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Poster

This study presents a mapping of high-latitude ionospheric total electron content (TEC) during the March 2023 storm period. High latitudes, particularly polar regions, are inadequately covered by ground-based GNSS receivers for ionospheric observation. To address this, the study investigates the integration of space-based GNSS measurements from Spire Nanosatellites to improve the 2D mapping of vertical TEC. The data used include line-of-sight (LOS) TEC measurements from the Madrigal database, as well as radio occultation (RO) and grazing-angle GNSS reflectometry (GNSS-R) measurements from Spire Nanosatellites. During the selected period from March 22-24, there were ~13,700 sets of RO data and ~16,300 sets of grazing-angle GNSS-R data available. Using all these measurements, we formulated a 2D TEC mapping problem for high latitudes (e.g., northern hemisphere latitudes > 60 degrees) with a spatial resolution of 2-degrees latitude by 4-degrees longitude. The electron density profiles simulated by the Whole Atmosphere Model are employed to support the use of space-based GNSS. The detailed methodology, mapping results, and some comparative analysis will be presented.

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Ionosphere and Thermosphere Research and Applications

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