3rd URSI AT-AP-RASC, Gran Canaria, 29 May – 3 June 2022

Latitude and Magnetic Local Time Dependences of Whistler Mode Waves in the Inner Magnetosphere Observed by PWE/OFA on board the Arase

Y. Kasahara* (1), K. Hayashi (1), S. Matsuda(1), Y. Miyoshi(2), A. Matsuoka(3), J.-F Ripoll(4) (5), and D. M. Malaspina(6)(7)

(1) Graduate School of Natural Science and Technology, Kanazawa University, Kanazawa, 920-1192, Japan, e-mail: kasahara@is.t.kanazawa-u.ac.jp; k-hayashi@cie.is.t.kanazawa-u.ac.jp; matsuda@staff.kanazawa-u.ac.jp, (2) ISEE, Nagoya University, Nagoya, Japan, e-mail: miyoshi@isee.nagoya-u.ac.jp, (3) Kyoto University, Kyoto, Japan, e-mail: matsuoka@kugi.kyoto-u.ac.jp, (4) CEA, DAM, DIF, Arpajon, France, (5) UPS, CEA, LMCE, Bruyères-le-Châtel, France, e-mail: jean-francois.rippol@cea.fr, (6) Department of Astrophysical and Planetary Sciences, University of Colorado, Boulder, CO, USA, (7) Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO, USA, e-mail: David.Malaspina@lasp.colorado.edu

The Plasma Wave Experiment (PWE) on board the Arase satellite measures electric wave fields from DC to 10 MHz and magnetic wave fields from a few Hz to 100 kHz [1] in the Earth's inner magnetosphere. In the present paper, we statistically analyzed the spatial distribution of the plasma waves measured by the onboard frequency analyzer (OFA), which is one sub-system of the PWE instrument. The OFA continuously measures electric and magnetic wave spectra with a time resolution of 1 second as a nominal operation mode in the frequency range from 64 Hz to 20 kHz [2], and we can statistically analyze the power spectrum of various plasma waves detected in the inner magnetosphere. A similar study was carried out [3] using the data from Van Allen Probes. As the inclination of Arase is 31 degrees of geomagnetic latitude, we can investigate the off-equatorial region using the OFA data. This is a broader magnetic latitude range than was accessible by the Van Allen Probes (~+/-20 degrees). It is thus possible to clarify the spatial distribution of plasma waves not only in the equatorial region but also in the off-equatorial region of the inner magnetosphere. The higher inclination of the Arase orbit also allows access to higher L-shells compared to the Van Allen Probes. In the present study, we focus on wave activity in the frequency range of whistler mode waves such as chorus and hiss emissions, as they play an important role in wave-particle interactions [4] and energetic plasma dynamics of the inner magnetosphere. We report the global distributions of these waves as a function of magnetic latitude, magnetic local time and L-value.

References

[1] Y. Kasahara et al., The Plasma Wave Experiment (PWE) on board the Arase (ERG) Satellite, *Earth Planets Space*, 70:86, doi:10.1186/s40623-018-0842-4. 2018.

[2] S. Matsuda et al., Onboard Software of Plasma Wave Experiment aboard Arase: Instrument Management and Signal Processing of Waveform Capture/Onboard Frequency Analyzer, *Earth, Planets and Space*, 70:75, doi:10.1186/s40623-018-0838-0, 2018.

[3] D. M. Malaspina et al., The Distribution of Plasmaspheric Hiss Wave Power with Respect to Plasmapause Location, *Geophys. Res. Lett.*, 43, doi:10.1002/2016GL069982, 2016.

[4] Ripoll, J.-F., Claudepierre, S. G., Ukhorskiy, A. Y., Colpitts, C., Li, X., Fennell, J., & Crabtree, C. Particle Dynamics in the Earth's Radiation Belts: Review of Current Research and Open Questions. Journal of Geophysical Research: Space Physics, 125, e2019JA026735. doi:10.1029/2019JA026735, 2020.