

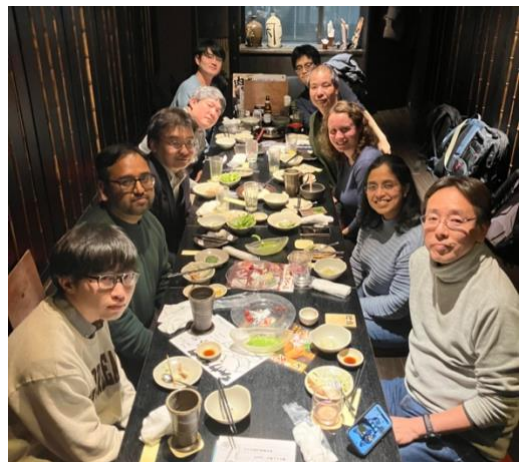
Name: Neethal Thomas

Affiliation: Sodankylä Geophysical Observatory, University of Oulu, Finland

Visit to ISEE, Nagoya University, to perform collaborative research using Arase and EISCAT

Using the PBASE grant, I had the opportunity to visit ISEE, Nagoya University, for a week from 26 – 30 January 2026 to carry out collaborative research with Prof. Yoshizumi Miyoshi on energetic electron precipitation (EEP) events using the Arase satellite and EISCAT incoherent scatter radar measurements. The visit was aimed at developing novel ideas for studying EEP events and quantify the EEP flux input to the Earth's upper atmosphere combining satellite and ground based measurements.

The week I spent at ISEE was very fruitful and exciting. With Prof. Miyoshi, I had very fruitful discussions on this EEP topic, and we developed initial ideas for developing an empirical model of electron precipitation based on Arase electron flux data. During my stay at ISEE, together with Prof. Miyoshi, I focused on studying the EEP events observed during Arase-EISCAT conjunction intervals. For the EEP events identified, the electron flux data from Arase, MEPE, and HEP instruments are combined and are then converted to electron density profiles. The electron density profiles based on Arase flux data are estimated utilising the forward model employing (i) parameterization of monoenergetic electron impact ionization model to calculate the ionization profile Q from Arase energy-flux spectrum and (ii) then to turn the ionization profile into the electron density using the Sodankylä Ion and neutral Chemistry model. The electron density profiles derived from Arase electron flux data are then compared with EISCAT measurements.



During this visit, I also had the opportunity to have insightful discussions with Dr. Akimasa Ieda on the D-region ion-neutral collision frequency using EISCAT measurements. I could also utilise the opportunity to discuss and foster collaborations with my former supervisor, Prof. Kazuo Shiokawa, and to have friendly discussions with Dr. Sandeep Kumar and Prof. Claudia Martinez. The opportunity to present my research in the group seminar and at the Arase analysis meeting was very encouraging, with lots of discussion and valuable input from members of Prof. Miyoshi's group.

Overall, the visit to ISEE was very productive for my scientific career and also for having insightful discussions on EEP research. Results from this EEP study utilising EISCAT and Arase will be a key contribution in evaluating solar forcing on the climate by providing realistic EEP flux inputs to the chemistry-climate models (Coupled Model Intercomparison Project - CMIP). I am thankful to the PBASE programme for funding this trip and Prof. Miyoshi for the guidance and this valuable collaboration.