

## IMAP/VISI と北海道 HF レーダーによる MSTID に関連した同心状重力波の観測

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## Coordinated observation of atmospheric gravity waves associated with MSTID using IMAP/VISI and the Hokkaido HF radar

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We report the recent results coordinated observation of atmospheric gravity waves (AGWs) associated with MSTID obtained with IMAP/VISI from space and the Hokkaido HF radar from the ground. IMAP/VISI is a visible imaging spectrometer which achieve the line-scanning of airglow emissions measurement from the international space station (ISS) (~400 km altitude) covering the wide range from +51 deg. to -51 deg. in geographical latitude. We obtain the global distribution of airglow emissions (O 630 nm at 250 km alt., OH Meinel band 730 nm at 87km alt., and O2 (0-0) atmospheric band 762 nm at 95 km alt.) and auroral emissions (O 630 nm at 250 km alt., N2 1P 730 nm at ~110 km alt. and O2 762 nm at ~120 km alt.). Since the successful launch of IMAP in August 2012, we usually operate IMAP/VISI approximately 15 orbits a day in the night side hemisphere. We found that meso-scale (~10 - 50 km) wave pattern is always seen in the airglow emission at O2 762 nm mainly at the whole latitude range, including more than 30 concentric gravity wave (CGW) events which suggests that the local generation source in the lower-atmosphere. From the cross-correlation analysis between front FOV data and rear FOV data of which time difference is typically 90 s at the same location, we can determine the direction and phase speed of atmospheric gravity wave.

On the other hand, a ground-based instrument plays important role for obtaining the time variations of AGWs since the horizontal motion of AGWs is important to determine the momentum transfer carried by AGWs. Considering the latitudinal coverage of IMAP/VISI, the combination between IMAP/VISI and the Hokkaido HF radar is the most feasible for the conjugate measurement of AGWs. We found 37 AGW events on the simultaneous IMAP/VISI and the Hokkaido HF radar measurements during the period from October 2012 to April 2014. In the most cases the AGW pattern taken with IMAP/VISI is seen only in O2 762 nm emission in the E-region (95km). Thus, we compared the AGW data by IMAP/VISI with the near-range echo data obtained in the E-region by the Hokkaido HF radar.

IMAP/VISI measured westward moving concentric gravity waves in O2 airglow emission with the phase speed up to 160 m/s from 11 to 15 UT on Feb. 5, 2014. Simultaneously the Hokkaido HF radar measured south-westward moving successive echo structures. Phase speeds of CGWs along the E-region echo area and along the radar beams were consistent with those of radar echo structures. During this period, GPS network data showed the south-westward motion of MSTID in the F-region over Japan. This fact suggests that the F-region MSTID was coupled with the E-region gravity waves.