

3D structure of aurora observed in October 2005

Yoshimasa Tanaka[1]; Takehiko Aso[2]; Akira Kadokura[2]

[1] ROIS; [2] NIPR

We have studied an auroral tomographic inversion analysis as one of subjects of Function and Induction Research Project at Transdisciplinary Research Integration Center, Research Organization of Information and Systems. This method enables us to reconstruct the three-dimensional (3D) structure of aurora luminosity and to understand the physical and dynamical process of auroral formation.

We applied this technique to some auroral events observed at the Swedish ALIS (Auroral Large Imaging System) stations in October 2005. For data analysis, the SIRT (Simultaneous Iterative Reconstruction Technique) was applied to the monochromatic images at 427.8-nm wavelength. The auroral arc-like structure observed at 0052-0101 UT on 25 October showed an interesting relation between its motion in the horizontal plane and its luminosity height profile. The arc-like structure rotated counterclockwise as one saw the sky from the ground, and the arc drift speed was higher (lower) in the region where the peak altitude of luminosity was higher (lower). In the presentation, we will discuss these results in terms of the magnetosphere-ionosphere coupling.

Furthermore, we plan to extend the computed aurora tomography to the Generalized - Computed Aurora Tomography, which enables to estimate the energy distribution of precipitating electrons based on the monochromatic aurora images, electron density profile from EISCAT radar, and cosmic noise absorption (CNA) from imaging riometer. We would like to discuss the method to estimate the energy distribution from the height profile of aurora luminosity and to combine CNA data with it.