

Name: **Adhitya Pavithran**

Duration of Stay: **03 August 2025 – 30 October 2025**

Report on Academic Visit under the PBASE Program

Under the support of PBASE program I visited the Institute for Space-Earth Environmental Research (ISEE), Nagoya University and Graduate School of Data Science, Nagoya City University, for a duration of approximately 3 months. During my stay in Japan, I worked closely with Prof. Kazuo Shiokawa and Prof. Masahito Nosé, focusing on estimating the ion mass in the Earth's magnetosphere, using magnetoseismic technique. I had detailed discussion with Prof. Nosé and Prof. Shiokawa regarding the methodology, tools and data that could be effectively used for the study. We utilized data from Magnetic Field instrument (MGF) and Plasma Wave Experiment (PWE) suite onboard Arase satellite. Using the magnetometer data from Arase satellite we determined the frequencies of toroidal Alfvén waves. These frequencies, along with the electron number density obtained from High Frequency Analyzer (HFA) instrument, a part of the PWE suite, were used in the magnetoseismic technique. We used the magnetohydrodynamic equation by Singer et al. (1981) for the magnetoseismic technique to numerically calculate the ion mass. I also gained valuable experience using PySPEDAS and PyGeopack python wrappers, which have proven to be powerful tools for data analysis. These skills will be highly beneficial for my current as well as future research. An example of estimation of ion mass is shown in Figure 1.

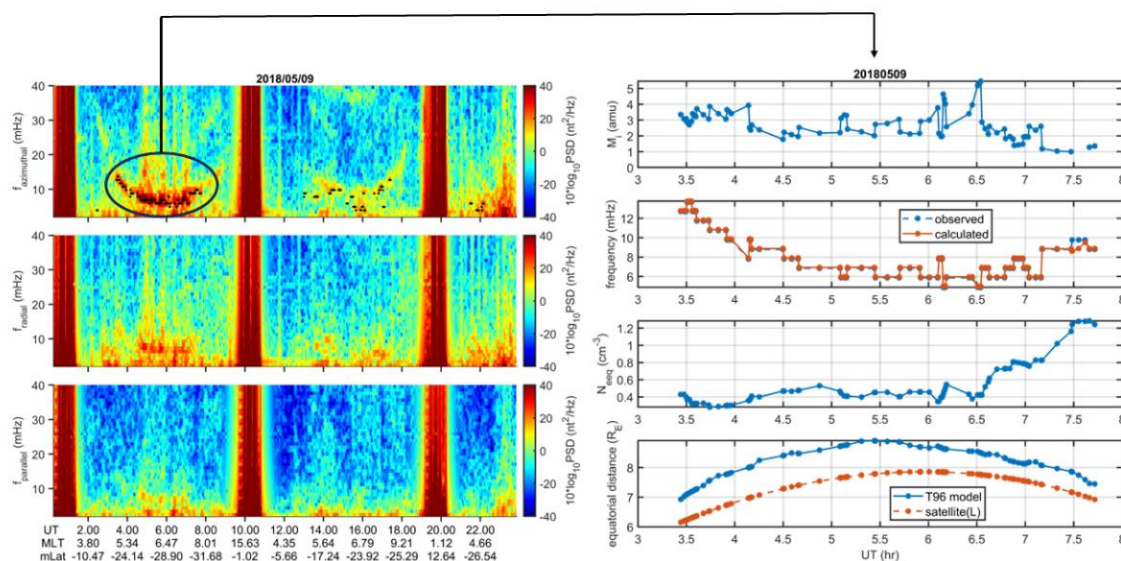


Figure 1: Left panels show the spectrogram of the toroidal wave in the azimuthal (toroidal), radial (poloidal) and parallel direction. The right panels show the estimated ion mass (M_i), toroidal frequencies, equatorial electron number density (N_{eq}) and the L values for the highlighted toroidal wave event in the spectrogram.

During my stay I also got an opportunity to present and discuss my work with Prof. Kyungguk Min from Chungnam National University, Korea, and Prof. Yoshizumi Miyoshi and his team. The discussion was highly productive and deepened my understanding of plasma waves in Earth's magnetosphere. I also actively attended several seminar and meetings such as ERG Science Conference, Division for Ionospheric and Magnetospheric Research Seminar, Friday Report meetings, Arase Analysis meeting.

These seminars provided a platform to learn about the ongoing research activities and interact with experts in the field.

I am also glad to have had insightful and friendly discussions with Dr. Kazuhiro Yamamoto, Prof. Claudia Martinez, Prof. Natalia Ganushkina, Dr. Chae-Woo Jun, Dr. Shreedevi, Dr. Geetashree Kakoti, Dr. Manu Varghese. Along with academic activities I also enjoyed exploring the Japanese culture by visiting places like Nara, Inuyama castle, Nagoya castle, Nagoya port with my friends Gayathri and Amrutha.

To conclude, my visit to Nagoya University and Nagoya City University has been a truly enriching experience, both professionally and personally. I have learned and grown significantly as a researcher. I am grateful to Prof. Shiokawa and Prof. Nosé for their guidance and support, and I am looking forward to further continue our collaborative research work in the future.