



Investigating the auroral electrojets using Swarm

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The auroral electrojets are large horizontal currents that flow within the ionosphere in ovals around the polar regions. They are an important aspect of space weather and their position and intensity vary with solar wind conditions and geomagnetic activity. The electrojet positions are also governed by the Earth's main magnetic field. During more active periods, the auroral electrojets typically move equatorward and become more intense. This causes a range of effects on Earth and in space, including geomagnetically induced currents in power transmission networks, disturbance to radio communications and increased drag on satellites due to expansion of the atmosphere. They are also indicative of where the aurora are visible.

Monitoring of the auroral electrojets in the pre-satellite era was limited to the network of ground-based magnetic observatories, from which the traditional AE activity indices are produced. These suffer in particular from the stations' poor distribution in position and so this motivates the use of satellite-based measurements. With polar low-Earth orbit satellites carrying magnetometers, all latitudes can be sampled with excellent resolution.

This poster presents an investigation using Swarm's magnetometer data to detect the electrojets as the spacecraft move above them. We compare and contrast two approaches, one which uses vector data and the other which uses scalar data (Hamilton and Macmillan 2013, Vennerstrom and Moretto, 2013). Using ideas from both approaches we determine the oval positions and intensities from Swarm and earlier satellites. The variation in latitude and intensity with solar wind conditions, geomagnetic activity and secular variation of the main field is investigated. We aim to elucidate the relative importance of these factors.

Hamilton, B. and Macmillan, S., 2013. Investigation of decadal scale changes in the auroral oval positions using Magsat and CHAMP data. Poster at IAGA 12th Scientific Assembly, 2013. <http://nora.nerc.ac.uk/503037/>
Vennerstrom, S. and Moretto, T., 2013. Monitoring auroral electrojets with satellite data. *Space Weather*, VOL. 11, 509–519, doi:10.1002/swe.20090