



Characterising atmospheric electricity in dusty environments

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In fair weather conditions, an electric field results from current flow in the Global Electric Circuit (GEC). When the current encounters extensive horizontal plumes of dust, charging occurs at the horizontal plume edges. Charge may also be generated within the plume, by frictional processes, which typically considerably exceeds that on the plume edges. For plumes near the surface, the effect of the plume charge can be sensed in the response of the surface electric field. A geographic area that is strongly affected by transient enhanced dust phenomena is the UAE, where frequent periods of enhanced dust occurrence perturb the electrical environment near the surface.

To investigate the effects of transient dusty events on the surface electric field, a measurement site was set up in the UAE, at Al Ain. The electric field was measured as the Potential Gradient (PG), over a range of conditions. To quantify the dust concentration, a Biral SWS-100 visibility sensor was installed at the field site, along with a Campbell CS-110 field mill for the PG. Additional data gathered during the campaign included the cloud base height with a Vaisala CL-31 ceilometer in order to fully characterise all factors affecting the surface electric field variations. Analysis based on combining these different data sources is presented here.