Characteristics in frequencies of Pi2 pulsations with the mid-latitude Northern American SuperDARN radar

Mariko Teramoto[1]; John M. Ruohoniemi[2]; Nathaniel A Frissell[2]; Evan Thomas[2]; Yuki Obana[3]
[1] JAXA, ISAS; [2] ECE, Virginia Tech; [3] Engineering Science, Osaka Electro-Communication Univ.

Standing fast mode waves trapped between the ionosphere and plasmasphere are responsible for Pi2 pulsations at mid and low latitudes on the nightside. Using the Sweden And Britain auroral Radar Experiment (SABRE) coherent radar at auroral and sub-auroral latitudes, Yeoman et al. [1991] suggested that the radar monitoring the mid-latitude ionosphere inside the plasmapause can detect Pi2 pulsations due to the fast mode. However, the spatial characteristics of Pi2 pulsations in the ionosphere remain largely unknown because few studies have examined the characteristics of Pi2 pulsations over wide geomagnetic latitude, using radars located at mid latitude. Recently, Frissell et al. [2011] found that the mid-latitude Blackstore SuperDARN radar and THEMIS ground magnetometers observed similar Pi2 pulsations at the ionospheric projection of the plasmapause. From the investigation of the spatial and temporal details of the radar data, they suggested that they are generated by Bursty Bulk Flows braking against the magnetospheric dipolar region.

We investigate nighttime Pi2 pulsations in the ionosphere using the mid latitude SuperDARN radar in Northern America when the radar was operating with the themisscan mode with a sampling rate of 8 seconds. In order to compare Pi2 pulsations in the ionosphere with those observed at mid latitude ground stations, we identified Pi2 pulsations from ground magnetometer over a 3-years period from 2008 to 2011 by using wavelet analysis. We will show the relationship between the frequency variation of Pi2 pulsations with the SuperDARN radar and the plasmapause locations.