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A new SuperDARN two-dimensional high temporal resolution ionospheric electric field observation

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It was recently revealed that electric field collocated with pulsating aurora shows periodic variations closely synchronised with an occurrence of the aurora by analysing electric field data along a single SuperDARN beam and simultaneous optical auroral data with an all-sky TV camera [Hosokawa et al., JGR, 2008]. To investigate the physical mechanism of the pulsating aurora and the associated electric field modulation, it is essentially important to know the structure and its temporal variation of two-dimensional electric field surrounding the pulsating aurora. However, as it takes at least 1 second to measure one-dimensional electric field data (along a single beam) with the conventional SuperDARN technique, it has been difficult to obtain two-dimensional electric field data with a temporal resolution that is high enough to resolve such variations. We have developed a new SuperDARN observational technique to overcome this problem and tried to obtain two-dimensional high temporal resolution SuperDARN electric field data and optical pulsating aurora simultaneously during the Iceland-Syowa conjugate auroral observation campaign period in September, 2009. The new technique and the initial results will be described and discussed in detail.

Keywords: SuperDARN, ionosphere, pulsating aurora, electric field, high temporal resolution