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IMAP/VISI による熱圏・中間圏大気光ならびにオーロラ発光観測の最新状況
Recent results of airglow and auroral emissions in the lower- and upper-thermosphere obtained with IMAP/VISI on ISS

坂野井 健[1*] ; 山崎 敦[2] ; 齊藤 昭則[3] ; 秋谷 祐亮[3] ; 穂積 裕太[3] ; 大塚 雄一[4] ; Perwitasari Septi[1] ; 西谷 望[4] ; 堀 智昭[4]
SAKANOI, Takeshi[1*] ; YAMAZAKI, Atsushi[2] ; SAITO, Akinori[3] ; AKIYA, Yusuke[3] ; HOZUMI, Yuta[3] ; OTSUKA, Yuichi[4] ; PERWITASARI, Septi[1] ; NISHITANI, Nozomu[4] ; HORI, Tomoaki[4]

[1] 東北大学大学院理学研究科, [2]ISAS, JAXA, [3] 京都大学大学院理学研究科, [4] 名古屋大学太陽地球環境研究所
[1]Graduate School of Science, Tohoku University, [2]Institute of Space and Astronautical Science, JAXA, [3]Graduate School of Science, Kyoto University, [4]STEL, Nagoya University

We report the recent results on airglow and auroral distribution in the lower- and upper-thermosphere using IMAP/VISI measurement data, and also report the current status of the operation of IMAP/VISI. IMAP/VISI is a visible imaging spectrometer which aims to measures nightglow emissions from ISS (˜400 km altitude) covering the wide range from +51 deg. to ? 50 deg. in geographical latitude. VISI adopts two field-of-views (+/-45 deg. to nadir) to make a stereoscopic measurement of the airglow and aurora emission to subtract background contaminations from clouds and ground structures.

Since the successful launch of IMAP on August 2012, we found that meso-scale (˜10 - 50 km) wave pattern is always seen in the airglow emission at O2 762 nm mainly at mid-latitudes. The typical O2 airglow intensity is several hundreds R to several kR. We found the concentric gravity wave (CGW) patterns for more than 170 events out of ˜4900 paths, and revealed that these CGW events tend to occur in the southern hemisphere. 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.

We compared the CGW pattern obtained with IMAP/VISI and the ionospheric data with Hokkaido HF radar (E-region irregularity) and the GEONET GPS stations (F-region TEC). 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.

In addition, we changed the VISI operation modes in July 2013, and started the measurment of airglow and auroral measurments at O 557.7nm, Na 589nm and OH 828 nm, in addition to O 630nm, OH 730nm and O2 762nm. After the VISI mode change we routinely obtain the spectra of airglow emissions to estimate OH rotational temperature and faint emissions of sodium and oxygen.

Further, we carried out intensive VISI measurments for 630nm emission during the last winter period to observe MSTID event at mid-latitudes. We will give a talk on the latest results and current status of IMAP/VISI, and would like to point issues for future missions.

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