



Characteristics of variations in the ground magnetic field during substorms at mid latitudes.

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Substorms are known to cause Geomagnetically Induced Currents (GIC) in power transmission lines through variations in the ground magnetic field. An improved knowledge and understanding of how the different phases of substorms affect the ground magnetic field will ultimately help to better understand how GIC arise. Although usually associated with high latitude power transmission networks, GIC also pose a risk to mid latitude networks such as the UK's National Grid.

Using a list of substorm expansion phase onsets derived from auroral observations by the IMAGE-FUV satellite, this study examines 553 onsets. In order to cover mid latitudes, ground magnetometer data from the SAMNET (Sub-Auroral Magnetometer Network) are exploited. These high time resolution (5s) data are used to study the ground magnetic field for an hour after onset, in particular the time derivative of the horizontal magnetic field, H . The data covers the period from 2000 to 2003 (just after solar maximum). Results are compared with a previous study of magnetic field variations at higher latitudes, using data with a much lower (1 min) cadence during substorms identified from geomagnetic indices during a period just after solar minimum.