Project Details

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Project Title:
GPS Occultation Sensor Contributions to Ionospheric Space Weather Specification and Prediction

PI Name: Paul Straus
PI Email: atn@g.ucla.edu
Affiliation: Aerospace Corporation
Project Member(s):
- Crowley, Geoffrey ; COI; Southwest Research Institute
- Lorentzen, Kirsten R.; COI; Aerospace Corporation
- Anderson, Phillip C; COI; The Aerospace Corporation
- Sauve, Vera Sue; Authorizing Official; The Aerospace Corporation
- Schunk, Robert W.; Collaborator; Utah State University
- Hajj, George A; Collaborator; Jet Propulsion Laboratory

Summary:
Through analysis of data from a new type of space-based ionospheric sensor, this proposal seeks to address aspects of three Space Weather effects that can potentially impact society. First, we will characterize the global morphology, strength and occurrence of small ionospheric irregularities capable of distorting electromagnetic signals. Second, we will validate key aspects of first-principles models projections of ionospheric daily and storm-time. Both ionospheric irregularities and variability can impact communications and navigation (e.g., GPS) systems. Finally, we will develop a method to improve specification of highly energetic particles in the Earth s radiation belts that can be responsible for damage to satellite components. Attainment of these goals is made possible by the advent of the GPS occultation sensor, which is capable of measuring electron densities over the full range of ionospheric altitudes from the D-region (60-90 km), through the E-region (90-150 km), and up to the F-region (150-800 km). Over the last few years several GPS occultation sensors have been flown, generally with the primary objective of making lower atmospheric observations. However, some ionospheric observations have been made as well. The launch of the Ionospheric Occultation Experiment (IOX) in late 2001 marked the first flight of an occultation mission focused on ionospheric remote sensing. The proposed study will utilize IOX and other occultation sensor observations of D-, E-, and F-region densities and density fluctuations to address the above three objectives through statistical evaluations and model/data comparisons. Ancillary data from NASA s TIMED and SAMPEX satellites will also be used. Successful completion of the proposed work will enable development of better environmental models, improve understanding of Space Weather phenomena, and validate the utility of GPS occultation sensors as a part of future LWS space missions.

Publication References:

Summary: ''

Reference: Straus, Paul Aerospace Corporation - GPS Occultation Sensor Contributions to Ionospheric Space Weather Specification and Prediction

Summary: no summary

Reference: Anderson, P. C.; Straus, P. R.; (2005), Magnetic field orientation control of GPS occultation observations of equatorial scintillation, Geophysical Research Letters, Volume 32, Issue 21, CiteID L21107, doi: 10.1029/2005GL023781