The Enigma of Lunar Dust Transport. W. M. Farrell[1,2], T.J. Stubbs[1,3,5], R. R. Vondrak[1,2], G. T. Delory[4,5], J. S. Halekas[4,5], and the DREAM Lunar Science Institute, [1]NASA/Goddard SFC, Greenbelt MD (William.M.Farrell@nasa.gov), [2]Johns Hopkins/Applied Physics Laboratory, [3]Univ. of Maryland Baltimore County, [4]Univ. of California, Berkeley, [5]NASA Lunar Science Institute, Ames RC, Moffett Field, CA.

We will review the highly contrasting points of view regarding the ability of fine dust grains to become transported in the near-space lunar environment. While Surveyor and Apollo camera images suggest the presence of a horizon glow that has been provoacatively interpreted as levitated and/or lofted dust, there is contrasting geological evidence to indicate that surface regolith has not been moved in a substantial way. While electric forces have been suggested as a driver for grain dynamics, recent detailed modeling of near-surface non-monotonic potentials would suggest grains could not get to large heights. While lofting models require submicron grains to hold/contain 100's of elementary charges, it can be shown analytically that a grain residing on a flat surface would have an exteremely low probability of having even a single electron on its surface. Can these diametrically opposing viewpoints be reconciled? We will review the pros and cons on both sides, and suggest that the UVS and LDEX instrument on LADEE will provide key new insights on dust transport at the Moon.