

## Spatial structures and generation mechanisms of flickering auroras

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In order to investigate the generation mechanisms of flickering auroras the high-speed imaging photometer system was operated at Syowa station (-66.2 MLAT) in Antarctica in 1998 and 35 events were identified as flickering auroras. The important results obtained from these observations and data analyses are summarized below.

Using these temporal and spatial characteristics of flickering auroras, the generation mechanisms of flickering auroras are investigated. Comparing with theoretical scales of the dispersive Alfvén wave (DAW), flickering auroras observed at Syowa station are produced by electron flux modulations due to DAW in the altitude range of 2000 - 5000 km. In addition, important evidence on the evolution of flickering auroras was found from the data analysis. That is, neighboring flickering spots (or columns) often appear in pairs and their luminosities change synchronously as if bright and dark spots (or columns) interchange. An isolated flickering spot (or column) is also observed. These flickering spots (or columns) remain in almost the same area during their lifetime and their shapes are smeared every half flickering period. The basic theory of DAW and ray tracing model demonstrate that the ray path of DAW is restricted within a narrow field-aligned resonance cone. Considering this result, we have proposed a new model in which two wave packets emitted from a localized source and propagating obliquely to the magnetic field line with opposite perpendicular wave vectors interact in the field-aligned resonance cone. Model calculation showed that the spatial and temporal structures of these interference wave exhibit similar characteristics as the observed spatial structure and evolution of flickering spots or columns. All these facts suggest that combinations of the multi-wave interaction and the resonance cones of DAW in the auroral acceleration region at 2000 - 5000 km altitudes produce the spatial and temporal structures of flickering auroras.