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Prediction and measurements of space weather conditions and impacts on space missions (3)

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ORBITAL DATA ANALYSIS OF ELECTRON-EMITTING FILM FOR SPACECRAFT MITIGATION
ONBOARD A SMALL SATELLITE**Abstract**

Satellite is greatly affected by the space environment and one of these effects is satellite charging. Various currents flow through the satellite and it is charged in order to keep the current balanced. When the satellite is charged, the potential difference is formed on its surface. When differential charging is over the threshold voltage, electrostatic discharge (ESD) occurs. Sometimes, this ESD causes severe damage on solar coupons, on-board electronics, connecting cables, etc. In order to prevent this type of accidents due to ESD, it is essential to mitigate the difference of potential between insulator and conductor. Therefore, a passive electron emitter has been developed for satellite charging and discharging mitigation. It is possible to generate a strong electric field to the local areas of our emitters by providing triple junction intentionally. As a result, this emitter can emit electrons as long as electron field exists. Since satellite body acts as the electron source for the emission, it is possible to change the current balance and increase the potential of satellite body. By this passive type emission, the difference of potential between insulator and conductor can be decreased that ultimately increase of the satellite potential. Recently, this emitter was mounted on HODOYOSHI-4 developed by University of Tokyo, a 50kg-class satellite, as one of the missions. HODOYOSHI-4 orbits the altitude of 630km with 98-degree inclination angle, passing through aurora zone, similar to HORYU-2. Sampling rate of emission current measurement of 'HORYU-2' was 4 minutes, whereas for 'HODOYOSHI-4' it is one second only. After receiving the orbital data, it is compared with the ground-test data. More detail will be presented in the conference.