Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)
©2015. Japan Geoscience Union. All Rights Reserved.

PEM08-05 Room:302 Time:May 26 15:25-15:40

Cold M/Q=2 ion distribution in the inner magnetosphere estimated from lightning-induced EMIC waves observed by Akebono

MATSUDA, Shoya[1*] ; KASAHARA, Yoshiya[1] ; GOTO, Yoshitaka[1]

[1]Kanazawa University

Ion cyclotron whistlers are electromagnetic ion cyclotron (EMIC) mode waves induced by lightning discharge. They are generated by mode conversion from lightning whistler waves to EMIC waves. It is well known that their propagation characteristics can be explained by the dispersion relation. Particularly, the dispersion relationship of EMIC, or determination of the bands that can be propagated by EMIC, depends strongly on the ion composition of the plasma. Hence, information on the variation of ion composition can be obtained through ion cyclotron whistler wave observation.

In our previous study, we found that M/Q = 2 ion cyclotron whistlers were frequently observed by the Akebono satellite at an altitude region around 3100-10000 km. In the current study, we examine spatial occurrence distributions of observed ion cyclotron whistler wave. We detected 845 H^+, 933 M/Q = 2 ion, 1888 He^+ band ion cyclotron whistler waves by visual inspection during the period from March 1989 to September 1995. It is found that each band of ion cyclotron whistler wave was observed in almost exclusive regions. We explain these characteristics by considering the wave generation mechanism along the geomagnetic field line. We estimate ion composition by considering the conditions necessary for ion cyclotron whistler generation, and we determine that a certain amount of M/Q = 2 ions exist at the restricted L shell region in the plasmasphere.

We show that the spatial occurrence distribution of observed M/Q = 2 ion cyclotron whistlers changes depending on the magnetic local time. It is determined that a certain amount of M/Q = 2 ions exist at L inside 2.4 in the local dayside and inside 3.0 in the local nightside. Therefore, there seems to be the density enhancement process in the local nightside region.

Keywords: ion cyclotron whistler, EMIC wave, M/Q = 2 ion, ion composition, Akebono satellite, inner magnetosphere