

EGU21-1897

<https://doi.org/10.5194/egusphere-egu21-1897>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Ionospheric F-layer scintillation observations using COSMIC and COSMIC2 GPS/GNSS radio occultation data

Lung-Chih Tsai¹, Shin-Yi Su¹, and Chao-Han Liu²

¹National Central University, Center for Space and Remote Sensing Research, Jhongli District, Taoyuan City, Taiwan (lchtsai@csrsr.ncu.edu.tw)

²Academia Sinica, Taipei, Taiwan

The FormoSat-3/ Constellation Observing System for Meteorology, Ionosphere and Climate (FS3/COSMIC) has been proven a successful mission on performing active limb sounding of the ionosphere using the GPS radio occultation (RO) technique. The follow-on program called FS7/COSMIC2 is in progress with satellite launched on 25 June of 2019 and includes six low-Earth-orbit (LEO) satellites at 24°-inclination and ~720-km orbits to receive multi-channel (1.5GHz and 1.2GHz) GPS and GLONASS satellite signals. The FS7/COSMIC2 can provide about 5,000 GNSS RO observations per day which are increased by a factor of about 5 comparing to FS3/COSMIC and within the region from the geographic equator to the latitude at 40°. We process 1-Hz amplitude data and obtain complete limb-viewing profiles of the undersampling-S4 scintillation index to study global F-layer irregularity morphology. There are a few percent of FS3/COSMIC and FS7/COSMIC2 GPS/GNSS RO observations having >0.09 undersampling S4max values on average. However, seven identified areas Central Pacific Area, South American Area, African Area, European Area, Japan Sea Area, Arctic Area and Antarctic Area have been designated to have a much higher percentage of strong limb-viewing L-band scintillations. Generally, the F-layer scintillation climatology, namely, its variations with each identified zone, altitude, season, and local time have been documented. The large dataset from the FS3/COSMIC and FS7/COSMIC2 programs enable statistical studies on equatorial and low-latitude ionospheric irregularity and their models.