サブストームに伴う磁気擾乱の子午面内伝播：地上衛星多点観測

今城 峻 [1]; 能勢 正仁 [2]; 相田 真里 [3]; 東尾 奈々[3]; 松本 晴久 [4]; 古賀 清一 [5]; 吉川 顕正 [6]
[1] 名大・ISEE; [2] 名大・宇地研; [3] JAXA; [4] 宇宙機構; [5] なし; [6] 九州大学地球惑星科学専攻

Propagation of substorm-associated magnetic fluctuations in the meridional plane: Multipoint ground-satellite observations

Shun Imajo[1]; Masahito Nose[2]; Mari Aida[3]; Nana Higashio[3]; Haruhisa Matsumoto[4]; Kiyokazu Koga[5]; Akimasa Yoshikawa[6]
[1] ISEE, Nagoya Univ.; [2] ISEE, Nagoya Univ.; [3] JAXA; [4] JAXA; [5] JAXA; [6] ICSWSE/Kyushu Univ.

The propagation of substorm-associated magnetic fluctuations (e.g., dipolarizations and Pi2 pulsations) has been investigated by many researchers, but the propagation in the meridional plane is not well understood because the coverage of satellites in middle-latitude magnetosphere has not been enough. The QZS-1 satellite, which has a quasi-zenith orbit with an inclination of 45^o, an apogee of 6.6 Re, and an orbital period of 24 h, stays the middle-latitude magnetosphere in the close meridian of the MAGDAS/KTN magnetic observatory (AACGM MLAT=71.0^o) located near the QZS-1 footprint, and the ETS-VIII geosynchronous satellite.

We examined a substorm event during July 09, 2013 at 15:00-16:00 UT. During the event, QZS-1 was located at 31^o MLAT and 23.5 h MLT. The ETS-VIII, THEMIS-D (a radial distance of ˜10 Re) and THEMIS-E (a radial distance of ˜7 Re) satellites were located near the equator in the similar magnetic meridian. The dipolarization was first observed by THEMIS-D at 10 Re at 15:14:30 UT. Then, ˜1 min later, some magnetic changes were observed by ETS-VIII and THEMIS-E. At the same time, the Pi2 pulsation was observed at the MAGDAS/KUJ magnetic observatory at low latitudes (AACGM MLAT=27.1^o). These indicate the inward propagation from 10 Re in the equatorial plane. QZS-1 observed a strong azimuthal magnetic field fluctuation 15 min after the first dipolarization at THEMIS-D, indicating outward (poleward) propagation from THEMIS-D. On the ground, the TIK magnetic observatory (AACGM MLAT=66.8^o), which is close to the footprint of THEMIS-D, observed negative bay near-simultaneously with the dipolarization at THEMIS-D, while KTN observed the negative bay with a 13.5 min delay. We suggest that the large delay time of the magnetic fluctuation at QZS-1 in the middle-latitude magnetosphere was associated with the crossing of field-aligned current during the poleward expansion of the substorm current system. Interestingly, although the magnetic latitude of the QZS-1 footprint was slightly lower than that at KTN, the magnetic fluctuations started 1.5 min earlier at KTN. This means that the fluctuation propagated the ionosphere to the magnetosphere.

We will further statistically investigate delay times between QZS-1 and ETS-VIII.