

**FEDSAT OBSERVATIONS OF THE TOPSIDE IONOSPHERIC AND
PLASMASPHERIC RESPONSE TO THE MAJOR MAGNETIC STORM OF 15
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S. Dimitrov⁽¹⁾, P.L. Dyson⁽²⁾ and E. Yizengaw⁽³⁾

⁽¹⁾*Department of Physics, La Trobe University, Victoria 3086, Australia*
spasedimitrov1@telstra.com

⁽²⁾ *As (2) above, but E-mail: p.dyson@latrobe.edu.au*

⁽³⁾ *Institute of Geophysics and Planetary Physics, UCLA, Los Angeles, CA 90095, USA*
E-mail: ekassie@igpp.ucla.edu

ABSTRACT

An analysis of the response of the topside ionosphere and plasmasphere during a major magnetic storm on May 15 2005, in which Kp reached 8+, is presented based on FedSat data. A main feature of the observations is structures exhibiting large Total Electron Content (TEC) increases that were observed at high latitudes.

Determining TEC from Global Positioning System (GPS) signals is a well-established technique used primarily with ground-based receivers. The observations then primarily reflect the behaviour of the ionospheric F-region because the high plasma densities in the region of the F2 peak make the dominant contribution to ground-based TEC measurements. FedSat orbits at about 800 km, well above the F2 peak so the major contribution to FedSat TEC comes from the region a few hundred kilometres above the orbit, i.e. the topside ionosphere and plasmasphere.

During the most disturbed period of the May 15 storm, FedSat obtained GPS measurements of TEC over Eastern Europe during daytime. The onset of the magnetic storm was seen to produce an enhancement of TEC compared to the quiet time TEC values. It is well known that during magnetic storms the location of auroral phenomena move equatorward and the FedSat observations show that related, distinct structures in plasma density occur in the topside an ionosphere plasmasphere at about 800 - 1200 km altitude. The FedSat TEC observations also show unusually large horizontal gradients, particularly in longitude. This paper will present and discuss these observations.