

Master project 2020-2021

Title: *Energetic particle precipitation during high-latitude substorms*

Description:

A substorm is a key element in transferring energy (ultimately from the solar wind) in the magnetosphere—ionosphere system. It is known that the substorm onset processes can efficiently accelerate magnetospheric particles causing high-energy particle precipitation to the ionosphere, up to relativistic energies. A previous MSc project investigated energetic particle precipitation during isolated and recurrent substorms at the main auroral oval (Lapland) latitudes. As high-energy particle enters the ionospheric D region, their ionisation causes absorption of the cosmic radio noise (CNA). Thus, the ground-based CNA measurements can be used to detect the effect of high-energy particles on the atmosphere. Based on analysis of the CNA data, the results show that an isolated substorm is rarely very intense, it brings less particles into the atmosphere as compared to periodically occurring events. High latitude substorms are often analysed as a separate category from the main oval substorms. They are expected to bring less energy into the atmosphere. The aim of the project is to investigate this hypothesis by analysing CNA behaviour during substorms observed from Svalbard. The previous thesis work provides a good reference. The project has a potential to be extended to analysis of solar wind and geomagnetic activity. In addition, Eiscat data can be used and an own experiment designed to further investigate the particle precipitation properties. Automatically detected substorms will be provided.

Time frame: autumn 2020 — spring 2021

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