



GLOCAEM – a new archive of global atmospheric potential gradient measurements

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Atmospheric potential gradient (PG) measurements provide valuable insight into the operation of the global electric circuit, and a number of local meteorological processes including fog, pollution and cloud processes, space weather influences on the lower atmosphere and large scale climate processes such as ENSO. Despite its diverse range of scientific applications, there is no simple route to access global PG data, which is now widely measured around the globe. This work describes a new data repository, GLOCAEM (GLObal Coordination of Atmospheric Electricity Measurements) which comprises PG and meteorological data from 10 different international institutions and 15 different locations worldwide, in close to real time. GLOCAEM is hosted at the UK Centre for Environmental Data Analysis (CEDA), which provides secure and long term storage of datasets for atmospheric research for the academic community. PG data is available in 1 second and 1 minute average values in a plain text format, with identical file formatting for each measurement location, and site and instrument information also provided. Measurement locations range from clean air island locations (Graciosa, Azores), to desert (Wise Observatory, Israel), to mountainous locations (Mt Aragats, Armenia), to snow covered polar latitudes (Halley, Antarctica), allowing a wide range of related atmospheric electrical phenomenon to be studied simply.

This work presents the first analysis of the combined GLOCAEM dataset for 1 year of data from 2016. Striking differences in the variability and magnitude of PG are demonstrated between the various sites as a result of local meteorological and orographical influences. Analysis of diurnal fair weather values shows similarity with the Carnegie curve at many sites, demonstrating the dominance of the global electric circuit at all sites during early morning hours, but with local influences apparent at most sites outside of this period. Recommendations of the suitability of the various GLOCAEM sites for the study of particular atmospheric electrical phenomena will also be provided.