

Name: Florian Günzkofer

Affiliation: Institute for Solar-Terrestrial Physics, German Aerospace Center (DLR)

Empirical Scaling of Joule Heating Rates in the TIE-GCM Model and EISCAT Measurements

As part of the SCOSTEP visiting scholar (SVS) program, I stayed at the Kyushu University in Fukuoka, Japan from September 3rd to November 29th, 2023. Prof. Huixin Liu acted as local host and supervisor for my work on comparing Joule heating rates in TIE-GCM model runs and EISCAT measurements.

The goal of this work is to evaluate whether the by default scaling of Joule heating rates in TIE-GCM model runs with a factor of 1.5 is actually accurate for all conditions. It has been suggested in previous works that adjusting this scaling with respect to geomagnetic activity and magnetic local time. For the purpose of this study, a long-term database of ion velocity measurements with the EISCAT UHF incoherent scatter radar has been collected. Measurement and model Joule heating rates are compared for different geophysical conditions, magnetic local times, and empirical convection models



Photo of Prof. Huixin Liu's (front row, middle) working group in the Kyushu University Magazine. Me: back row, second from the right.

as drivers for the model runs. Towards the end of my stay at Kyushu University, we have started to prepare a manuscript about the performed work. We therefore intend to publish the results in the near-future.

It is safe to say that these results would not have been obtained without my stay at the Kyushu University. As it turned out after a few days of the visit, the originally planned investigations would not be possible with the available measurements. The possibility to discuss the matter directly and personally with my supervisor allowed to slightly alter the original plan. This resulted in the research that has been conducted during my stay and the soon to be submitted publication. Seminars and discussions with students, Postdocs, and other guests of the working group additionally gave me very nice and interesting insights about the work conducted at the hosting institution.

During my stay at the Kyushu University, I lived in the university's own guest house located directly on campus only a few minutes walking distance from my office. The university offers several cantinas and a large number of convenience stores is located on or in close proximity to the campus. A large shopping mall including e.g. a supermarket or several clothing stores can be reached from campus within 15 minutes by bus. The university also provides plenty opportunities for recreational activities, e.g. a gym, swinging pool, and several indoor and outdoor sports grounds. Additionally, the campus is located only 40 minutes walking distance from the ocean (a bus connection that also takes around 40

minutes is available as well). Several social events, e.g. barbecues, joint runs, and evening gatherings were organized by the working group or the department. The city of Fukuoka can be reached by means of local transport and offers many museums, parks, beaches, restaurants and places generally great for sightseeing, e.g. the Fukuoka castle. Also, many other cities worth a visit can be easily and quickly reached by train from the Fukuoka main station, e.g. Hiroshima (1 h), Kagoshima (1 h), and Osaka/Kyoto (2.5 h).

In summary, my stay at the Kyushu University as part of the SVS program did not only result in great scientific results and their presumable publication in a journal, but also allowed me to experience a completely new culture and to obtain very important experiences, both professional and personal in nature.