Ronald
Caton
Space Vehicles Directorate, Air Force Research Laboratory
Keith Groves, Institute for Scientific Research, Boston College
William McNeil, Institute for Scientific Research, Boston College
Charles Carrano, Institute for Scientific Research, Boston College
Charles Rino, Institute for Scientific Research, Boston College
Rebecca Bishop, The Aerospace Corp
Oral
With the pending launch of COSMIC-2 mission, the Space Vehicles Directorate of the Air Force Research Laboratory is exploring techniques for improving capabilities for the specification of the global scintillation environment. With an initial focus on the development of improved algorithms for the use of Radio Occultation (RO) in scintillation specification, larger objectives include the development of an architecture for the incorporation of in-situ observations from the Ion Velocity Meter (IVM) instruments as well as ground-based recordings of signals from the RF Beacon transmitters to better inform existing ionospheric models.

Typical methods used to characterize the ionospheric scintillation environment with RO sensors involve the use of the tangent point along the line of occultation for the localization of turbulent regions. While these techniques have been shown to reproduce equatorial scintillation climatology, they lack the precision necessary for use of such algorithms to accurately geolocate scintillating features. Long slant paths and sweeping horizontal geometries make precise geolocation of scintillation inducing irregularities a difficult task. In a recent study using data from the Communication/Navigation Outage Forecasting System (C/NOFS) Occultation Sensor for Ionospheric Sensing and Specification (CORISS) sensor in comparison with truth data from ground-based sensors on the AFRL SCINDA (Scintillation Network Decision Aid) network, use of a tangent point based algorithm for geolocation of ionospheric irregularities resulted in spatial uncertainties of a thousand kilometers or more and temporal uncertainties of +/- 30 minutes.

Improved methodologies coupling information from the six satellite COSMIC-2 constellation (expected to provide up to 10,000 occultation measurements daily to multiple GNSS platforms) with ground-based SCINDA measurements will provide an innovative approach to the identification and characterization of equatorial ionospheric irregularities on a global scale. In this presentation, we will discuss the status of our work on enhanced RO algorithms as well as future plans for the construction of more sophisticated algorithms providing enhancements from additional COSMIC-2 sensors.
OSTS session
Regional and Global CAL/VAL for Assembling a Climate Data Record
Meeting name
Joint COSMIC Tenth Data Users' Workshop and IROWG-6 Meeting
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