

The initial results from the low-latitude ionospheric tomography network with the FORMOSAT 3/COSMIC TBB program

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Abstract

Since 2006, we have set up four ground stations locating at Chung-Li (25.136°N, 121.539°E), TasoTun (23.981°N, 120.697°E), CheCheng (22.725°N, 120.544°E) and Itu Aba Island (10.06°N, 106.244°E) of the tropical region to receive beacon signals from six FORMOSAT-3/COSMIC satellites. Applying the differential Doppler technique on six quadrature components of three-band beacon signals, we can obtain the total electric contents (TEC) values and scintillation along the radio path through the ionosphere. Such measurements can be used to derive to the regional ionospheric irregularity and tomography. In this paper, we confirm the receiving antenna pattern and transmitting antenna from COSMIC satellites and we have implemented the multiplicative algebraic reconstruction techniques (MART) algorithm to reconstruct ionospheric tomography images and observed the diurnal variations and the dynamic of equatorial anomaly that the peak appear at sunrise and then moved to the poles of the earth. The maximum of vertical TEC is located at about 10° of magnetic latitudes about after local noon and moved to equator at sunset and then disappeared at night.

Keywords: Ionosphere, equatorial anomaly region, scintillation, ionospheric tomography.