



**Scenario**  
DOCTORAL TRAINING PARTNERSHIP

**NERC**  
SCIENCE OF THE  
ENVIRONMENT

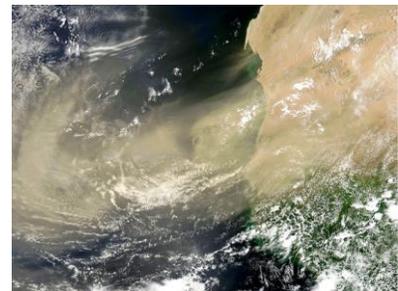
## Electric dust storms: environmental challenges and impacts

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Mineral dust aerosol is a major component of the Earth-Atmosphere system, comprising 70% of the global aerosol mass burden. Dust in the atmosphere is often observed to be electrically charged [1], leading to the initiation of discharges, ignition hazards, and changes in the effects of the dust as well as in its transport and removal. The effect of charge on dust transport (both inside cloud and long range transport) is inadequately understood and is thought to be important for a number of climatic processes. For example, dust charging may allow giant dust particles to undergo extended long-range transport. Additionally, charging may influence the alignment of dust particles in the atmosphere, altering how they interact with radiation and their impact on climate. This project will study the effects of dust charging as part of a major project in the Middle East to investigate the broader role of charge in cloud and precipitation processes. Unique new measurements of dust electrification are being obtained in the Middle East, which will soon be complemented by both surface and airborne measurements (including by free balloons and UAVs (Unmanned Aerial Vehicles)). These measurements will inform modelling studies on dust charge generation and long range transport.



*Left – cloud to cloud lightning generated above a desert surface ([NOAA](#)) ;centre – dust storms in Uttar Pradesh were associated with fatal lightning ([The Wire](#)) right –dust storm transported westwards from the Sahara (measured by NASA Aqua satellite).*

### **Training opportunities:**

This experimental project will provide training and experience in instrumentation and fieldwork, and data analysis informing improvements in numerical models. There will be international fieldwork opportunities.

### **Student profile:**

A background in meteorology or physics, particularly experimental physics is desirable, with a good appreciation of laboratory experimental work, computer programming and data processing.

### **Funding particulars:**

This project will receive in-kind logistics support from the UAE Rain Enhancement Programme.

**Reference:** [1] Harrison et al (2018) [Saharan dust plume charging observed over the UK](#), *Environ Res Lett* **13** 054018 (2018)

<http://www.reading.ac.uk/nercdtp>