ROVER WHEEL CHARGING NEAR AND WITHIN A LUNAR POLAR CRATER. T. L. Jackson[1,2] ,W. M. Farrell[1,2], M. I. Zimmerman[2,3], [1] *Solar System Exploration Division, NASA Goddard Space Flight Center, Greenbelt, MD, USA,* [2] *NASA Lunar Science Institute, NASA Ames Research Center, Moffett Field, California, USA,* [3]*Johns Hopkins Applied Physics Laboratory, Laurel, MD.*

Introduction: Any object moving along the lunar surface will experience tribo-charging due to the contact between the object and the regolith. As with the stepping astronaut charge model [1], a rover wheel will dissipate its collected charge through the most conductive path: through the surface or the ambient plasma. While roving in certain locations, such as about the lunar terminator and nightside regions, the dominant remediating path for dissipation will be the plasma. Roving within a lunar crater however, creates a situation where the rover is effectively cut off from the ambient plasma, causing dissipation times to increase significantly.

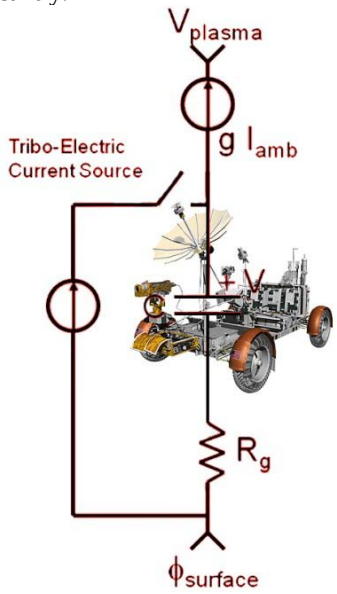

Figure 1: Equivalent circuit model for a rover on the lunar surface. The switch open signifies no movement, while the switch closed signifies roving, and hence, tribocharging.

The objective of this work is to present the results from the advancement of the wheel charging model derived from the astronaut charging model. The model is applied as an analog to determine the dissipation times for a continuously rolling rover wheel to bleed off its excess charge into the surrounding plasma at various locations on the lunar surface (i.e. dayside, near the lunar terminator, leeward of a crater wall, and at the far edge of a crater). A tribo-electric generator model is used as the charging source, and an expression that accounts for the adhesion of lunar dust (sticking factor) has also been included in order to determine how dust effects charge remediation. The effect on the charging/discharging behavior is observed while other parameters are varied, i.e. regolith grain size, wheel type, wheel speed and sticking factor.

We hope to gain a fundamental understanding of an object's electrical interaction with the charged surface and surrounding environmental plasma under varying conditions and identify electrostatically challenging regions like those within polar craters.

References: [1] Jackson, T. L. et al. (2011) *J. Spacecraft and Rockets*, [2] Farrell, W. M. et al. (2010) *J. Geophys. Res.* 115, E03004.