Validation and Application of FORMOSAT-7/COSMIC-2 Space Weather Product Global Ionospheric Specification

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Abstract

The FORMOSAT-7/COSMIC-2 (F7/C2) satellite mission was launched on 25 June 2019 with six low-earth-orbit satellites, and can provide thousands of daily radio occultation (RO) soundings in the low- and mid-latitude regions. This study shows the results of Global Ionospheric Specification (GIS) electron density, which is space weather data products based on F7/C2 RO sounding. GIS is the ionospheric data assimilation product based on the Gauss-Markov Kalman filter, assimilating the ground-based GPS and space-based F7/C2 RO slant total electron content, providing continuous global three-dimensional electron density distribution. Detailed validation of GIS is carried out using manually scaled digisonde N_mF_2 (h_mF_2), yielding correlation coefficients of 0.903 (0.862). Moreover, GIS is capable of reconstructing the variation of equatorial ionization anomaly (EIA) crests during a minor geomagnetic storm. The results show that GIS is reliable product in studying ionosphere climatology and day-to-day space weather variations.