

## Geospace I: Ionospheric dynamics

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*Paper 511 - Session title: Geospace I: Ionospheric dynamics*

### 10:30 **Advanced ionospheric current estimates by means of the Swarm constellation mission: A selection of representative results**

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ESA's Earth Observation Mission Swarm, launched on 22 November 2013, provides the opportunity of reliable electric current estimates in the ionosphere based on multi-satellite magnetic field measurements. The lower pair, Swarm A/C flying side-by-side at a longitudinal separation of  $1.4^\circ$ , is well suited for determining radial currents. The higher satellite, Swarm B flying at 520 km altitude, provides from time to time well-matched observations with the 50 km lower pair, which can be used for zonal current estimates. We apply in both cases Ampere's ring integral for determining the mean current density passing through the encircled area. Most prominent results are obtained at auroral latitudes where intense field-aligned currents (FACs) are known to flow. Besides the well-known distribution of Region 1 and Region 2 FACs we find significant FACs also inside the polar cap. Interplanetary conditions are identified which favour these currents. Field-aligned and radial currents are also observed at mid and low latitudes, respectively. Here the Swarm results have been used to check theoretical predictions of these current systems. Horizontal currents in the topside F-region are known to be weak. Still, the constellation aspect of the satellite mission has proven to be sensitive enough. We recovered the mean latitudinal distribution and diurnal variation of the tiny zonal current density in the F-region. There are predominantly eastward currents on the dayside and weaker westward currents on the nightside.