

Statistical analysis of plasmaspheric EMIC waves

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We investigate statistically the plasmaspheric EMIC wave using the Akebono/VLF measurements. The plasmaspheric EMIC waves are mainly observed at lower L-shell region ($L < 2$). There are no significant MLT dependences and geomagnetic activities, which are different from the EMIC waves outside the plasmopause. We also investigate statistically the magnetosonic mode waves (MSW), and MSW are typically observed at $L > 2.5$. There are some events to show that EMIC waves and MSW are simultaneous observed, suggesting that MSW convert to EMIC waves inside the plasmasphere. Considering the results from the statistical survey, we propose two different mechanisms on the origin of the plasmaspheric EMIC waves. One possibility is the cyclotron resonance with energetic ions. The estimated resonance energy of ions is a few hundred keV that are radiation belt ions. Another possibility is the mode conversion from MSW. MSW propagate radially into the inner magnetosphere after the generation at the outer portion of the plasmasphere, and then MSW convert to EMIC waves.

Keywords: EMIC wave, statistical analysis, occurrence mechanism, magnetosonic wave, spatial distribution