



Solar Event reveals Charge-Enhanced Cloud Formation

G. Harrison (1), **M. Ambaum** (1)

(1) Department of Meteorology, University of Reading

Charge affects the activation of cloud droplets by modulating the minimum supersaturation at which haze droplets begin to grow. Although the droplet charge required to enhance activation is substantial, we show that sufficient charging occurs at the edges of layer clouds because of the fair-weather current in the global atmospheric electrical circuit. Our theory predicts that droplet neutralisation will cause a transient decrease in cloud base temperature. During a period of extreme solar activity, we detected transient current bursts at the surface beneath a layer of cloud. We attribute these to bursts of ion production which would cause transient droplet neutralisation. We report here for the first time transient decreases in downward long wave radiation measurements coincident with the transient current bursts. As the vertical current density passing through stratiform clouds is a global phenomenon, there are many regions in which this effect can potentially occur; we find that the effect of charge-enhanced activation on surface radiation in the present-day climate could be as large as 0.1 W m^{-2} .