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In situ studies of the auroral acceleration region by Cluster particle and field data

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Cluster multi-point in situ data from the auroral acceleration region became available late 2008 and were used to address and resolve various open issues on the acceleration processes, as illustrated by a rich harvest of publications. Here, results are presented from recent event and statistical studies on the two topics: (1) the interaction and relative role of quasi-static and Alfvénic acceleration in large-scale auroral surges; (2) the auroral density cavity, how the density is distributed within the AAR and with respect to geocentric altitude. DMSP imager data were used in the event studies to get a close-in- time overview the large-scale auroral distribution within the MLT sector of the Cluster oval crossings, of great benefit for the interpretations of the data.