

Using all-sky cameras to produce maps of electron precipitation over Lapland

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Energetic particle precipitation into the Earth's atmosphere plays an important role in the chemistry of the polar mesosphere and lower thermosphere. The production of odd nitrogen species at 80-100 km altitude is known to have a significant effect on the ozone concentration in the stratosphere, with implications for global climate. The atmospheric modelling community needs reliable estimates of precipitation energy flux and spectra. Currently studies usually use magnetic indices (e.g. Ap) as a proxy for total energy flux, or use satellite-based measurements (typically of radiation belt electrons) to estimate the precipitation characteristics. The radiation belt satellite measurements suffer from a poor pitch angle resolution at small pitch angles which is unsuited for this work, and neither magnetic indices or radiation belt measurements are able to describe the small-scale horizontal spatial structure in the precipitation. We aim to regularly produce maps of precipitating electron flux and energy spectra over Lapland using ground-based all-sky camera observations of the aurora. This will accurately describe the spatial structuring of the particle flux, which is likely to be important for localised atmospheric models. We also aim to test and develop new proxies for the precipitation which are better suited for the task than the existing magnetic indices. At 41am we will present the current status of this project.