

地上GPSネットワークを用いて、電離層3Dトモグラフィ

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Ionospheric 3D Tomography by using ground-based GPS network

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In recent years, the tomography method has been increasingly used for the investigation of electron density distribution in the ionosphere. However, the loss of information and inconsistency of data make ionospheric tomography an ill-posed inverse problem. The algorithm developed by SPEL of Kyoto University used the constraint condition that the gradient of electron density tends to be smooth in the horizontal direction and steep in the vicinity of the F2 peak.

Based on the constrained least-square method of SPEL's model, we further construct an algorithm to obtain the optimized solution. Comparing with the SPEL's model, the new algorithm has fast calculation and fast hyper-parameter survey. The new algorithm mainly uses the ground-based Global Positioning System (GPS) receiver data. Observations by other instruments, e.g. LEO satellites, ionosondes, and radars, can also be included in this algorithm to match well with the real distribution of ionospheric electron density.

The simulation results tested with total electron content (TEC) data generated using the International Reference Ionosphere (IRI-2007) model and measured by the GPS satellites will be discussed in the presentation.