

Mapping of Ionospheric Characteristics at the F2-Layer Peak Based on the GPS Radio Occultation Data

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The FORMOSAT-3/COSMIC program used the radio occultation technique to receive multi-channel GPS carrier phase signals from six low Earth orbiting satellites and approach active limb sounding of the Earth's atmosphere and the ionosphere. Using the Abel inversion through compensated total electron content (TEC) values, we can collect about fifteen hundreds of vertical profiles of the ionospheric electron density within one day. The retrieved foF2 and hmF2 results have been used to produce numerical maps representing the complex properties on a world-wide scale. In this study we choose as our coordinate functions a particular set of the functions $G_k(\lambda, \theta)$ of which the surface spherical harmonics are linear combinations and are specified of terms involving with three groups of (1) powers in $\sin \lambda$ for representing the main latitudinal trend without longitudinal variation, (2) first order sectorial harmonics for representing first order longitudinal variation, and (3) second order tesseral order harmonics for second order longitudinal variation. The derived numerical maps have also been examined through the original CCIR and URSI maps used in the International Reference Ionosphere (IRI) model.

Keywords Radio occultation, Ionospheric characteristics, Total electron content (TEC)