Comparison of CNA and optical auroras observed at Poker Flat,Alaska

yoshizumi monzen[1], Mamoru Ishii[2], Hirotaka Mori[3], Yasuhiro Murayama[2], Takashi Okuzawa[4]

[1] EC,UEC, [2] CRL, [3] Global Environment Div., Comm. Res. Lab., [4] Dept. Info.& Commun.Eng., Univ. Electro-commun.

http://www.uec.ac.jp/

The movement of Cosmic Noise Absorption region with high velocity, so called CNA drift, is often found in the dataset of imaging riometer measurement. The main purpose of this study is to research the characteristics of optical aurora during the CNA drift. The dataset of CNA is obtained from the imaging riometer at Poker Flat Research Range (65.1N, 147.5W), Alaska. In addition, the dataset of the meridian scanning photometer (MSP) is used for the comparison. Some initial results show that the CNA distribution is quite similar to that of optical aurora. We will present some quantitative comparisons using numerous examples, and discussions about energy spectrum in CNA drift event.

The movement of Cosmic Noise Absorption region with high velocity, so called CNA drift, is often found in the dataset of imaging riometer measurement (e.g., Hargreaves, 1970). Some studies explained that this phenomena occurs by the movement of flux tube along geomagnetic field line which connects between magnetospheric source region and ionosphere.

The main purpose of this study is to research the characteristics of optical aurora during the CNA drift. In a sense it is equivalent to the research of energy spectrum of the CNA drift. While the source of CNA is thought relatively high energy electrons (40-60keV), the energy range of optical aurora is less than 10keV. Thus a quantitative analysis of the comparison between auroral luminosity and the magnitude of CNA will give us the information of particle energy spectrum.

The dataset of CNA is obtained from the imaging riometer at Poker Flat Research Range (65.1N, 147.5W), Alaska. This instrument started to operate on October 1995. This system scans the viewing region of a 400km*400km square of the radio sky at the 90km altitude every second, using 208 available antenna beams among 256 antenna phasing patterns. The maximum of horizontal spatial resolution is 11km at 90km near the zenith over the antenna, which will enable us to resolve fine structures of auroral arcs with width of the order of tens of kilometers. In addition, the dataset of the meridian scanning photometer (MSP) is used for the comparison. This instrument measured the absolute intensity at wavelengths of optical aurora, i.e., 557.7nm, 630.0nm, 427.8nm, and 486.1nm, in every second.

Some initial results show that the CNA distribution is quite similar to that of optical aurora. We will present some quantitative comparisons using numerous examples, and discussions about energy spectrum in CNA drift event.