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Numerical mapping of foF2 and hmF2 based on the GPS/MET data

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The Global Positioning System/Meteorology (GPS/MET) program used the radio occultation technique to receive multi-channel GPS carrier phase signals from a low Earth orbiting satellite (the MicroLab-1) and demonstrate active limb sounding of the Earth's atmosphere and the ionosphere. Using the Abel inversion through compensated total electron content (TEC) values, we have collected more than forty thousands of vertical profiles of the ionospheric electron density from April 1995 to Feb. 1997. 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 λ 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 GPS/MET observations and compared with the original CCIR and URSI maps.