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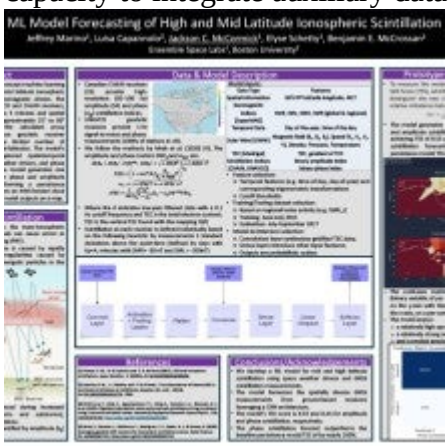
Poster
Ensemble Space Labs, in collaboration with Boston University, has developed a proof-of-concept machine learning model that forecasts high and mid latitude ionospheric scintillation over North America funded by a NASA Phase I SBIR. The training datasets were compiled from multiple sparse sources, including UNAVCO and CHAIN receivers, with temporal resolutions up to 5 minutes and spatial resolution of 1° by 1°, spanning North America (approx. 25° to 80° latitude) over the period 2015–2018. Ensemble implemented proxy indices to facilitate using geodetic receiver observations to mitigate the limited number of scintillation observations. The model's convolutional architecture captured spatiotemporal dependencies of TEC, space weather drivers, and receiver data in order to forecast probabilistic output of phase and amplitude scintillation. The model generates probabilistic forecasts for phase and amplitude scintillations one hour into the future, achieving True Skill Scores (TSS) of 0.53 and 0.44, respectively. The phase scintillation forecast outperforms the baseline persistence model TSS of .27 by nearly 100%.
The model is deployed on an AWS-hosted cloud environment that visualizes the model outputs via heat map that depicts scintillation probabilities at a 1° by 1° resolution. Analysis of different training data combinations (UNAVCO vs. CHAIN) revealed modest performance variations, supporting the model's robustness and capacity to integrate auxiliary data without degradation in performance.


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