

R006-39

Zoom meeting B : 11/2 PM2 (15:45-17:30)  
15:45-16:00

## Energetic electron precipitation associated with pulsating aurora: Statistical analysis

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Whistler mode chorus wave is one of candidate plasma waves which causes pitch angle scattering of relativistic electron trapped in the radiation belt and precipitation of the electrons into the atmosphere [1,2,3]. The energetic electron precipitation (EEP) caused by the chorus wave could influence significantly on chemistry in the mesosphere and lower thermosphere [4,5]. Observational evidences of the EEP associated with pulsating aurora (PsA) which is also caused by the chorus wave have been reported [6,7,8]. However, these results were based on case studies. Here, we used a long-term data set of VLF subionospheric propagation in subauroral latitude to investigate statistical property of the EEP. The subionospheric propagation is sensitive to EEP with energy >100keV [9]. We used 25.2 kHz VLF radio signal which is transmitted at North Dakota (L=3.0) and received at Athabasca University GeoSpace Observatory (L=4.3) to identify occurrence of EEP in the subauroral latitude. We identified quasi-periodic change in the VLF amplitude whose time scales are similar with PsA and assumed that power spectrum density of the amplitude changes integrated from 4 to 20 sec range reflects occurrence of EEP associated with PsA. We surveyed the EEP from October 2016 to December 2017 and found occurrence distribution of the EEP with respect to magnetic local time (MLT) and its dependence on AE and Dst indices. The result shows that the EEP occurrence show strong dependences on MLT and geomagnetic activities. The EEP preferentially occurs in the post-midnight sector during high AE period (the occurrence rate reaches 7% around 2 MLT for AE>300nT). EEP does not occur when AE<100nT (below 1%). These are similar with occurrence characteristics of PsA and the chorus wave. It is worth to note that the occurrence rate reaches 20% around 1-2MLT for Dst<-40nT while the occurrences are smaller than 3% for -40nT<Dst<0nT and almost zero % for Dst>0nT. This means that occurrences of the EEP in subauroral latitude is significant during magnetic storms. We also found 24 EEP events which had good conjunction between all sky imager at The PAS and POES /NOAA 19 satellite during the period of the statistical analysis. NOAA 19 satellite observed short lived spikes of EEP when the satellite passed over PsA regions or closed to the VLF radio propagation which was detecting the EEP. Among them, 22 and 12 events accountancies >100keV and >300keV EEP, respectively, and 6 events include >800 keV EEP. These results suggest that the chorus wave is responsible for EEP with energy >100keV and the energy of EEP extents up to relativistic energy.

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