

## **Correlation between Poynting Flux and TEC at high latitudes during extreme geomagnetic storm events**

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The Halloween Storm on 29 – 31 October 2003 and the superstorm on 20 – 21 November 2003 were two of the most extreme geomagnetic storms in solar cycle 23. These events disturbed Geospace environment causing power outages in high latitudes such as Sweden and temporary disfunction of numerous spacecrafts such as the Solar and Heliospheric Observatory (SOHO) satellite. We investigate the correlation between the Poynting flux measured by the Defense Meteorological Satellite Program (DMSP) satellites and GPS global ionosphere map (GIM) total electron content (TEC) simulated from the Center for Orbit Determination in Europe (CODE) during these events. The TEC value is an important quantity in determining radio wave delays and is strongly influenced by solar activities. The ionospheric TEC values are obtained from GPS and ground-based stations over the globe and constructed at the University of Bern. GIM TEC are sampled along DMSP satellite (F13, F15 and F16) orbits and compared to the Poynting flux measurements to demonstrate the electromagnetic energy impact from the solar wind on the ionospheric constituents at high latitudes. We also binned the TEC and Poynting flux using 2 degree magnetic latitude and 1 hour magnetic local time grids to illustrate their spatial correlation over the polar regions. The Poynting flux enhancement is found in both auroral oval and at higher latitudes and can extend below 50 degree magnetic latitude equatorward during these two superstorms. Corresponding TEC enhancement at high latitudes is noticed due to ionospheric heating.