

Study on significant surface charging environment in the medium earth orbit

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Study on spacecraft significant surface charging in the medium earth orbit (MEO) is important for spacecraft designs and operations, because the significant charging sometimes cause spacecraft anomalies due to discharging arcs. We study the surface charging environment using the Electric Field and Wave instruments (EFW) and the Helium Oxygen Proton Electron (HOPE) data of the Van Allen Probes. We find that significant charging events (< -50 V) are located about 25000 km further away from the center of the Earth and in the mid-night to dawn region. The very significant charging (< -1000 V) events are only observed in eclipse. The relationship between surface potential and electron temperature suggests that the high electron temperature is a necessary but not sufficient condition for significant charging. We will discuss the significant surface charging environment through the charging processes in the time history of the high energy electron fluxes.