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Research trip report to the Institute of Atmospheric Physics CAS

Submitted by Claudia Martinez (ISEE, Nagoya University)

Period of stay: 16.01.2024 – 06.02.2024

Location: Prague, Czechia

My research focuses on studying naturally occurring plasma waves in the magnetosphere and their impact on radiation belt dynamics. Specifically, I have been examining the characteristics and propagation properties of very low (VLF) and extremely low (ELF) frequency waves through multi-point observations. I have been actively involved in the PWING project, and recently had the opportunity to visit Prof. Ondrej Santolik's group at the Institute of Atmospheric Physics (IAP) in Prague, Czechia, thanks to the PBASE program.

During my visit, I wanted to focus on the properties of unusual emissions called bursty-patches, previously detected at two nearby PWING VLF receivers on the ground. These emissions exhibit unique propagation properties as they are detected at higher frequencies than the local electron half gyrofrequency. As an expert in ray tracing and wave analysis, my discussion with Prof. Santolik was centered on how to tackle the question of how bursty-patches are reaching higher latitudes, but also about their latitudinal propagation. I also benefited from the insight of other members of his group who are experts in wave and particle-related topics. Together, we devised a plan to comprehensively investigate the question of bursty-patch propagation using PWING ground stations and conjugate satellite observations from Arase. Upon returning to Japan, my next steps will involve data selection at the PWING stations of KAN and OUJ, followed by further case selection and ray tracing modeling from Arase data. The findings from this analysis will be presented at the upcoming VERSIM workshop (Sept. 30 – Oct. 4, 2024).

Additionally, I had valuable discussions with Dr. David Pisa (IAP) regarding the ongoing development of a PHLR and sferics filter to be implemented at all PWING stations. We aim to complete the code by Fall 2024 and validate its functionality by the year's end. During my visit, I also had the chance to meet with Prof. Frantisek Nemec at Charles University, and interact with his students. One of his students may potentially visit ISEE in FY2024. We also discussed our current collaboration using long-term data of PWING stations for the study of quasi-periodic emissions. Furthermore, we finalized discussions on a paper that was submitted for review to JGR Space Physics a few days ago.