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Improvement of retrieval algorithm of CO2 and CH4 profiles from GOSAT/TANSO-FTS TIR band

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The Greenhouse Gases Observing Satellite (GOSAT), which was developed by the National Institute for Environmental Studies (NIES), the Ministry of the Environment (MOE), and the Japan Aerospace Exploration Agency (JAXA), has been observing greenhouse gases continuously for about four years since its launch on January 23th, 2009. GOSAT consists of four spectral bands: three of the four bands in shortwave infrared (SWIR) region and one in thermal infrared (TIR) region. GOSAT can simultaneously observe CO2 and CH4 column-averaged dry-air mole fractions and their profiles in the same field of view from the SWIR and TIR bands. TIR Version 00.01 Level 2 (L2) data have been released to the public. The V00.01 L2 data were processed with a previous version (V100.100) of Level 1B (L1B) data. Although a single TIR V00.01 L2 CH4 profile does not have enough quality for scientific use, the TIR column-averaged CH4 value agrees to aircraft CH4 data within 0.5% [Saitoh et al., 2012]. On the other hand, TIR V00.01 L2 CO2 data do not have enough quality; they show a relatively large variability and have a clear bias in mid-troposphere in low latitudes. This study improves an algorithm for retrieving CO2 and CH4 profiles from TIR band. The new algorithm simultaneously retrieves several parameters other than target gases such as CO2 and CH4. The TIR retrieval processing in this study uses the latest version of L1B data; therefore, L2 data bias attributed to L1B spectral bias would be expected to decrease.

Keywords: greenhouse gas, satellite remote sensing, retrieval algorithm