

INVESTIGATIONS OF THE TOPSIDE IONOSPHERE AND
PLASMASPHERE DISTRIBUTION OF PLASMA DURING
MAGNETIC STORMS

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A relatively new data source is used to probe the topside ionosphere and plasmasphere distribution of plasma during magnetic storms.

The primary observations that will be used in this study are observations of total electron content (TEC) measurements made between a GPS receiver on a low-earth orbiting (LEO) satellite, such as CHAMP, and the GPS satellites. These measurements are different from GPS occultation measurements in that they are for positive elevation angles, that is to say, looking *up* at the satellites. Typically such measurements are made every 10 seconds as the LEO satellite moves in its orbit and anywhere from six to twelve GPS satellites are in view at a given time. Thus, this data set directly probes the topside ionosphere and plasmasphere distribution. Stankov [*J. Geophys. Res.*, 2003] and colleagues in their paper refer to this TEC data source as “over satellite electron content” or OSEC. We will focus on data from four OSEC data sources: CHAMP, SAC-C, and GRACE during this study. By combining this data set with ground GPS TEC, *in-situ* measurements of electron density from DMSP and ionosondes through the ionospheric data assimilation three-dimensional (IDA3D) space-weather mapping algorithm we will be able to relate the high-altitude plasma density near the equator and along field lines to the high-altitude distribution in the polar regions.

This presentation will focus on initial results from the October-November 2003 magnetic storms. The OSEC data will be presented and the variation of the topside and plasmasphere distribution of plasma in space and time will be investigated. Tomographic inversions of the OSEC data will be presented, which allows investigation of the height distribution of the topside and plasmaspheric plasma. Finally, IDA3D space-weather maps, using combined ground and space based data sources, will allow a global interpretation of the OSEC results.

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2. G - Ionospheric Radio and Propagation
3. (a) Data Assimilation
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