Geophysical Research Abstracts
Vol. 17, EGU2015-4258, 2015
EGU General Assembly 2015

Ionospheric electron density profiling and modeling of COSMIC following-on simulations

Lung-Chih Tsai (1,2), Shin-Yi Su (1), Chao-Han Liu (3), and Tulasi Ram Sudarsanam (4)

(1) Center for Space and Remote Sensing Research, National Central University, Chung-Li, Taiwan, (2) Institute of Space Science, National Central University, Chung-Li, Taiwan, (3) Academia Sinica, Taipei, Taiwan, (4) Indian Institute of Geomagnetism, Navi Mumbai, India

The FormoSat-3/ Constellation Observing System for Meteorology, Ionosphere and Climate (FS3/COSMIC) has been proven a successful mission on profiling ionospheric electron density (Ne) by the radio occultation (RO) technique. Thus a following-on program (called FS7/COSMIC2) has been decided in progress. The COSMIC following-on mission will have six 24°-inclination and 550-km low Earth orbiting (LEO) satellites and six 72°-inclination and 750-km LEO satellites to receive Tri-G (GPS, GLONASS, and Galileo) satellite signals. In this study, FS7/COSMIC2 RO observations were simulated by calculating limb-viewing GNSS-to-LEO TEC values through two independent ionospheric models (the TWIM and NeQuick models) separately. We propose a compensatory Abel-inversion scheme to improve vertical Ne profiling and also three-dimensional (3D) Ne modeling in the FS7/COSMIC2 simulation study and also future real observations. In this feasibility study, FS7/COSMIC2 RO observations will increase $\sim$10 times compared with FS3/COSMIC, and the windowing day number to collect Ne profiles and derive every half-hour 3D Ne model could be decreased from 30 to 6 days. The simulation results show that the improvements of rms foF2 and hmF2 differences are at >30% in relative percentage over the standard Abel inversion, and the modeled 3D rms Ne differences, i.e. errors, are about one order less than those from FS3/COSMIC.