Observation of hectometric auroral radio emissions in Iceland -Evaluation of the observation system and primary observation-

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The Earth's auroral region is an active radio source at frequencies from a few hertz to several megahertz. In the hectometric range, it was found that Terrestrial Hectometric Radiation (THR) is related to auroras by observations of the Ohzora satellite [Oya et al.(1985)]. In resent research, Shinbori et al. [2003] indicated that THR follows SC by several minutes using the Akebono satellite data. At the ground level, auroral roar and MF burst were discovered by Kellogg and Monson [1979, 1984] and Weatherwax et al. [1994] in the northern Canada, respectively. The former is narrowband emission near 2nd and 3rd harmonics of the ionospheric electron cyclotron frequency, and the latter consists of impulsive broadband emissions in the frequency range 1.4-4.5 MHz. However, their dependence on the geomagnetic activity and seasons and polarization have not been discussed based on a long-term observation data, and the physical mechanism of these phenomena in the auroral ionosphere has not been understood accurately.

We set up new observation system at Husafell station in Iceland in September, 2005 and have started to observe auroral radio emissions. Radio signals, which are received by the cross loop antennas, are converted into left- and right- handed polarized components. Finally, radio spectra from 1 MHz to 5 MHz are obtained. The purpose of this system is to observe auroral hectometric radio emissions, such as auroral roar and MF burst, and to clarify the spectrum, polarization, dependence on the geomagnetic activity, and so on. It is expected that the detail physical process will be elucidated by clarifying the characteristics of appearance and propagation. We evaluated the new system, however it is found that the number of the observed events would be smaller than expected due to the low sensitivity because average power spectrum densities of auroral roar and MF burst are 50-100 nV/m/Hz^0.5. In this presentation, we will not only show the results obtained from the observation data for about half a year, but also suggest some ideas to improve the sensitivity of the system.

There is a basic question whether auroral roar and MF burst observed at the ground-level are generated by the same process as THR observed by satellites. We can obtain a new picture of auroral radio emissions by comparing the results from present ground-based observation and the Akebono satellite observation. We will show statistical analysis results of THR observed by the Akebono satellite and discuss its spectrum, polarization, and so on, comparing with some recent researches of the ground-based observation.