Statistical analysis of auroral substorm evolution using ground-based data at Syowa Station

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A statistical analysis of auroral substorm was carried out using the ground-based auroral observation at Syowa Station in the Antarctic. All-sky TV camera video data obtained by the 45th Japanese Antarctic Research Expedition (JARE-45) during February to October in 2004 were analyzed. Occurrence frequency, local time distribution, and propagation speed of the poleward expansion (PE), N-S aurora (NS), and pulsating aurora (PA) are especially focused.

Following results were obtained:

1.Both occurrence rate of PE and the ratio of NS to PE occurrence are high in March and September.

2.Occurrence rate of PE and NS has a peak around 23h MLT. As for the PA, the local time distribution is rather flat from 20h to 3h MLT.

3.NS appears about 13 minutes after PE, and PA appears about 29 minutes after PE in average.

4.The poleward expanding speed of PE is about 1.7 km/s, and the drift speed of NS in the east-west direction is about 2.4 km/s in average.

In our presentation, we will discuss such results in detail.