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Coordinated Coverage of FACs with Cluster and Swarm

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We explore the capability of Swarm-Cluster coordination for probing the behaviour of the field aligned currents (FAC) adjacent to the ring current (RC) at medium and low orbits. The RC and connecting R2 FACs influence the geomagnetic field at low Earth orbit (LEO) and are sampled in situ by the four Cluster spacecraft every perigee pass. Coordination of the configuration of three Swarm spacecraft configurations with the constellation of the four Cluster spacecraft has been achieved through joint operations; providing a set of distributed, multi-point measurements covering this region. A particularly close coordination of all spacecraft is considered during the start of the Swarm operations. We report here preliminary results of joint signatures of R1 and R2 FACs, and the use and application of new analysis techniques derived from the calculation of curl B and magnetic gradients to compare estimates of the current distributions. Hall currents associated with the FAC signatures at the Swam locations are shown to be directly obtainable from the three spacecraft configurations. For context, we identify the associated auroral boundaries through application of a method to determine the FAC intensity gradients in order to interpret and resolve the R1 and R2 FACs.