PEM28-P01 Room:Convention Hall Time:May 27 18:15-19:30

The estimation of the altitude of auroral emission from grand-based multiple optical observation

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It is known that precipitation of relatively high energy (greater than 10 keV) electrons produce pulsating aurora. However, precise characteristics of precipitating electrons producing pulsating aurora, such as the local time dependence of their energy, and small-scale distribution within a patch (~100 km horizontal scale) are not understood well. Ground-based optical triangulation is useful to estimate the auroral height, which is responsible to the energy of precipitating electrons.

In this study, we analyzed the data of N2+428nm auroral emission that obtained with ground-based all-sky EMCCD cameras at three stations in north Scandinavia (Kilpisjarvi, Abisko and Tromso), for the pulsating auroral event during 26th February, 2014 to estimate the pulsating auroral height using the triangulation method.

We chose an auroral patch which is seen correspondence each other visually and positioned near the center the field of the view of the EMCCD camera. We used data in range where is in the latitude of 68-69 degrees north and the longitude of 20-24 degrees east in this analysis to analysis data in area surrounded auroral patch. Then, we gained relatively auroral intensity distribution to divide intensity at each point by average of intensity in that data selected.

To obtain the distribution between two point, we did subtraction of relatively intensity at two points . And same steps were conducted for other patterns. We calculated the distribution by changing the altitude at intervals of 2km. When the distribution was the minimum value, it was the auroral height.

We estimated that auroral height is 98~104km in this case. This height was in range of the tick electron density zone (about 90-120km) observed EISCAT simultaneously. Compared with past studies, this result is said that it is consistency value and the precipitation electron may have ~10keV.

In this presentation, we report these result of estimation and discuss them.

Keywords: pulsating aurora, altitude of auroral emission, grand-based multiple observation