

## O2 airglow concentric structure observed from International Space Station

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Visible and near-infrared spectral imager (VISI) for ISS-IMAP (the International Space Station - Ionosphere, Mesosphere, upper Atmosphere and Plasmasphere mapping) mission observes nighttime airglow emission from ISS. VISI observes the airglow in the nadir direction by two field-of-views (FOVs) which directs the forward and the backward to the ISS orbit. Some concentric structures which are difficult to observe the entire image by the ground-based imagers were detected from the space by VISI. Concentric structure in the 762-nm O<sub>2</sub> airglow emission observed on June 1, 2013 was analyzed in this study. Spatial scale of this concentric structure was determined to be 1,200 km from the center of the structure to its edge. Propagation velocity of the waves which spread radially from the center was derived as  $125 \pm 62$  m/s from the difference between the images taken by two FOVs of VISI. Duration time of the concentric structure was estimated to be 2 - 5 hours from the spatial scale and the propagation velocity of the waves. Concentric structure in GPS-TEC which was caused from the tornado was observed before the VISI observation had faster propagation velocity and longer wavelength than those in the airglow concentric structure. It was speculated that the O<sub>2</sub> airglow observed by VISI was caused by secondarily waves which propagate in the horizontal direction that were caused from the atmospheric gravity waves generated disturbance in the troposphere.

Keywords: airglow, concentric structure, atmospheric gravity waves, International Space Station, near infrared