

The impact of space weather on the lunar electrostatic environment

T. J. Stubbs (1,2), W. M. Farrell (2) and R. R. Vondrak (2)

(1) University of Maryland, Baltimore County, Baltimore, MD, USA, (2) NASA Goddard Space Flight Center, Greenbelt, MD, USA (Timothy.J.Stubbs.1@gsfc.nasa.gov)

It is well known that space weather events, such as coronal mass ejections (CMEs), will present a significant radiation hazard to astronauts on the surface of the Moon; however, the impact of the coincident disturbance to the Moon's electrostatic environment is much less well understood. Observations from the Apollo era revealed that typically the dayside of the Moon was electrostatically charged to a few volts positive due to the photoemission of electrons from the surface; while the terminator region and nightside were charged in excess of 100 volts negative by electrons from the solar wind. There is evidence that the electric fields created by these charging processes drive the transport of electrically-charged lunar dust at the surface up to altitudes of 100 km. During intervals of extreme space weather it is possible that enhanced surface electric fields and dust transport could also pose an increased hazard to astronauts on the Moon's surface. In this study we predict the surface electric fields at various locations on the Moon's surface during the passage of a CME and discuss the anticipated effects on dust transport, and the implications for scientific and exploration activities.