

リアルタイム電離圏3次元トモグラフィーとその応用

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Real-time 3-D ionospheric tomography and its application to ionospheric studies

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For ionospheric studies and also for advanced GNSS applications, obtaining three-dimensional ionospheric density profiles are important. However, tools which can provide ionospheric density are limited. Three-dimensional ionospheric monitoring by using a GNSS network can be a powerful tool to provide 3-D ionospheric density profiles.

Based on the 3-D ionospheric tomography technique [1,2], we have developed a system to reconstruct ionospheric density profile over Japan in real-time. By using GPS data from GEONET provided through a data distribution company, 3-D ionospheric density profile over Japan is reconstructed every 15 minutes with typical latency of 10 minutes.

The tomography results are shown to be consistent with observations by four ionosondes operated by NICT. Performance of tomography in different parts of Japan is discussed in the lights of ground receiver distribution as well as GPS satellite orbits.

3-D ionospheric density profiles during magnetic disturbances are examined and usefulness of 3-D ionospheric tomography is demonstrated.

References:

[1] G. K. Sela, et al., Three-dimensional GPS ionospheric tomography over Japan using constrained least squares, *J. Geophys. Res.*, 2014.

[2] C. H. Chen et al., Medium-scale traveling ionospheric disturbances by three-dimensional ionospheric GPS tomography, *Earth Planets and Space*, 2016.