R005-02
Zoom meeting C ：11/1 AM1 (9:00-10:30)
9:15〜9:30

Improvement of the Auroral Computed Tomography analysis method for each aurora type

#Yoshimasa Tanaka[1)],Yasunobu Ogawa[2)],Mizuki Fukizawa[3)],Takeshi Sakanoi[4)],Keisuke Hosokawa[5)],Takuo Tsuda[5)],Akira Kadokura[6)]
([1]NIPR/ROIS-DS/SOKENDAI,([2]NIPR,([3]Graduate School of Science, Tohoku University,([4]PPARC, Grad. School of Science, Tohoku Univ.,([5]UEC,([6]ROIS-DS/NIPR

Auroral Computed Tomography (ACT) is a method to reconstruct the three-dimensional (3-D) spatial distribution of the auroral luminosity and the energy distribution of the precipitating electrons from auroral images taken simultaneously at multiple observation sites. So far, the ACT method has been mainly applied to discrete auroras, and has been clarified to be effective in estimating their altitude profiles and the energy spectra of the precipitating electrons. It is generally difficult to reconstruct the 3-D distribution of faint auroral phenomena, such as pulsating auroras, by the ACT analysis. Due to the development of high-sensitivity imagers, however, there is a growing demand for the use of ACT analysis for the pulsating auroras. The improvement the ACT method and analysis procedures is required to reconstruct the 3-D distribution of the pulsating aurora.

In this study, we summarize the ACT analysis method and its key points separately for the discrete auroras and pulsating auroras. In particular, we focus on the following points: (1) the reduction of the effect of the diffuse auroras, (2) the estimation of the relative sensitivity between imagers, (3) the determination of the hyper-parameters of the regularization term, and (4) the validation of the reconstruction results using model auroras. We have also extended the ACT method to more generalized one, the G-ACT method, which retrieve the 3-D spatial distribution of the aurora (and ionospheric electron density) and the energy distribution of the precipitating electrons by combining multiple auroral images with ionospheric electron density observed by radars. We also show the points to be considered when combining optical data and ionospheric electron density data in this G-ACT analysis.