

Activity of plasmaspheric hiss waves during the May 2024 Gannon storm observed by the Arase satellite

Satoshi Kurita¹, Yoshizumi Miyoshi², Yoshiya Kasahara³, Shoya Matsuda³, Mitsunori Ozaki³,
Ayako Matsuoka⁴, and Iku Shinohara⁵

¹ Research Institute of Sustainable Humanosphere, Kyoto University, ² Institute of Space-Earth
Environmental Research, Nagoya University, ³ Graduate School of Natural Science and
Technology, Kanazawa University, ⁴ Graduate School of Science, Kyoto University, ⁵ Institute of
Space and Astronautical Science, Japan Aerospace Exploration Agency
e-mail (speaker): kurita.satoshi.8x@kyoto-u.ac.jp

We report on the activity of plasmaspheric hiss waves during the Gannon storm that occurred in May 2024 based on the Arase observation. During the time interval, the apogee and perigee of the Arase satellite were located at noon and midnight, respectively, and the radial profiles of wave activities on the dawn and dusk sides were obtained. At the beginning of the geomagnetic storm, plasmaspheric hiss waves disappeared, likely accompanied by a severe magnetospheric compression. The plasmaspheric hiss activity resumes from the late main phase, and the activity continues for several weeks within the plasmasphere in the L-value range from 2 to ~ 4 , as the usual state for the waves. The mean, median, and standard deviation of the plasmaspheric hiss wave power are derived after resuming the hiss activity. We found that the mean amplitude is higher than the median value, and the standard deviation is larger than the mean value. The significant dawn-dusk asymmetry of the mean and median hiss wave power was not identified in the Arase observation. During the Gannon storm, the Arase observation shows the slot region filling with energetic and relativistic electrons, which was followed by energy-dependent slow decay of electron fluxes. We will discuss the contribution of the plasmaspheric hiss waves to the slow flux decay after the Gannon storm to clarify the importance of the plasmaspheric hiss waves on the formation of the slot region during the time interval.

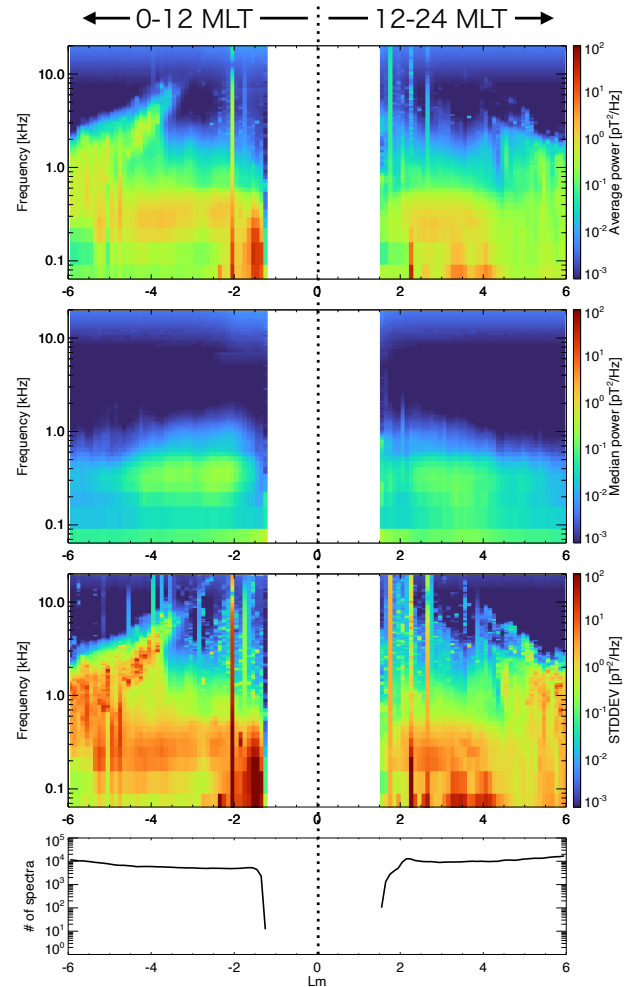


Figure 1. The top three panels show L-shell profiles of mean, median, and standard deviation of wave magnetic field power from 64 Hz to 20 kHz observed by the Arase satellite after the Gannon storm (from May 12 to 31, 2024), respectively. The bottom panel represents the number of spectra used to compute the statistical parameters shown in the top three panels. The plasmaspheric hiss wave activity is seen in the L-shell range from -4 to -2 and 2 to 4 (negative L-shell value corresponds to the dawn side).