

**Macro Triboelectric Stair-Stepped Behavior of Dipole Dust: Harnessing Surface Power High Voltage Dust.** D. Hawk, United First Nations Planetary Defense, W11575 W Town Hall Rd., Gresham, WI 54128. (Contact: itspaceagency@gmail.com/678.702.7180)

**Introduction:** Lunar Dust is a well-known primary exploration limiting factor i.e., Apollo 11 dust characterization, Apollo 12 Dust Detector Experiment (DDE) leading to LEAM and LADEE LDEX, and Chang'e-3 Yutu. Lunar nanophase iron dust harbors magnetic and electrical charge properties.

Dust Bowl, dust storms, were highly charged electrical storms with potentials into the hundreds of kilovolts known to cause lightning, knocking people unconscious, deaths occurred. Abrasion concomitant dipole dust particles arcing across the positive cornea and negative retina caused cattle and people to go blind. Dipole-dust lofted in optimum concentrations produce one hundred kilovolts plus charged clouds arranged in a 3-axis negative-positive geopotential array [1]. Like volcanic eruption dust lightning, large landers are expected to produce high velocity triboelectrostatic buildup of electrons accumulating on the spherical dust dipole ends and may be enough to create lunar cloud lightning upon landing and takeoff.

High voltage rocket engine dust plumes will be 3-axis checkerboarded, 1/6-G geopotential-ridged, negative-positive clouds of charged spherical dipole particles. The clouds will be 45-degree stair-stepped. Dust Bowl storms reached heights of 13,000 feet reported by aircraft and carried by the jet stream with known sand deposition on decks of ships three hundred miles in the Atlantic. On the Moon, some dust will be jettisoned off the surface and into orbit while the rest of the dust will be carried across the entire lunar surface.

**Lunar Equipment:** In addition to sand blasting, surface equipment exposed to rocket engine dust cloud ejecta will be impacted by 3-axis checkerboarded waves of electrically charged negative and positive clouds with the highest electrical potential closest to ejecta dust optimum concentration-to-charge potential. In addition to rocket engine caused lightning, charged triboelectric dust arcing will impact most lunar surface electronic equipment and optics such as a WPT laser lens.

**Conclusion:** The bad news first. In addition to rocket engine sand blasting, in waves lunar equipment and astronauts will be exposed to high voltage dust potentials into the 100s of kilovolts. The good news is, if lunar dust is optimally lofted in negative and positive clouds it could produce vast amounts of lunar surface power.



Figure 1. Dust Bowl dust storm.

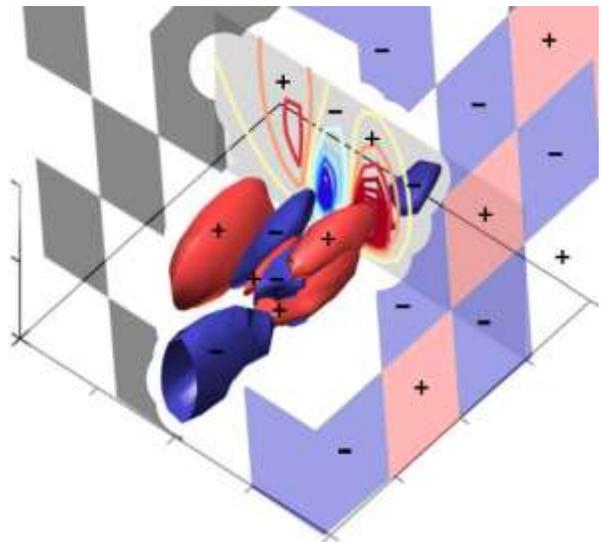


Figure 2. Overlay of 3-Axis Electrical Cloud Construction of a Reconstructed Electrical Dust Storm from Locally Observed Electric Field Data [1].

**References:** [1] Zhang, H., Zhou, YH. Reconstructing the electrical structure of dust storms from locally observed electric field data. *Nat Commun* 11, 5072 (2020).