Lord Kelvin's Scottish atmospheric electrostatics measurements

[1]Karen L. Aplin
[2]R. Giles Harrison
[1]Department of Physics, University of Oxford
[2]Department of Meteorology, University of Reading
e-mail: karen.aplin@physics.ox.ac.uk

***Abstract*—Lord Kelvin (William Thomson), arguably one of the greatest classical scientists, made important contributions to environmental electrostatics during a brief but productive period from 1859–1861. By 1859 Kelvin had recognised the need for "incessant recording" of atmospheric electrical parameters, and responded by inventing both the water dropper equaliser for measuring the atmospheric potential gradient (PG) and photographic data logging. The water dropper equaliser was widely adopted internationally and is still in use today. On the basis of theoretical electrostatic considerations, Kelvin developed a portable electrometer, and used it to investigate the PG on the Scottish island of Arran. During these environmental measurements, Kelvin may have unwittingly detected atmospheric PG changes during solar activity in August/September 1859 associated with the "Carrington event", and he also almost certainly detected airborne pollution effects from the Scottish mainland on the PG during this period. These little-appreciated measurements in pursuit of refining theory also suggest that Kelvin should be recognised as one of the first environmental physicists.**