Geophysical Research Abstracts
Vol. 19, EGU2017-4028, 2017
EGU General Assembly 2017

Electrified atmospheric dust during disturbed weather conditions in the Negev desert

Shai Katz (1), Yoav Yair (2), Colin Price (1), and Roy Yaniv (1)

(1) Department of Geosciences ,Tel-Aviv Univeisity, Tel-Aviv, Israel, (2) School of Sustainability, Interdisciplinary Center (IDC), Herzliya, Israel

Dust storms over the Negev Desert in southern Israel are common and become frequent during the spring and autumn, depending on synoptic conditions and local effects. These storms are often accompanied by significant dust electrification, most likely due to saltation and triboelectric processes.

We present new atmospheric electrical measurements conducted at the Wise Observatory (WO) in Mizpe-Ramon (30035'N, 34045'E) Israel, during two strong dust storms that occurred over the Negev desert on October 27-28th and December 1st, 2016. The first event generated a local gust front due to strong downdrafts from an active Cumulonimbus cloud (known as Haboob). In the second event, a Cyprus Low with strong synoptic-scale winds lifted the local sand particles at the Negev and lowered the visibility.

During the passage of the dust storms above our instruments, very large fluctuations in the electric field (Ez) and current density (Jz) were measured. In the October Haboob event, the Ez data showed a superposition of signatures generated by lightning and by the dust aloft. The Ez values fluctuated between +123 to +2144 and -15336 to +19788 V m-1 for several hour-long episodes. The respective values of the vertical current density [Jz] were between -18 and +18 pA m-2. During the December dust storm we measured Ez values up to +4000 V m-1 lasting for $\sim$ 3.5 hours and another episode with values up to +668 V m-1 lasting for approximately 1.5 hours. These values were accompanied by changes in the Jz values between -16.5 and +17 pA m-2.

The electric field and current density variability and amplitude are significantly different from the average fair-weather values measured at the Wise Observatory (Yaniv et al., 2016), which are $\sim$ 180 V m-1 and $\sim$2 pA m-1. We will show that these differences in the electrical behavior between these two dust storms may be related to the speed and direction of the wind near the surface.