東向きに拡大するオーロラサージのオーロラトモグラフィ解析結果

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Results of auroral computed tomography analysis of eastward expanding auroral surges

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We present results of auroral computed tomography (ACT) analysis of three eastward expanding auroral surges (EEASs) observed on March 9, 2013. We conducted a campaign of auroral observations in northern Scandinavia using multiple imagers and the European Incoherent Scatter (EISCAT) radar from March 5 to March 9, 2013. Three EEASs were observed intermittently at about 15-minute intervals in the post-midnight sector (01:55-02:40 MLT) by monochromatic (428nm) all-sky EMCCD imagers at Tromso (69.6N, 19.2E), Norway, Kilpisjarvi (69.0N, 20.9E), Finland, and Abisko (68.4N, 18.8E), Sweden, with an exposure time of about 2 seconds and an sampling interval of about 10 seconds. We applied the ACT technique to these EMCCD image data. The ACT allowed us to accurately estimate horizontal sizes and drift velocities of the surges. In addition, it was found that the altitude of maximum emission was temporally stable and confined to a narrow range between 96 km and 114 km. The averaged energy of precipitating electrons that was estimated by the ACT with a traditional model for electron auroral emission (Rees 1993) was mainly distributed between 2 keV and 7 keV with a maximum at 4 keV. Furthermore, we found that the averaged energy increases with increasing total energy flux of precipitating electrons. The relation between the averaged energy and total energy flux may be consistent with a theory in which electrons are accelerated by a field-aligned potential difference (Ono et al., 1993). On the other hand, the relation between the averaged energy and the width of discrete arc was not clear, because the averaged energy showed a strong dependence on the location of discrete arc, which may be explained by artifacts that appear at the edge of images. In the presentation we also show a substorm observed by a campaign of auroral tomography observations in March, 2015.