

Intensity and frequency of electrified dust storms in the Middle East

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Dust storms in the Middle East are a common natural phenomenon and have become more frequent in recent years, due to the observed warming and drying trends attributed to regional climate change. Such dust storms are often accompanied by large electrical charging, most likely due to saltation and triboelectric processes. We present atmospheric electrical measurements conducted at the Wise Observatory (WO) in Mizpe-Ramon (30°35' N, 34°45' E, 850 MSL) and on Mt. Hermon (33°18' N 35°47' E, 2200 MSL) in Israel. Atmospheric electrical measurements during several strong dust storms that occurred in the Middle East in 2015-2016 showed that when dust was being transported above the instruments, very large fluctuations in the electric field (E_z) and the current density (J_z) occurred. Values > 6 kV/m and peak current density of 12 pA/m^2 were observed, persisting for hours during peak aerosol concentrations. The electric field and current density variability and amplitude measured in all events deviate significantly from the mean fair-weather values at both sites. There are also notable differences in the polarity and magnitude of the observed electrical parameters between the dust storms, which are attributed to wind speed, dust episode duration and compositional differences of the soil in the source regions. These differences will be discussed and compared to dust storms in other regions.

Keywords: Electric Field, Dust Electrification, Regional Climate Change

