R010-P01
ポスター 3 ：9/26　AM1/AM2 （9:00-12:30）

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Dawnside Surface Charging Events on the Defense Meteorological Satellite Program F16 Satellite

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To predict surface charging events in the low Earth orbit (LEO), we investigated the interactions between LEO surface charging and plasma environments using precipitating electrons and ions flux data from the Special Sensor J5 (SSJ5) instrument onboard the Defense Meteorological Satellite Program (DMSP) F16 spacecraft, which orbits at an altitude of 833 km and an inclination of 98.9 deg in dawn/dusk local time. SSJ5 can detect the differential flux of electrons and ions with energies from 30eV to 30 keV using 19 energy channels. The aperture of SSJ5 is tied to the spacecraft ground. Therefore, the aperture of the instrument has the same potential as the satellite when the satellite surface is charged negatively with respect to ambient plasmas. The negative-floating aperture accelerates ambient cold ions and enables the SSJ5 to detect an extreme enhancement in ion flux within a single energy channel. By identifying such extreme enhancements in ion flux data, we can monitor anomalous charging events of the DSMP F16 satellite.

In this study, we analyzed the ion flux data of SSJ5/DMSP F16 between 2009 and 2019 and found approximately 1400 surface charging events. The charging events were distributed at auroral latitudes (65-80 deg MLat) as well as pre-midnight (20-24MLT) and morning sectors (03-06MLT). This result indicates that the surface charging events are not only associated with auroral arcs, whose occurrence is maximized in the pre-midnight sector (Partamies et al. 2014). From the surface charging event list, we examined one conjunction event where the DMSP F16 was located at ˜05:50 MLT while the RBSP-B satellite was located at 05:00 MLT. During this event, the RBSP-B detected clear chorus waves. This result may suggest that high-energy electrons precipitated by the chorus waves contribute to the surface charge in the LEO.