

Coherence analysis of Pc1 geomagnetic pulsations observed at multipoint ground stations at Russia, Japan and Canada

Chae-Woo Jun[1]; Kazuo Shiokawa[2]
[1] STEL, Nagoya Univ; [2] STEL, Nagoya Univ.

Pc1 geomagnetic pulsations propagate from high to low latitudes through the ionospheric wave duct. A few papers had shown longitudinal propagation of Pc1 pulsations [e.g., Kawamura et al. 1981; Sakaguchi et al. 2012]. Despite these previous researches, diurnal variations of longitudinally distributed Pc1 pulsations have not been investigated yet. In order to understand generation and propagation processes of Pc1 pulsations in the magnetosphere and the ionosphere, it is necessary to investigate spatial distribution of Pc1 pulsations using magnetometers at longitudinally and latitudinally separated ground stations. We have investigated spatial distributions of the Pc1 pulsations observed by induction magnetometers at three ground stations at Moshiri (MOS) in Japan, Magadan (MGD) in far-eastern Russia and Athabasca (ATH) in central Canada from January 2009 to December 2011. Simultaneous Pc1 events observed at MGD and ATH occurred in the morning and afternoon sectors. This result is consistent with the global distribution of EMIC waves observed in space [Min et al. 2012]. The simultaneous Pc1 events with high coherence (> 0.5) observed at ATH and MGD concentrates in the afternoon to pre-midnight sector. The Pc1 frequencies of the simultaneous Pc1 events at ATH and MGD in the afternoon to pre-midnight sector were higher than those in the post-midnight to morning sector. Simultaneous Pc1 events observed at MGD and MOS at subauroral and middle latitudes, respectively, were most frequently observed at night suggesting that propagation in the ionospheric duct suffers less attenuation at night. In the presentation we discuss these results in combination with the EMIC wave distribution in the magnetosphere and their propagation to the ionosphere and in the ionospheric duct.

Reference

Kawamura et al, 1981, Comparative study of magnetic Pc1 pulsations between low latitudes and high latitudes: Source region and propagation mechanism of the waves deduced from the characteristics of the pulsations at middle and low latitudes, Mem Natl Inst. Polar Res. Issue, 26, 1-12.

Sakaguchi et al, 2012, Visualization of ion cyclotron wave and particle interactions in the inner magnetosphere via THEMIS-ASI observations, JGR, 117, A10204, doi:10.1029/2012JA018180.

Min et al, 2012, Global distribution of EMIC waves derived from THEMIS observations, JGR, 117, A05219, doi:10.1029/2012JA017515.