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Detecting charge in the base of layer clouds

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Stratiform clouds are known to acquire charge at their upper and lower horizontal boundaries as a consequence of vertical current flow in the global atmospheric electric circuit, passing through the cloud. Balloon carried sensors have provided direct observations of this effect, but opportunities for measurements are limited. For cloud bases at low altitudes with substantial charge, there is a weak effect of the charge on the electric field measured at the surface. This allows the cloud base charge to be inferred. Using cloud and surface electric field measurements obtained at Reading during 2015 and 2016, the presence of cloud base charge has been inferred. For the charge to be detectable it is found that the cloud base needs to be below 1 km altitude, and that the stratiform cloud needs to persist for typically 12 hours. If the cloud altitude becomes too low (<200m), the electric field becomes enhanced as if within a fog layer, and is no longer indicative of the cloud base charge. This is consistent with theoretical expectations requiring the layer cloud to be sufficiently extensive that the vertical current passes through, rather than around the cloud.