km. The airglow wavelengths observed by VISI are 630 nm, 730 nm, and 762 nm and by the ground-based all-sky image of Hawaii (20.48 N, 156.2 W) are 630 nm and 557.7-nm with 5.5 minutes interval. The observational data of ISS-IMAP/VISI and an all-sky imager in Hawaii were investigated for the nights when VISI made the observation over Hawaii, and the sky over the imager was clear. The night when the plasma bubble was detected by the ground-based all-sky imager, the plasma bubble was detected by the 630nm airglow observation of ISS-IMAP/VISI. The spatial and vertical structures of the airglow that were observed by the ground-based imager and the ISS-IMAP/VISI were analyzed. The sensitivity of the observation of ISS-IMAP/VISI will also be discussed in the comparison of the ground-based observation.

Keywords: airglow, plasma bubble, ISS-IMAP