

Collaboration with NASA-ACOS team on GOSAT sensor calibration, data retrieval, validation, and carbon flux estimation

Tatsuya Yokota^{1*}, YOSHIDA, Yukio¹, MORINO, Isamu¹, Shamil Maksyutov¹, Hiroshi Suto², Akihiko Kuze², SHIOMI, Kei², KAWAKAMI, Shuji², NAKAJIMA, Masakatsu²

¹National Institute for Environmental Studies, ²Japan Aerospace Exploration Agency

More than four years have passed since the Greenhouse gases Observing SATellite (GOSAT) was launched. Over those years, the members of the GOSAT Project at JAXA and NIES collaborated closely with those of the NASA Atmospheric CO₂ Observations from Space (ACOS) team through frequently exchanging information and research findings during bi-weekly teleconferences, field campaigns, and annual workshops. The major outcomes brought through the GOSAT-ACOS collaboration are as follows. 1) Microscopic vibrations in the TANSO Fourier Transform Spectrometer (FTS) aboard the satellite were discovered and their influence on the collected data was evaluated and removed. 2) By collecting and analyzing vicarious calibration data cooperatively during the US Railroad Valley field campaigns, details on the characteristics of TANSO FTS, along with the instrument's degradation trend, was elucidated. 3) The inter-comparisons of algorithms, developed independently by the two teams, for retrieving ground surface pressure and concentration of CO₂ from the satellite data lead to significant improvement in the quality of the concentration data products. 4) The two teams' collaboration accelerated the validation of the retrieved concentration data products in the community of the Total Column Carbon Observation Network. 5) The GOSAT-ACOS cooperation also made the inter-comparisons of the satellite-based CO₂ flux estimates possible among the participants of the GOSAT Research Announcement studies and the NASA OCO-2 science team. We herein explain the above items and also report the progress of the GOSAT Project.

Keywords: satellite-based greenhouse gas remote sensing, carbon dioxide, methane, calibration, data validation, carbon flux estimation