

Rocket GPS-TEC Tomography method to obtain high altitude resolution

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In the high altitude atmosphere of the earth, there is a layer of atmosphere called ionosphere, filled with extricated electrons, and the observation of the electron density profile in the ionosphere is recently taken notice of.

As an approach to the observation of electron density profile in the ionosphere, there is the remote sensing method called GPS-TEC method, which calculates the total electron counts (TEC) on the transmission path of GPS wave, from its propagation delay. By applying tomography analysis on TEC values in multiple paths, which are one dimensional information, the electron distribution profile can be earned as two dimensional data, and this method is called GPS-TEC tomography method. However, this method has a defect, that it has low resolution in altitude direction.

In order to enhance the altitude resolution, we have proposed "Rocket GPS-TEC Tomography method," which applies tomography analysis on the TEC values earned by rocket observation. Compared to the conventional GPS-TEC tomography, this method can observe TEC values in horizontal paths, as the observation rocket navigates in both range and altitude direction. By this approach, we assumed that altitude resolution of the tomography result will improve. In this study, we verified the efficacy of proposed method through simulation experiment.

Keywords: ionosphere, GPS-TEC, sounding rocket