2011 Workshop: GPS observations and tools

Long title
GPS, global scale currents and plasma structures
CEDAR-GEM
Conveners
David Murr
Gary Bust
Lars Dyrud
Description

GPS continues to be a growing observational and analysis tool for the space physics and space weather community. GPS observations have been used to investigate properties of equatorial spread-F (ESF) at low latitudes, traveling ionospheric disturbances (TIDS) and storm enhanced density (SEDs) at mid-latitudes, irregularities dues to gradient drift instabilities, auroral and cusp precipitation and magnetospheric waves at high latitudes, and as signatures of complex (chaotic) behavior.

As we move to a new phase of research emphasis on the overall dynamics of a system, and the coupling and boundaries between the thermosphere, ionosphere, magnetosphere and solar wind stream, GPS will continue to play a major role in our observations, analysis and understanding of this complex, coupled, dynamical system. For example, in the polar cap region, GPS is one of the few instruments that can directly observe space-time responses to direct coupling to solar wind variations.

This joint CEDAR-GEM workshop intends to allow researchers from these various coupled disciplines to come together and discuss current ongoing research with GPS, future possible research topics and collaborations among all the researchers and to discuss new possible techniques and analysis methods that might be use by GPS to further our understanding of the Earth's space physics environment.

Overview

This joint CEDAR-GEM workshop intends to allow researchers from the magnetosphere, ionosphere and thermosphere disciplines to come together and discuss current ongoing research with GPS, future possible research topics and collaborations among all the researchers and to discuss new possible techniques and analysis methods that might be use by GPS to further our understanding of the Earth's space physics environment.

The goal of this workshop is to have the scheduled talks be no more than 5 minutes each, and to generate discussions and questions both during the talks and after, for as long as desired. Audience members are encouraged to add a slide or two to the discussion process.

The workshop is separated into 2 sessions. The first session from 16:00-18:00 on Monday has a focus on "GPS-based studies of the Ionosphere and IT System". The second session from 10:00-12:00 on Tuesday has a focus on "GPS TEC, A new tool for investigation the MI system".

Agenda

16:00-18:00 Monday: GPS-based studies of the Ionosphere and IT System

- Coster: GPS data in Madrigal
- Galvin: The 2011 Tohoku Tsunami observed in the Ionosphere using GPS TEC
- Valladares: Studies of the low-latitude ionosphere using networks of GPS receivers
- Psiaki: GPS Investigations of Equatorial Ionospheric Scintillation: Receiver Development, Data Collection Campaigns, Inverse Diffraction, & Nonlinear Tomography
- Bust: Closely clustered GPS scintillation arrays in Antarctica
- Morton: Multi-Band GNSS Scintillation at HAARP
- Deshpande: Studying polar ionospheric irregularities using forward modeling and observations from Antarctica

10:00-12:00 Tuesday: GPS TEC, An New Tool for Investigating the MI System

- Murr: An overview of ULF wave observations with GPS TEC
- Nikoukar: Comparisons between ULF waves observed with a Doppler Sounder, Magnetometers, and GPS TEC
- Thomas: GPS Total Electron Content and SuperDARN

- Gyllen: GPS TEC comparisons with PFISR
- Murr: Recent results from the CHAIN network of receivers
- Bust: Plasmaspheric Imaging with LEO GPS TEC data
- Dyrud: Geoscan and Cedar and Gem GNSS science opportunities

Justification

GPS signals are an important tool/diagnostic for studying the coupled ionospheric system. To date it has been used more extensively in the CEDAR community and we believe the GEM community could benefit from this exchange.

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