

EGU21-10193, updated on 26 Nov 2022

<https://doi.org/10.5194/egusphere-egu21-10193>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



An 11 year record of GOSAT XCO₂ measurements from NASA's ACOS version 9 retrieval algorithms: comparisons to models, TCCON, and OCO-2

Thomas Taylor¹, Christopher O'Dell¹, Annmarie Eldering², David Crisp², Michael Gunson², Brendan Fisher², Robert Nelson², Vivienne Payne², Hannakaisa Lindqvist³, Kivi Rigel⁴, David Griffith⁵, Greg Osterman², Debra Wunch⁶, and Akihiko Kuze⁷

¹Colorado State University, Cooperative Institute for Research in the Atmosphere, Fort Collins, United States of America (tommy.taylor@colostate.edu)

²Jet Propulsion Laboratory (JPL), California Institute of Technology, Pasadena, CA, 91109, USA.

³Finnish Meteorological Institute (FMI), 00560 Helsinki, Finland

⁴Finnish Meteorological Institute, 99600 Sodankylä, Finland

⁵University of Wollongong, Centre for Atmospheric Chemistry, Australia

⁶Department of Physics, University of Toronto, Toronto, Ontario, Canada

⁷Japan Aerospace Exploration Agency (JAXA), Tsukuba, Ibaraki, Japan

The GOSAT TANSO-FTS sensor has been collecting high spectral resolution measurements of reflected solar radiation in the Oxygen A-band (0.76 microns) and two shortwave-infrared carbon dioxide (CO₂) absorption bands (1.6 and 2.0 microns) since April, 2009. The measured radiances allow for estimates of the total column carbon dioxide (XCO₂) via retrieval inversion. An eleven year long record of XCO₂ retrieved via NASA's Atmospheric Carbon Observations from Space (ACOS) build 9 software suite is analyzed and discussed. The v9 XCO₂ data has been publicly available on the NASA Goddard Earth Sciences Data and Information Services Center (GES DISC) since the spring of 2020.

The ACOS GOSAT v9 XCO₂ is evaluated against CO₂ flux inversion models, observations from the Total Carbon Column Observation Network (TCCON), as well as against collocated measurements from NASA's OCO-2 satellite. The results indicate a product that agrees with OCO-2 and models within approximately 0.25 ppm with less than 1 ppm standard deviation (σ). Agreement with TCCON is within approximately 0.1 ppm with approximately 1 ppm σ for daily overpass mean aggregated data. The ACOS GOSAT v9 XCO₂ product will allow CO₂ flux inversion modelers and terrestrial ecologists to address questions about long term (decadal) carbon cycle dynamics related to net and gross carbon fluxes.