

Impact of Anthropogenic Global Climate Change on Thermospheric Circulation and Tides in Whole Atmospheric Models

Name: Chih-Ting Hsu

Affiliation: National Science Foundation National Center for Atmospheric Research, U.S.A.

As part of the PBASE project, I stayed at Kyushu University in Fukuoka, Japan from July 24 to August 24, 2024. Prof. Huixin Liu is my host at Kyushu University.



The main project we worked on was the impact of CO₂ on the thermospheric dynamics. It is known that the increase in CO₂ concentration leads to thermospheric cooling and further changes the dynamics of the thermosphere. However, the detailed features of the secular change in thermospheric dynamics that related to the CO₂ concentration need to be confirmed with more observations and numerical simulations. During my visit, we compared the simulation result from two whole atmospheric models, the U.S. National Science Foundation National Center for Atmospheric Research's WACCM-X (Whole Atmosphere Community Climate Model - eXtended) and the GAIA (Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy) supported by Japan's National Institute of Information and Communications Technology, under two CO₂ conditions (low and high CO₂ concentration in the atmosphere). The WACCM-X and GAIA simulations show a good agreement with respect to the change of global wind circulation and atmospheric migrating tides. We prepare to publish our new finding based on these WACCM-X and GAIA simulations to AGU journal. The manuscript is under preparation now.

During my stay at Kyushu University, I resided in the on-campus Ito guest house. The cafeteria at Kyushu University provides students with budget-friendly and healthy dining options every day. Fukuoka can be reached by local bus and subway, and other cities in Kyushu can be easily accessed via Shinkansen. I visited some local shrines here during my stay. The shrine is the center of the

traditional Japanese religion. In a shrine, you can make a wish and divine the things you want to know. I try this traditional divination in these shrines and all results are "Lucky"! I think this is a good sign of our cooperation with Kyushu University.

