

SWARM SATELLITE AND EISCAT RADAR OBSERVATIONS OF AURORAL ARCS AND FIELD-ALIGNED CURRENTS

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SWARM is the first multi-satellite constellation to fly at ionospheric altitudes. It is ESA's Earth Explorer mission and the three satellites were launched in late 2013. Each of the satellites have instruments that make high-precision and high-resolution measurements of the vector magnetic field, complemented by precise navigation, accelerometer, plasma and electric field measurements.

Our interest is to use the SWARM magnetic field measurements to calculate the magnetic field-aligned electrical currents. The plasma and electric field instruments provide additional information. We concentrate on selected SWARM orbits that go over the Northern Scandinavia and the incoherent scatter EISCAT UHF and VHF radars in Tromsø (67° cgmLat) that provide information of the ionospheric electron densities and plasma drifts. The scientific aim is to study the electrodynamics associated with auroral arcs. The auroral arcs are observed optically by ground-based all-sky cameras. We will estimate the auroral differential electron energy flux from the radar-measured electron density altitude profiles and that will be compared to the field-aligned current distribution estimated from the vector magnetic field instruments of SWARM. In addition, the tri-static VHF radar measurement is able to yield the F-region electric field and it will be compared to the electric field provided by the EFI instrument of SWARM. While the EISCAT radars provide a local measurement of the electrodynamic parameters, the SWARM satellites yield measurements of plasma parameters over a large latitudinal span of the night sector auroral oval.