

# **Intense auroral electric field events at magnetospheric boundaries**

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The profile of intense (0.5-1 V/m, mapped to the ionosphere) high-altitude (4-7 earth radii geocentric distance) electric fields on auroral field lines has been studied using Cluster data. The locations of monopolar and bipolar electric fields with respect to the plasma sheet boundaries have been determined by identifying gradients in particle flux, plasma density and plasma temperature. Bipolar electric field occur at particle boundaries within the plasma sheet, while monopolar electric fields occur at sharp particle boundaries, such as at the polar cap boundary. It is suggested that the electric field profile depends on whether plasma populations, able to support intense field-aligned currents and closure by Pedersen currents, exist on both sides, or one side only, of the boundary. The characteristics of the intense boundary-associated electric field events are further studied. The scale sizes of the electric fields, and the associated FACs and density gradients are determined. The possibility of local current closure is also investigated.