地上複合観測によるパルセーティングオーロラの時空間変動特性とMLT依存性

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Temporal and spatial variations of pulsating auroras and the MLT dependence obtained from ground-based observations

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Pulsating Aurora(PA) changes its emission amplitudes periodically with wave forms of rectangular pulses, and the typical period is from a few seconds to a few tens of seconds [e.g., *Oguti et al*., 1981; *Yamamoto*, 1988]. It's one of auroras seen usually in recovery phase of substorm between postmidnight and dawn sector. Optical observations have been carried out for a long time and showed that the sizes of PAs in the latitudinal and longitudinal directions were 10-200 km. Recently, some ground-satellite coordinated observations suggested generation mechanisms of PAs in detail, and they are mainly categorized into pitch angle scatterings due to either whistler mode wave chorus or Electron Cyclotron Harmonics[*Nishimura et al*., 2010; *Liang et al*., 2010], and time-varying field aligned potential[*Sato et al*., 2004]. However, which one of above generation mechanisms is dominant remains to be investigated.

Ground observations have been made mainly using all-sky imagers from now on, but they were inadequate for quantitative discussion about small-scale characteristics of PAs such as the shapes and dynamics due to their spatial resolutions. In addition, fast temporal variations of intensity like quasi-3Hz modulations, which is reported by a number of particle observations[e.g., *Sandahl et al*., 1980], is hardly discussed in detail using ground instruments.

We have carried out observations using multiple instruments(an EMCCD camera, an all-sky video camera, a photometer, and a search coil magnetometer covering the frequency range of ELF-VLF) between Nov. 2010 and Mar. 2011 at Poker Flat Research Range. Our EMCCD camera has narrow field of view corresponding to 100km x 100km at altitude of 110 km and high sampling rate up to 100 frames/sec.

An initial analysis result of event on Mar. 4th 2011around 1100UT revealed two important features of PAs in small-meso scale. One is PAs in the FOV could be categorized into three regions which showed different periods. Another is 1-3Hz modulations were significant inside each patches, and it seemed that there was no higher frequency modulations. In addition, simultaneous observations with the search coil demonstrated that modulations of PA ranged 1 to 3Hz correlated to ELF amplitudes integrated over frequency range of 1-10Hz. On the other hand, enhancements of VLF emissions corresponding to whistler mode waves were not seen during this period. However, isolated PA seen around UT14:30 on the same day showed continuous modulations with peak at 3Hz and no correlations to ELF amplitudes.

These results demonstrate that the generation process of PA depends on a variety of factors in the ionosphere and the magnetosphere and PA presents different temporal and spatial features such as modulations and relations to ELF-VLF waves. We are going to present results of multi-events study in order to investigate the above temporal and spatial features.