



Validation of XCH₄ derived from SWIR spectra of GOSAT TANSO-FTS with aircraft measurement data

M. Inoue (1), I. Morino (1), O. Uchino (1), Y. Miyamoto (2), Y. Yoshida (1), T. Yokota (1), C. Sweeney (3), P. P. Tans (3), and T. Machida (1)

(1) National Institute for Environmental Studies, Tsukuba, Japan (inoue.makoto@nies.go.jp), (2) Okayama University, Okayama, Japan, (3) Earth System Research Laboratory, National Oceanic and Atmospheric Administration, Boulder, CO, USA

Greenhouse gases Observing SATellite (GOSAT) was launched in January 2009 and has been operationally observing atmospheric carbon dioxide (CO₂) and methane (CH₄) from space. In this study, we have validated column-averaged volume mixing ratios of CH₄ (XCH₄) derived from the Short-Wavelength InfraRed (SWIR) spectrum of Thermal And Near-infrared Sensor for carbon Observation - Fourier Transform Spectrometer (TANSO-FTS) on-board the GOSAT using aircraft data measured by the National Oceanic and Atmospheric Administration (NOAA) and the National Institute for Environmental Studies (NIES). In order to complete CH₄ profiles and calculate XCH₄, we extrapolate profiles obtained by aircraft to the surface with the lowest aircraft measurement and utilize the climatological CH₄ density profiles obtained from Atmospheric Chemistry Experiment (ACE) or Halogen Occultation Experiment (HALOE) as the stratospheric and mesospheric profiles.

Because aircraft measurements within a few hours of the GOSAT overpass time were limited, we prepared temporally interpolated aircraft-based XCH₄ data by fitting with a curve that contains annual trend and annual/semiannual sinusoidal variations to compare with the GOSAT XCH₄ within ± 2 degrees or ± 5 degrees latitude/longitude box centered at each aircraft observation site. Comparison between GOSAT SWIR XCH₄ and aircraft-based XCH₄ shows that there is a strong positive correlation of both XCH₄ data in some observation sites. In addition, we will also present the GOSAT SWIR column averaging kernel impact on the calculation of XCH₄ derived under the aircraft measurement.