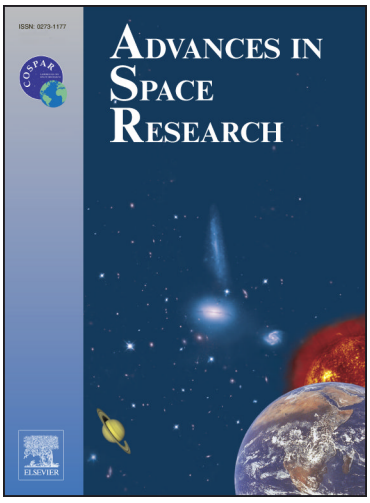

Anticipated Electrical Environment at Phobos: Nominal and Solar Storm Conditions

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PII: S0273-1177(17)30584-7
DOI: http://dx.doi.org/10.1016/j.asr.2017.08.009
Reference: JASR 13365

To appear in: *Advances in Space Research*

Received Date: 28 January 2017
Revised Date: 1 August 2017
Accepted Date: 8 August 2017

Please cite this article as: Farrell, W.M., Halekas, J.S., Fatemi, S., Poppe, A.R., Hartzell, C., Marshall, J.R., Stubbs, T.J., Zimmerman, M.I., Zheng, Y., Anticipated Electrical Environment at Phobos: Nominal and Solar Storm Conditions, *Advances in Space Research* (2017), doi: http://dx.doi.org/10.1016/j.asr.2017.08.009

Anticipated Electrical Environment at Phobos: Nominal and Solar Storm Conditions

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Abstract. A passing coronal mass ejection (CME) will manifest a different response at an airless body compared to a magnetized planet. Specifically, because the regolith-rich surfaces of airless bodies are directly exposed to the variations in the plasma flow, the surfaces are found to undergo anomalous surface charging during the passing of CME fast plasma events. In this study, we model the surface charging expected at Phobos for nominal solar wind conditions and also those associated with disturbed solar wind conditions during the passage of a CME similar to that observed by MAVEN at Mars in early March 2015. We use an ambipolar diffusion model to examine the development of the trailing wake/void in the plasma flow behind Phobos and mini-wakes forming within obstruction regions like Stickney Crater. We also consider the roving of an astronaut in Stickney Crater for Phobos positioned near 10 hours Local Time relative to Mars. We examine the plasma dissipation of the collected astronaut charge from contact electrification with the regolith.