

GPS Ionospheric Tomography with the Constrained Least-squares Method

Shuhei Teraishi[1]; Akinori Saito[1]; Genta Ueno[2]; Mamoru Yamamoto[3]

[1] Dept. of Geophysics, Kyoto Univ.; [2] ISM; [3] RISH, Kyoto Univ.

The three-dimensional electron density distribution in the ionosphere was estimated with a newly developed GPS ionospheric tomography model using a dense GPS network in Japan operated by Geographical Survey Institute (GSI). The constrained least-squares method was applied to the tomography model because the intersecting-links between GPS satellites and receivers over Japan are dense enough to estimate the ionospheric electron density without any a priori electron density distribution model. The electron density profile derived from the IS observation of the MU radar was also included in the procedure to increase the accuracy of the estimated electron density distribution. The constraint for the estimate is that the vertical gradient of the electron density is restricted to be low in the altitude above 800km.

Results of the GPS ionospheric tomography using absolute total electron content data derived from GEONET data on the geomagnetic quiet days and a disturbed day will be evaluated quantitatively using the electron density profile by the MU radar at Shigaraki and the peak electron density data by the ionosonde at Kokubunji.