Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PEM031-04 Room:103 Time:May 26 09:15-09:30

Comparison of ionospheric Pc5 oscillations with geomagnetic pulsations observed on the ground and in geostationary orbit

Kaori Sakaguchi[1*], Tsutomu Nagatsuma[1], Takahiro Obara[2]

[1]NICT, [2]JAXA

Pc5 pulsations are electromagnetic wave at periods of 150-600 s in the ultra-low frequency (ULF) range, which are frequently observed and have been studied well by ground and satellite magnetometers. The most common generation process of Pc5 pulsations is the field line resonance (FLR) of shear Alfven waves standing along Earth's magnetic field lines, which are coupled with fast compressional mode propagating from the flank side of magnetopause. The ionosphere in both hemisphere acts the reflection boundary of FLR and the ionospheric current generated by waves results in Pc5 geomagnetic pulsations on the ground. In the magnetosphere, magnetometers and electric field instruments onboard satellites observe directly in situ amplitude of Pc5 pulsations. Previous studies identified Pc5 pulsations as one of the key mechanisms of transport and acceleration of energetic electrons in Earth's outer radiation belt; wave power of Pc5 band is well correlated with radiation belt electron fluxes. In particular, waves in global mode (low-m) are likely more effective than localized mode (high-m). However, it is difficult to know correct wave numbers from satellite nor ground observations, because satellites are in situ and ground magnetometers integrate all neighbor signals. Thus, we investigated Pc5 pulsations using data from King Salmon HF radar (KSR), which observe two-dimensionally the doppler velocity of ionospheric plasma (E x B drift) due to electric-field components of Pc5 pulsation. First of all, we searched Pc5 oscillation observed by KSR beam 3 (westward beam) in 2007. Secondly, we investigate the similarity and difference of ionospheric Pc5 oscillations with geomagnetic variations simultaneously observed on the ground (Pebek and King Salmon) and in geostationary orbit (ETS-8); these align the almost same meridian. In this presentation, we show the local time distribution of ionospheric Pc5 oscillations, their relations with solar wind parameters, and event and statistical analyses of Pc5 events on the ground, in the ionosphere and in geostationary orbit.

Keywords: Pc5 pulsation, HF radar