Modeling Dust Clouds on the Moon

Jamey Szalay*[1,2] and Mihály Horányi[1,2]

[1] Laboratory for Atmospheric and Space Physics, University of Colorado at Boulder, Boulder, Colorado, USA
[2] Department of Physics, University of Colorado at Boulder, Boulder, Colorado, USA

The lunar environment is a complex and dynamic system. Without an appreciable atmosphere or large-scale magnetic field and with the exception of regions with strong magnetic anomalies, the solar wind freely reaches the lunar surface. Combined with photoemission from the lunar surface due to direct exposure to solar UV radiation, this can lead to surface charging, near-surface electric fields, and the mobilization and transport of the lunar soil.

Analysis of images taken by the Surveyor landers indicate the presence of lofted dust clouds and yield estimates for their spatial extent and density. However, the lofted grains predicted by this analysis are immense in size. A 1D hybrid code, treating electrons and ions as fluids and the dust grains as particles, has been developed to constrain the properties of these clouds. Results from this model show such lofted clouds may be explained with much smaller grains via strong coupling phenomena. We will discuss these results and compare to existing observations.