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Visualization of gravity wave hot spots at the upper mesosphere with airglow imaging observation by IMAP/VISI

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A global characteristic of gravity wave activity at the upper mesosphere is derived with airglow image data set of IMAP/VISI. Nadir-viewing imaging from satellites provides an excellent opportunity to study gravity waves in the upper atmosphere on a global scale. Compared to limb and occultation experiments, nadir-viewing instruments have good horizontal resolution and sensitivity to gravity waves with short horizontal wavelengths. The Atmospheric Infrared Sounder (AIRS) aboard the Aqua satellite and The Cloud Imaging and Particle Size (CIPS) instrument on the AIM satellite have revealed stratospheric gravity wave activity characteristics. In the mesosphere, however, the global characteristic of gravity wave activity is less studied based on nadir-viewing instruments compared to the stratosphere. In this study, mesospheric gravity waves are studied with a 3-year data-set (from 2013 to 2015) by the Visible and Near-Infrared Spectral Imager of the Ionosphere, Mesosphere, upper Atmosphere and Plasmasphere mapping mission (IMAP/VISI). Gravity waves are detected based on the O₂(0-0) atmospheric band (762 nm), the typical emission peak of which is around 95 km altitude. In the analysis, we focus on gravity wave peak events, in which the airglow variance exceeds a threshold. The occurrence frequency of the peak events is derived for each season, and the hotspots of gravity waves are located. The results show the hotspots of gravity waves over the Andes and North America, both are well-known hotspots reported by previous studies of stratospheric gravity waves.