

Preliminary results of auroral tomography analysis of discrete arcs observed on March 14, 2015

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We conducted a campaign of auroral tomography observation using multi-point imager network and the EISCAT UHF radar in Northern Europe in March, 2015. During this campaign, an auroral breakup was observed at 23:15 UT on March 14 by three all-sky EMCCD imagers and three wide-view CCD imagers. Wavy structure of discrete arcs was often observed around the magnetic zenith at Tromso from 22 to 23 UT and pulsating aurora was observed after the breakup. The monochromatic (427.8 nm) images were taken at a sampling interval of 2 seconds by the three EMCCD imagers and at an interval of 10 seconds by all the six imagers. The EISCAT UHF radar at Tromso measured the ionospheric parameters along the field line at the magnetic zenith from 20 to 24 UT.

We apply the auroral tomography method to these data set to reconstruct reliable three-dimensional distribution of the 427.8 nm emission, that will allow us to investigate quantitatively the following subjects; (1) relation between the 427.8 nm emission and electron density enhancement along the field line, (2) spatial distribution of energy of precipitating electrons in the wavy structure, in particular, relation between the energy of precipitating electrons and thickness of discrete arc, (3) relation between motion of the wavy structure and spatial distribution of the ionospheric conductivity, and (4) spatial and temporal variations of energy distribution of precipitating electrons at the auroral breakup. We present preliminary results from the auroral tomography analysis of the discrete arcs.

Keywords: aurora, tomography analysis, 3D distribution, ionosphere, EISCAT radar