

Development of user-oriented space environment prediction model for individual satellite

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Geospace environment is dynamically changing depending on the solar wind conditions. As a result, space environment disturbances, such as substorms and relativistic electron enhancements are occurred. These are the key subjects of space weather research. On the contrary, there are numbers of commercial satellites operated in geospace. These satellites sometimes faced on the hazardous conditions because of geospace disturbances. Changing the particle environment surrounding individual satellite causes spacecraft charging problem. Less than 100 keV energy of charged particles, and more than 500 keV energy of charged particles cause surface and internal charging to satellites, respectively. Spacecraft charging is one of the major reasons of spacecraft anomaly. To mitigate the risk of satellite anomaly, prediction of middle to high energy particle environment in geospace is important.

However, the risk of spacecraft anomaly is also depend on the specification of the satellite (e.g. surface materials, radiation tolerance, etc.). Therefore, the prediction of space environment is still not enough for satellite operators. These information should be interpreted to the risk of individual satellite.

To estimate a risk of spacecraft charging for individual satellite, we try to combine forecasting model of space environment and engineering model for individual satellite. Based on the combination of these models, we will provide specific information of charging risk for individual satellite. In this presentation, we will introduce our approach of developing user-oriented space environment prediction model for individual satellite, and our initial results.

Keywords: Space Weather Forecast, Spacecraft Charging, User-Oriented