R006-13
Zoom meeting B ：11/1 PM1 (13:45-15:30)
14:30〜14:45

second harmonic poloidal ULF 波動によるリングカレント陽子の動径輸送：あらせ・RBSP-B 衛星の観測

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Radial transport of ring current protons by second harmonic poloidal standing Alfven waves: Arase and RBSP-B observations

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Poloidal standing Alfven waves can obtain their energy from an energy gradient or radial gradient in the phase space density of resonant particles through the drift-bounce resonance. Because the temporal and spatial variations of low energy (1-10 keV) ions are more complicated than high energy (>100 keV) ions, the importance of the low energy ions in the excitation of the poloidal waves has not been fully understood.

In this study, we examine an event with second harmonic poloidal waves observed by the Arase satellite and demonstrate that the poloidal waves were excited by ˜12 keV protons. The azimuthal wave (m) number was estimated to be positive (eastward propagation) and ˜180, based on the finite Larmor radius effect of protons and the theory of the drift-bounce resonance. The steep outward gradient of the proton phase space density well corresponds to the exciting regions of waves (L = 5.7-6.1), suggesting that the outward gradient of protons supplies free energy to the waves.

The time variation of radial distributions of the resonant protons was measured by the Arase and RBSP-B satellites. At L ˜5.7, RBSP-B measured a sudden increase of ˜10 keV protons 1.5 hours after the wave excitation detected by Arase. Evaluating the diffusion coefficient (D{sub}LL{¥sub}) and energy variation of protons with L (dW/dL) given in the analytical formulae, we find that protons can move ˜0.4 Re inward in 1.5 hours and simultaneously lose their energy by ˜2 keV through the drift-bounce resonance. We interpret the sudden flux increase at ˜10 keV as a result of the radial diffusion of ˜12 keV protons.