

Multipoint observation of Pc5 pulsations by QZS-1, THEMIS, and MAGDAS/KTN on the same geomagnetic field line

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The field-aligned structure of ultra-low-frequency waves has been theoretically investigated, but there are few observations on the same geomagnetic field line at different magnetic latitude because of rare occasions of long-time good conjunctions between multi satellites and a ground station. The QZS-1 satellite had a quasi-zenith orbit with an inclination of 45 degrees, an apogee of 6.6 [Re], and an orbital period of 24 [h]. The ionospheric footprint keeps the good conjunction with MAGDAS/KTN station for a long time (~3 hours) when the satellite was located near maximum magnetic latitude in the northern hemisphere (~32 degrees).

We examined a Pc5 pulsation event during March 31, 2012 at 20:00-21:00 UT. During the event, the ground station and satellites were almost located on the close L shell of ~9.5 in the 5-6.5 h MLT sector. The QZS-1 and THEMIS-A satellites were located at 31 and -5 degrees in magnetic latitude, respectively. The similar Pc5 magnetic oscillations were identified in the H component of KTN and the eastward component of QZS-1 with in-phase relationship, indicating the counterclockwise rotation of magnetic perturbations by the ionospheric screening effect. The amplitude at KTN (35 nT) was ~10 times larger than the amplitude at QZS-1 (3.5 nT). THEMIS-A satellite observed the Pc5 oscillation in the electric field with the amplitude of ~1 [mV/m] but there was no clear magnetic oscillation. The electric field oscillated in antiphase with the eastward component magnetic field at QZS-1. The ETS-8 geosynchronous satellite at L=6.6 did not observe the similar oscillation, indicating that the this Pc5 event was limited at the specific L shell. The other several good conjunction events were found, and these are going to be analyzed. We also plan to compare the observation to the field-aligned structure of electric and magnetic fields derived from model calculations of the field line resonance and the ionospheric screening effect.