R006-26
Zoom meeting B ：11/2 AM1 (9:00-10:30)
9:30〜9:45

A statistical study of EMIC wave-particle interactions in the magnetosphere using Arase observations

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We performed a statistical study to demonstrate EMIC wave-particle interaction at different peak wave occurrence regions in the magnetosphere using in-situ observations by Exploration of energization and Radiation in Geospace (Arase) satellite. In our previous study, we found that EMIC waves have four different peak occurrence regions with different geomagnetic environments in the magnetosphere (H-band at 3-8 MLT at L>7; H-band at 11-15 MLT at L=6.5-8; He-band at 9-21 MLT at L=5-7; He-band at 12-19 MLT at L=7-9). This study included the inter-calibrated proton distribution data using LEPi and MEPi instruments in the energy range of 30 eV- 184 keV to investigate proton pitch angle distributions and partial thermal pressures with EMIC wave activities. We found that EMIC waves are observed below the proton instability threshold derived by linear kinetic theory. By using cold plasma approximation, we can compute the minimal resonant energy using the central frequency of EMIC waves and electron number density profile. We found that the minimal resonant energy for most of the EMIC wave events is concentrated between 1-100 keV, except for H-EMIC waves in the morning sector at higher L shells having scattered minimal resonant energy from 1 eV to 10 keV depending on normalized frequency by equatorial proton gyrofrequency, respectively. This result supports possible free energy sources for morning side EMIC waves excited due to suprathermal protons (<100 eV) heated by magnetosonic waves. This presentation shows spatial distributions of EMIC waves in the magnetosphere, energetic proton distributions between with and without EMIC wave activities, and the minimal resonant energy distributions at the different peak occurrence regions. We will discuss possible free energy sources causing EMIC waves at different regions and demonstrate the influence of different generation processes of EMIC waves on energetic proton distributions using in-situ satellite observations and theoretical model calculations.