Comparison Between Surface Charging Event from Michibiki (QZS) Satellite and Space Environment Data from Global MHD Simulation

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Space environment around geospace varies depending on the solar wind and high energy particle conditions originated from the solar activity. It is well known that the satellite anomaly sometimes happened because of the dynamical variations of the space environment. To understand the current and future conditions of space environment, which we call 'Space Weather Forecast', is one of the quite important activities for safety and security of the satellite operation.

On the other hand, the detailed information of satellite anomaly, possibly related to space disturbances, cannot be available in usual. The risk of the individual satellite depends not only on the space environment, but also on the materials of the satellite body and electrical components, which controls the satellite charging condition. Therefore, it is hard for the satellite operator to judge the risk of the satellite based on the space environment information only.

To solve this type of problem. we will try to develop specialized information for the nowcasting and forecasting space environment for each satellite, and also estimate the risk of satellite anomaly by combining information of space environment and that of satellite materials with a charging model. To seek this approach, we estimate the risk of satellite charging based on the prediction of space environment using the case study of MICHIBIKI satellite, which is on the quasi-zenith orbit. As a first step, we are comparing the space environment data and surface charging data obtained from MICHIBIKI satellite and space environment data obtained from Global magnetospheric MHD simulation. Although the global MHD simulation only produce MHD temperature and density, we need to make an empirical relationship between simulation and observation to obtain the estimated electron and ion temperature and density. In this presentation, we will introduce the results of our data analysis.