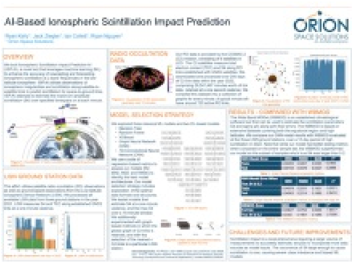
Ryan
Kelly
Orion Space Solutions
Ryan Nguyen, Orion Space Solutions
Jack Ziegler, Orion Space Solutions
Ian Collett, Orion Space Solutions
Poster
Ionospheric scintillation, characterized by rapid fluctuations in radio signal phase and amplitude, presents significant challenges to ground-to-space communication links, particularly in the low-latitude ionosphere. The lack of reliable tools for forecasting or nowcasting scintillation can impact the reliability of communication with GNSS satellites. In response to these limitations, we have built Ionospheric Scintillation Impact Prediction AI (ISIP.AI), a novel tool that leverages machine learning (ML) to enhance the accuracy of nowcasting and forecasting ionospheric scintillation in the low-latitude ionosphere. ISIP.AI utilizes observations of ionospheric irregularities and scintillation along satellite-to-satellite links to estimate scintillation for space-to-ground links.

ISIP.AI attempts to predict the maximum amplitude scintillation (S4) over specified timespans at ground-to-space links. Key inputs for the model include transmitter and receiver positions and operational data products from the COSMIC-2 mission, which provides GNSS radio occultation measurements of the ionosphere. We have implemented several ML architectures including classical ML models, Convolutional Neural Networks and Graph Neural Networks. We then evaluated these models against results from the established Wide Band MODel (WBMOD) climatological software tool.



Poster PDF
[Kelly-Ryan.pdf]
Poster category
Ionosphere and Thermosphere Research and Applications
Poster session day
Wednesday, April 17, 2024
Poster location
3
Meeting homepage
Space Weather Workshop 2024
Download to PDF