Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

PEM08-10 会場:302 時間:5 月 26 日 17:05-17:20

One-year statistical analysis of ELF/VLF emissions at subauroral latitudes at Athabasca, Canada

One-year statistical analysis of ELF/VLF emissions at subauroral latitudes at Athabasca, Canada

MARTINEZ CALDERON, Claudia[1*] ; SHIOKAWA, Kazuo[1] ; MIYOSHI, Yoshizumi[1] ; OZAKI, Mitsunori[2] ; SCHOFIELD, Ian[3] ; CONNORS, Martin[3]
MARTINEZ CALDERON, Claudia[1*] ; SHIOKAWA, Kazuo[1] ; MIYOSHI, Yoshizumi[1] ; OZAKI, Mitsunori[2] ; SCHOFIELD, Ian[3] ; CONNORS, Martin[3]

[1]Nagoya University, [2]Kanazawa University, [3]Athabasca University, Canada
[1]Nagoya University, [2]Kanazawa University, [3]Athabasca University, Canada

Whistler mode waves in the ELF and VLF frequency range are naturally observed in the Earth's magnetosphere. They are generated around the equatorial plane and then propagate into the ionosphere along the field lines and can sometimes be detected on the ground. Whistler mode waves play an important role for both generation and loss of energetic electrons in the inner magnetosphere. Especially, chorus waves outside the plasmapause cause non-adiabatic accelerations of MeV electrons of the outer belt, while plasmaspheric hiss contributes to the formation of the slot region through the pitch angle scattering. Additionally, quasi-periodic (QP) emissions have also been associated with electron precipitation.

Using a 100 kHz-sampling loop antenna, we have continuously monitored ELF/VLF emissions at subauroral latitudes in Athabasca, Canada (MLAT=61.31, L=4.3) since September 2012. Using the data from 1 November 2012 to 31 October 2013, we have made the first statistical analysis of ELF/VLF emissions at subauroral latitudes, taking into account their spectral features, occurrence rates, and correlations with solar wind and magnetic variations.

We found that the occurrence is maximum in the morning sector (∼07 MLT) and minimum in the night sector (after 18 MLT) with no particular dependence on seasons or AE and Dst indices. Chorus and hiss show a maximum occurrence rate at 07-08 MLT, while the highest occurrence of QP emissions is found around noon MLT. Even though these results show similarities with satellite measurements in the inner magnetosphere, the occurrence rates obtained in this study show that the rates at ATH can be up to 7 times lower than those in the magnetosphere. This suggests that not all waves that are generated in the magnetosphere can be detected on the ground. Additionally, a superposed epoch analysis shows that AE index and solar wind speed slowly increases up to several days before we start seeing the emissions in ATH. These results suggest that substorm activities associated with solar wind high-speed streams can contribute to the generation of ELF/VLF waves that are detected at subauroral latitudes.

キーワード: ELF/VLF, statistics, subauroral latitudes, chorus, hiss, qp
Keywords: ELF/VLF, statistics, subauroral latitudes, chorus, hiss, qp