

Simultaneous Observation of the Atmospheric Gravity Waves in the MLT region by ISS-IMAP/VISI and All-sky Imagers

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The atmospheric gravity waves in the mesosphere and the lower thermosphere (MLT) observed by the simultaneous observation of the all-sky imager at Hawaii and ISS-IMAP/VISI (International Space Station ? Ionosphere, Mesosphere upper Atmosphere, and Plasmasphere/ Visible-light and infrared spectrum imager) were analyzed at first time. There are plenty of previous studies of ground-based observations to observe the atmospheric gravity waves (AGWs) whose wavelengths are 20-100 km in the MLT region. In this study, the simultaneous observational data, which are the 557.7 nm airglow observed by the all-sky imager and the 762 nm airglow observed by VISI, were carried out to elucidate AGWs in the MLT region. There were 54 nights of available data of the simultaneous observation from March 14, 2013 to August 31, 2014. The all-sky imager can detect the waves whose horizontal wavelength is 20-200 km. VISI can detect the waves whose wavelength is 40-600 km. The atmospheric wave whose wavelength is 40-200 km can be observed by the both observations. The horizontal wavelength distribution of the atmospheric gravity waves was derived the statistical analysis. It was found that its occurrence rate maxima were 20-40 km and 200-600 km. Wave packets whose scale size is 1,000 to 2,000 km were observed by VISI. The wave packet that had 1,200 km scale size observed by VISI at around 0640 UT on December 25, 2013 was observed as waves of 20-40 km horizontal wavelength by the all-sky imager for 4 hours continuously without any attenuation. The waves observed in this event were interpreted to be transmitted in the duct propagation.

Keywords: ISS-IMAP/VISI, atmospheric gravity wave, all-sky imager, airglow