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The SANDEE campaign: Electrical effects during sand transport by aeolian processes in the Negev desert and implications for Mars

Itzhak Katra[1] and Yoav Yair[2]
[1]Dep. of Geography and Environmental Development, Ben-Gurion University of the Negev, Israel
[2]Interdisciplinary Center (IDC) Herzliya, Israel

The electrification of mineral sand/dust particles during aeolian processes is a well-documented phenomenon both in natural settings and in laboratory experiments. When in motion, small airborne dust particles collide with other suspended particles or impact the surface through the kinetic energy they acquire from the ambient wind. Field experiments will be conducted in conjunction with the AMEDEE-2020 Analog Mars Mission, planned for November 2020 in the Ramon Crater in southern Israel and led by the Austrian Space Forum. During SANDEE, we will deploy a portable wind-tunnel (Katra et al., 2016) at the site, and record particle movements in conditions that simulate sand storms of varying speeds. We will use local Negev desert, as well as Mars-simulant, soil samples that will be placed inside the wind-tunnel. We will measure particles' dynamic, mineralogical and electrical characteristics as they are blown by wind inside the tunnel. A JCI 114 portable electric field detector will be used to to measure the amplification of the ambient electric field during sand movement. A vertical array of traps oriented along the wind direction will be used for sampling particles, in order to calculate the related sand fluxes and to analyze particle characteristics. The experiment will be repeated at night under dark conditions, in order to observe if light is emitted from electrified dust, due to corona discharges.

We expect that SANDEE will help decipher wind-speed/aerosol/electrical charge relationships. These have practical implications for future Mars landers, because airborne sand particles are likely to interfere with communications and also to impede the energy output of solar panels due to the electrical adhesion of charged aerosol.