



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

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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) onboard 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.