ニューラルネットワークを用いた電離圏トモグラフィー

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Neural Network based Ionsopheric Tomography

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Three dimensional ionospheric tomography is effective for investigations of the dynamics of ionospheric phenomena. However, it is an ill‐posed problem in the context of sparse data, and accurate electron density reconstruction is difficult. The Residual Minimization Training Neural Network (RMTNN) tomographic approach, a multilayer neural network trained by minimizing an objective function, allows reconstruction of sparse data. In this study, we validate the reconstruction performance of RMTNN using numerical simulations based on both sufficiently sampled and sparse data. The reconstructed images from the disturbed and sparse data are consistent with the model data, except below 200 km altitude. To improve this performance and limit any discrepancies, we used information on the electron density in the lower ionosphere. Also we apply the developed method to actual observed data. The details will be shown in our presentation.

The results suggest the restricted RMTNN‐tomography‐assisted approach is very promising for investigations of ionospheric electron density distributions, including studies of irregular structures in different regions.