



## **Spacecraft Surface-Charging Risk Index in Auroral Region**

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High-level surface charging is frequently observed on spacecrafts in auroral region. It may lead to electrostatic discharges and result in significant damage to the satellite. Besides the sunlit condition, two major factors affecting the charging level are the ambient plasma density and the precipitating electron flux. One example for the first factor is that polar satellites experience more surface-charging events during solar minimum conditions, when the ambient plasma density is lowered due to the change of solar UV output [Anderson, 2012]. However, the energetic electron precipitation, which occurs frequently with stronger geomagnetic activities in solar cycle decent years, may also contribute to the charging events. In this letter, we present a statistical survey of surface charging events recorded by DMSP satellites over one solar cycle. The relationship between the charging events and the geomagnetic activity indices, the solar radio flux at 10.7 cm (F10.7 index), and the monthly average sunspot number are investigated. Ruling out the influence of geomagnetic activities, we have specifically considered the effect of plasma density on surface charging frequency in auroral region. Finally, we find a set of parameters which can be used to estimate the likelihood of surface charging events in the auroral region during different periods of a solar cycle.