

Study on the energy characteristics of the pulsating aurora using ground-based observation

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Energy characteristics of the precipitating electrons for the pulsating aurora was analyzed by using the zenith fixed multi-color photometer data at Syowa Station in 2003. The two emission wavelengths, 844.6nm (OI) and 670.5nm (N2 1PG) were used, and the same method as Ono et al. (1992) and Morishima et al. (1993) was applied for the analysis. The number of the events analyzed was 37. For each event, average energy, E_{av} and total energy flux, E_{tot} were calculated, assuming that the energy spectrum of the precipitating electrons are Gaussian. Followings results were obtained: (1) The minimum and maximum values of E_{av} are 0.03-7.66keV and 4.46-37.8keV, respectively. Average values are 2.03keV and 13.60keV, respectively. Difference between the maximum and minimum is 4.38-34.27keV, and the average is 11.57keV. Both the minimum and the maximum values increased as the observation local time goes from midnight to morning side. (2) The minimum and the maximum values of E_{tot} are 0.29-5.13 erg/cm²/sr/sec, and 2.69-22.9 erg/cm²/sr/sec, respectively. The average values are 1.99 and 6.65 erg/cm²/sr/sec, respectively. Difference between the maximum and minimum is 2.23-4.66 erg/cm²/sr/sec, and the average is 4.66 erg/cm²/sr/sec. (3) If the fitting relation, $E_{tot} = A E_{av}^B$ is assumed, then the value of B is 0.4-0.8, and the average is 0.6. These values are significantly smaller than the values in Morishima (1993), 0.82-1.4. (4) There are several types in the variation in E_{av} - E_{tot} relationship for the one pulsation sequence (OFF - ON - OFF): (Type a) Linear variation type; (Type b) E_{av} in the OFF to ON sequence is clearly larger than that in the ON to OFF sequence; (Type c) E_{av} in the OFF to ON sequence is clearly smaller than that in the ON to OFF sequence; (Type d) Two separate lines appears for the OFF and ON period. These results will be discussed in our presentation.