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Progress of Validation of GOSAT Standard Products

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The Greenhouse gases Observing SATellite (GOSAT), launched on 23 January 2009, is the world's first satellite dedicated to measuring the concentrations of the two major greenhouse gases, carbon dioxide (CO2) and methane (CH4), from space. The data measured with the Thermal And Near-infrared Sensor for carbon Observation Fourier Transform Spectrometer (TANSO-FTS) and the Cloud and Aerosol Imager (TANSO-CAI) are processed into several types of data products. Column abundances of CO2 and CH4 (TANSO-FTS SWIR L2 data product) are retrieved from the FTS L1B spectral data. Validation of the FTS Level 2 data product is critical since the data is used for generating the FTS Level 3 (global distributions of column-averaged mixing ratio data of XCO2 and XCH4) and the FTS Level 4 (regional CO2 fluxes and three dimensional distribution of CO2 calculated from the estimated fluxes) products.
The reference data to be used for validating abundances are required to have uncertainties of less than 1.0 % (0.3 % or 1 ppm is desirable) for CO2 and 2.0 % for CH4. Ground-based high-resolution FTSs that measure direct solar light are known to have the highest precision in observing column abundances of CO2 and CH4.
Data provided from TCCON (Total Carbon Column Observing Network) have been used for the GOSAT data validation. The major error factors in the retrieval of the Level 2 column abundances of CO2 and CH4 are interferences by aerosols and thin cirrus clouds. To elucidate their influences on the column abundance retrieval, we measure aerosols and cirrus clouds using lidars and/or sky-radiometers at selected FTS sites.
Concentrations of CO2 and CH4 measured by CONTRAIL (Comprehensive Observation Network for Trace gases by AIrLiner) are also of great importance in validating the Level 2 data product. In the CONTRAIL project, vertical profiles of CO2 concentrations are obtained during the take-off and landing periods at uncertainties of 0.2 ppm. These profiles are used to calculate XCO2. Furthermore airborne data prepared by NOAA and NIES are utilized in the validation work.
We will present recent results of the validation activity in which we compare the Level 2 column concentrations against the reference data provided from TCCON, CONTRAIL, NOAA, and NIES.