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Observation of flickering aurora using a high-speed EMCCD camera.

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Flickering aurora is characterized by s the intensity modulation with a frequency of about 10 +/- 3 Hz, and by the horizontal scale of patch or column structure with a range of several km. It is known that electromagnetic ion cyclotron (EMIC) waves or inertial Alfven waves (IAW) can contribute to produce the flickering aurora. In addition, resent recent ground-based optical data demonstrated the existence of small structures less than 1 km. Since both of the quasi-electrostatic field-aligned potential drop and the inertial Alfvenic acceleration play key role on the generation of flickering aurora, it is important to investigate the precise dynamics of flickering aurora using a ground-based instrument. However, such precise observations have rarely been carried out so far. To clarify the precise dynamics of small-scale aurora such as flickering aurora, we conducted ground-based optical measurements with ground-based observations with an EMCCD camera at Toolik field station (68.6N, 149.6W) and Poker Flat Research Range (65.1N, 147.3W), Alaska, during the period from December 2009 to March 2010. The EMCCD camera measured N2 1PG aurora at 670 nm pointing to the local magnetic zenith, and was continuously operated with a frame rate of 100 Hz, bin number of 64 x 64, and spatial resolution of 280 m mapping at an altitude of 110 km. At Poker Flat another EMCCD camera was additionally installed, and measured O 845 nm aurora simultaneously. Further, to detect the magnetic variations in the ELF range caused by EMIC and inertial Alfven waves, we installed the search coil magnetometers and operated with 400 Hz sampling. In this presentation, we will report the initial results of these observation data focusing on the flickering aurora event.

Keywords: aurora, flickering, high-speed imaging, optical observation, acceleration, alfven wave