



**Propagation characteristics of the VLF waves observed
by the plasma wave experiment (PWE) on board the Arase
~ Collaborative observations with the Van Allen Probes ~**

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The Plasma Wave Experiment (PWE) is one of scientific instruments on board the Arase (ERG) satellite launched on December 20, 2016 to measure electric field from DC to 10 MHz and magnetic field from a few Hz to 100 kHz in the inner magnetosphere [1]. Varieties of operation modes are implemented in the PWE, and the data products from the PWE are classified into continuous data and burst data. The continuous data consists of waveform in ELF range and wave spectra in ELF/VLF/HF range for surveying the entire observation. We also produce spectral matrices as continuous data to derive wave normal direction and Poynting flux of the plasma waves detected by the PWE. On the other hand, the burst data is used for waveform measurements less than 20 kHz, but the data are intermittently obtained due to the limitation of the telemetry capacity. As the Arase carries a huge mission data recorder (MDR), we store the intermittent waveform data in the MDR and transmit them to the ground after data selection.

Since mid-March, 2017, when the nominal operation of the Arase began, we have been operating the PWE optimizing its observation mode and data selection process according to the decision at the weekly data-survey meeting. In addition, we also performed collaborative observations with the ground-based stations, Van Allen Probes and the other satellites in the magnetosphere. We intensively conducted the burst mode operations, by which huge amount of waveforms were continuously captured and downloaded to the ground. During the conjunction periods between the Arase and Van Allen Probes in summer, 2017, we could identify several correlated wave spectra for both satellites. Although the orbit of the Arase satellite is quite similar to the ones of the Van Allen Probes, it is important to note that the inclination of Arase (31°) is much larger than the ones of Van Allen Probes (~ 10°), which will allow us to study propagation characteristics of plasma waves not only in the equatorial region but also in the off-equatorial region. In the presentation, we introduce the recent results in the PWE data analyses, especially focusing on the collaborative observations with the Van Allen Probes.

1. Y. Kasahara, Y. Kasaba, H. Kojima, S. Yagitani, K. Ishisaka, A. Kumamoto, F. Tsuchiya, M. Ozaki, S. Matsuda, T. Imachi, Y. Miyoshi, M. Hikishima, Y. Katoh, M. Ota, M. Shoji, A. Matsuoka, and I. Shinohara, "The Plasma Wave Experiment (PWE) on board the Arase (ERG) Satellite", *Earth, Planets and Space*, January 2018, doi:10.1186/s40623-017-0759-3.