UMEÅ UNIVERSITET

Space weather master project: Drivers for auroral substorm spikiness

We are looking for a motivated master student (or one or more project students, for example for a summer project) for a project concerning the temporal behavior of so called geomagnetic substorms.

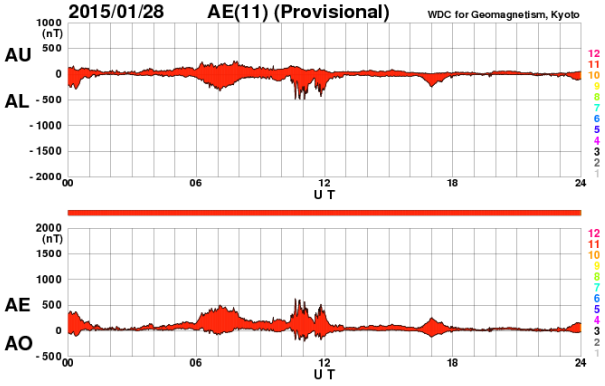
A substorm is a brief (a few hours long) disturbance in Earth's magnetosphere. From the ground it can be observed optically as an increased auroral activity and also as increased magnetic field disturbances measured by ground-based magnetometers.

Substorms can have detrimental effects on human infrastructure in the scientific context of near-Earth space plasma processes, commonly referred to as "Space Weather". While the general behaviour of substorms today is reasonably well understood, there are still many open questions about their temporal variations: While some substorms exhibit smooth temporal variations, others exhibit rapid variations in the form of spikes (i.e., large excursions in dB/dt>~500 nT/min), and it is not known what determines the spiky nature of substorms. Understanding what drives the substorm spikiness is important since spikes may cause so-called "Geomagnetically Induced Currents" (GICs) in the ground, and such GICs can short-cut through human infrastructure (e.g. power transmission lines), causing devastating burnouts.

The project is based on the visualization and analysis of large amounts of ground-based data and satellite data, and we will statistically investigate possible drivers in the solar wind for the spikiness of substorms. The project will constitute pilot study, laying the foundation for future in-depth projects in the research group.

Requirements: Good skills in programming (e.g. C, Matlab and Python) are required. However, you do not need to have a background in space physics or plasma physics since we will go through all needed aspects of space plasma aspects within the project.

For more information, contact Maria Hamrin, maria.hamrin@space.umu.se



Left above: Kyoto AE index (bottom panel). Right above: Aurora photograph (cred. ESA).