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一般化オーロラトモグラフィの EISCAT_3D プロジェクトへの応用
Application of Generalized Auroral Computed Tomography to the EISCAT_3D project

田中 良昌 [1*], 小川 泰信 [1], 門倉 昭 [1], 山岸 久雄 [1], 宮岡 宏 [1], 麻生 武彦 [2], 上野 玄太 [3], 才田 聡子 [4]
Yoshimasa Tanaka[1*], Yasunobu Ogawa[1], Akira Kadokura[1], Hisao Yamagishi[1], Hiroshi Miyaoka[1], Takehiko Aso[2], Genta Ueno[3], Satoko Saita[4]

[1] 国立極地研究所, [2] 総合研究大学院大学, [3] 統計数理研究所, [4] 情報・システム研究機構　新領域融合研究センター
[1]National Institute of Polar Research, [2]The Graduate University for Advanced Studies, [3]The Institute of Statistical Mathematics, [4]Transdisciplinary Research Integration Center, Research Organization of Information and Systems

Aurora Computed Tomography (ACT) is a method for retrieving three-dimensional (3-D) distribution of auroral luminosity from auroral images obtained simultaneously by the multi-point observation. As a next step of the ACT, we have developed Generalized - Aurora Computed Tomography (G-ACT) that reconstructs the energy and spatial distributions of precipitating electrons from multi-instrument data, such as ionospheric electron density from the EISCAT radar, cosmic noise absorption (CNA) from imaging riometer, as well as the auroral images. This method is compatible with 3-D ionospheric data observed by the EISCAT_3D radar, because the tomography method essentially assumes that the observational data are the projection of the 3-D data.

In this study, we examine how the G-ACT method can contribute to the EISCAT_3D project by numerical simulation. We first obtained auroral images observed by ALIS (Aurora Large Imaging System) and the electron density distribution observed with the EISCAT_3D radar by assuming spatial and energy distribution of incident electrons and then applied the G-ACT to these data. The results showed a possibility that the G-ACT can interpolate the electron density distribution observed with the EISCAT_3D radar at a higher spatial resolution. On the other hand, the 3-D aurora distribution reconstructed from only optical images was improved by a use of the EISCAT 3-D data. Furthermore, we suggest where new imagers should be installed for simultaneous observation with the EISCAT_3D radar.

キーワード: オーロラトモグラフィ, EISCAT_3D, 逆問題, 3 次元構造, オーロライメージャ, 電離圏電子密度
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