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Session 5B Paper 5
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Ionosphere/Plasmapause Variations During the 17 March 2013 Identified by Ground-based and Space-based GPS Signals

Earth's plasmasphere is a region of cold ($T \le ~1 \text{ eV}$), dense (n ~101 to ~104 cm-3) plasma located in the inner magnetosphere and coincident with a portion of the ionosphere that corotates with the planet in the geomagnetic field. Plasmaspheric plasma originates in the ionosphere and fills the magnetic flux tubes on which the corotation electric field dominates over the convection electric field. The corotation electric field results from Earth's spinning magnetic field while the convection electric field results from the solar wind driving of global plasma convection within the magnetosphere. The outer boundary of the plasmasphere is the plasmapause, and it corresponds to the transition region between corotation-driven vs. convection-driven plasmas.

During quiet periods of low solar wind speed and weak interplanetary magnetic field (IMF), ionospheric outflow from lower altitudes can fill the plasmasphere over the course of several days with the plasmapause expanding to higher L-shells. However, when the convection electric field is enhanced during active solar wind periods, such as magnetic storms, the plasmasphere can be rapidly eroded to L~2.5 or less leading to many interesting magnetospheric and ionospheric features such as plasmapause erosion, plasmaspheric plumes and ionospheric plasma outflows.

In this presentation, we focus on the dynamics of the plasmapause as observed by groundbased and space-borne GPS receivers. We will focus on the period 15 March to 19 March 2013, which includes the on-set and recovery periods of a strong geomagnetic storm. We will examine the location and erosion time scales of the plasmapause during the active portion of the storm. An extensive global network of ground-based scientific receivers (~4000) will be utilized in the study. Space-based observations will be obtained from data from the CORISS GPS radio occultation (RO) sensor on the C/NOFS satellite as well as the COSMIC GPS RO sensors.