2012 Workshop: High Latitude GPS Scintillations

Long title
High Latitude GPS Scintillations and Forward Modeling
Conveners
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Description

This workshop will provide a forum to present and discuss high latitude GPS scintillation observations from Arctic and Antarctic regions, forward modeling and inverse methods in study of high latitude ionospheric irregularities. Talks on both observation and modeling are welcome. Topics may include: GPS scintillation observations, GPS observations compared with ancillary observations from other instruments such ASI, SuperDARN, magnetometers, riometers etc., Forward EM wave propagation modeling, and inverse methods to study high latitude plasma irregularities.

Justification

Polar region is at the boundary where solar wind and magnetospheric plasma combine in the ionosphere. High latitude irregularities are therefore a result of different systems interacting with each other. GPS scintillation measurements combined with physical parameters derived from a forward propagation model, and inverse methods can be used to study the physics of these irregularities. A CEDAR workshop focused on these issues will lead to an improved understanding of the high latitude irregularities and the drivers that are responsible for their creation.

The study of ionospheric scintillations of radio signal involves the problem of electromagnetic (EM) wave propagation in random media. Modeling GPS scintillations from high latitude ionospheric irregularities can be thus considered as a 3 dimensional forward EM propagation problem. Moreover, the path of signal from satellite to ground has a variable angle of incidence. This delivers more challenges for the problem in addition to those created by inhomogeneity in the random media

of irregularities as well as by the geometry of magnetic field lines at high latitude regions. Therefore, another motivation behind this workshop is to encourage implementation of forward modeling in ionospheric irregularity study.

The proposed workshop connects to the CEDAR strategic plan in the following ways: First, the development, growth and decay of ionospheric irregularities is a complex physical problem. It couples together different geophysical regions (thermosphere, ionosphere, magnetosphere and possibly solar wind forcing), and it couples together different spatial scales (large scale drivers such as neutral winds and electric fields lead to small scale irregularities). Second, it addresses "Variability in the space-atmosphere interaction region" and third, it addresses "The systems perspective" through complexity, nonlinearity and feedback.

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