



Observations of auroral acceleration at magnetically conjugate spacecraft: A Cluster case study

Colin Forsyth (1), Andrew Fazakerley (1), Andrew Walsh (1), Clare Watt (2), Kristian Garza (1), Christopher Owen (1), and the Cluster Auroral Team

(1) UCL Mullard Space Science Laboratory, Dorking, UK, (2) University of Alberta, Alberta, Canada, (3) Technische Universität Braunschweig, Braunschweig, Germany, (4) Université de Toulouse, Centre d'Etude Spatiale des Rayonnements, Toulouse, France, (5) CNRS, UMR 5187, Toulouse, France, (6) The Royal Institute of Technology, Stockholm, Sweden

On the 14th December 2009, Cluster passed through an auroral acceleration region (AAR) at an altitude of 4400-5900 km. Cluster 4 passed through the AAR at 4450 km, 2.5 minutes prior to Cluster 1 and Cluster 3. The spacecraft observed various signatures of the AAR: low energy ion conics, inverted-V electron distributions, field-aligned currents and narrow beams of heavy ions. During their crossing, Cluster 1 and Cluster 3 were magnetically conjugate, separated by 1500 km. The multi-spacecraft nature of this encounter facilitates the determination of the spatially averaged electric field within the AAR along with the field-aligned currents. The spatially averaged parallel electric field between Cluster 1 and Cluster 3 was 0.3-0.5 mV/m in the upward current region and represented over 10% of the total parallel potential in the AAR. We discuss whether this acceleration is due to an unobserved mid-cavity double layer or a spatially extended low-level electric field.