

18th International Workshop on Greenhouse Gas Measurements from Space

July 12 (Tue.) – 14 (Thu), 2022

Online

Agenda

Note: All times indicated here are in JST (Japan standard time, UTC+9).

Oral Presentations

Day 1 (Tuesday, July 12)

8:00 – 8:15 Opening Session

8:15 – 9:00 Session 1. Results from current missions

Chairs: John Worden (JPL, US) & Takafumi Sugita (NIES, Japan)

1-1. The OCO-2 and OCO-3 Missions: Status, results and plans (Vivienne Payne, JPL, US)

1-2. Progress in understanding the natural carbon cycle with remote sensing CO₂ observations
(Junjie Liu, JPL, US)

1-3. Gridded Level 3 TROPOMI Methane Data Products (Olga Khaliukova, Colorado School of
Mines, US)

1-4. Results from GHGSat Constellation's First Full Year of Operation and Latest Phase of
Expansion (Dylan Jervis, GHGSat, Canada)

9:00 – 9:15 Break

9:15 – 10:00 Session 3. Retrieval algorithms and methods for inter-instrument and product Cal/Val

Chairs: Vivienne Payne (JPL, US) & Yukio Yoshida (NIES, Japan)

3-1. Radiance Comparison from OCO-3 and OCO-2 Simultaneous Nadir Observations (thomas p
kurosu, JPL, US)

3-2. Using Clear Ocean Scenes to Constrain Changes in Instrument Response in OCO-3 (Graziela
R. Keller, JPL, US)

3-3. UPlume: Automated algorithm for methane plume detection and source quantification by
satellite point source imagers (Jack H. Bruno, Harvard Univ., US)

3-4. Understanding causes of differences between the GGG2014 and GGG2020 data products
(Joshua L. Laughner, JPL, US)

10:00 – 16:00 Poster session and/or Break

16:00 – 16:45 Session 1. Results from current missions

Chairs: Ruediger Lang (EUMETSAT, Germany) & Takafumi Sugita (NIES, Japan)

1-5. More than a decade of GOSAT and GOSAT-2 operations and data products using their
unique capabilities of FTS multiplex advantage and target observations (Akihiko Kuze,
JAXA, Japan)

- 1-6. Current Status and Recent Topics on GOSAT and GOSAT-2 Standard Products and Other Data (Tsuneo Matsunaga, NIES, Japan)
- 1-7. Towards near-real-time XCO₂ retrieval from OCO-2 observations using Neural Network techniques (Cédric Bacour, LSCE, France)
- 1-8. On-orbit characterization of the TanSat instrument line shape using observed solar spectra (Zhaonan Cai, CAS, China)

16:45 – 17:00 Break

17:00 – 17:30 Session 3. Retrieval algorithms and methods for inter-instrument and product Cal/Val

Chairs: Nicholas Deutscher (Univ. Wollongong, Australia) & Yukio Yoshida (NIES, Japan)

- 3-5. Characterization of TANSO-FTS-2 onboard GOSAT-2 and the Level-1 algorithm updates (Junko Kasuya, JAXA, Japan)
- 3-6. Towards Arctic and boreal methane flux estimates: systematic evaluation of TROPOMI XCH₄ observations at high latitudes (Hannakaisa Lindqvist, FMI, Finland)
- 3-7. Comparison of IASI CH₄ retrievals based on ASIMUT and RTTOV (Charles Robert, IASB-BIRA, Belgium)

17:30 – 17:50 Session 4. Uncertainty quantification and bias correction techniques, including in situ measurements

Chairs: Isamu Morino (NIES, Japan) & Hirofumi Ohyama (NIES, Japan)

- 4-1. Commercial ship and aircraft-based evaluation of satellite derived XCO₂ and XCH₄ over oceans - updates and prospective (Astrid Müller, NIES, Japan)
- 4-2. Analysis of Biases in XCO₂ measured by a Pulsed Multiwavelength Airborne Lidar during the 2017 ASCENDS/ABOVE Campaign (James B. Abshire, NASA, US)

17:50 – 18:00 Session 2. Status of / Results expected from future missions

Chairs: Yi Liu (CAS, China) & Yasjka Meijer (ESA)

- 2-1. Assessment of the optimal operating point for a high resolution XCO₂ imager dedicated to the monitoring of 0.1 to 15.0 MtC.yr⁻¹ sources. (Francesco Graziosi, LSCE, France)

18:00 – Poster session and/or Break

Day 2 (Wednesday, July 13)

8:00 – 9:00 Session 5. Observations to quantify hot spots and local/urban emissions

Chairs: Ray Nassar (ECCC, Canada) & Naoko Saitoh (Chiba Univ., Japan)

- 5-1. Monitoring facility-scale CO₂ emission changes from space (Ray Nassar, ECCC, Canada)
- 5-2. Monitoring anthropogenic emissions from space: insights from OCO-3's Snapshot Area Mapping (SAM) mode (Abhishek Chatterjee, JPL, US)
- 5-3. Satellite monitoring of urban CO₂ emissions: optimizing the selection of cities and meteorological conditions (Danjou Alexandre, LSCE, France)

5-4. Carbon Mapper: on-orbit performance predictions and airborne prototyping (Riley Duren, Carbon Mapper, US)

5-5. Estimating urban methane emissions from space (Eric A. Kort, Univ. Michigan, US)

5-6. Strong methane point sources contribute a disproportionate fraction of total emissions across multiple basins in the U.S. (Daniel H. Cusworth, Univ. Arizona, US)

9:00 – 9:15 Break

9:15 – 10:00 Session 6. Flux estimates and atmospheric inversions from space-based GHG measurements and solar-induced chlorophyll fluorescence (SIF)

Chairs: Lesley Ott (NASA, US) & Makoto Saito (NIES, Japan)

6-1. Using OCO-2 column CO₂ retrievals to rapidly detect and estimate extreme terrestrial biosphere carbon anomalies (Andrew F. Feldman, NASA, US)

6-2. Is GOSAT XCO₂ useful in the OCO era? (Christopher O'Dell, CSU, US)

6-3. MethaneAIR Point Source Quantification: Method Exploration and Control Release Experiments (Apisada Chulakadabba, Harvard Univ., US)

6-4. Predictability of fossil fuel CO₂ from air quality emissions (Kazuyuki Miyazaki, JPL, US)

10:00 – 16:00 Poster session and/or Break

16:00 – 17:00 Session 6. Flux estimates and atmospheric inversions from space-based GHG measurements and solar-induced chlorophyll fluorescence (SIF)

Chairs: Dominik Brunner (EMPA, Switzerland) & Makoto Saito (NIES, Japan)

6-5. GOSAT and GOSAT-2 Level 4 global surface flux estimates (Makoto Saito, NIES, Japan)

6-6. Estimating the trend, seasonality, and variability of global and regional CO₂ fluxes with a Bayesian flux-inversion framework (Michael Bertolacci, Univ. Wollongong, Australia)

6-7. Interannual variability of anthropogenic methane emission estimated by an inverse model using GOSAT and surface observations (Rajesh Janardanan, NIES, Japan)

6-8. Towards assimilation of GOSAT partial column retrievals in CTE-CH₄ atmospheric inverse model for estimation of global and regional CH₄ budgets (Aki Tsuruta, FMI, Finland)

6-9. Increasing Natural Gas Demand Threatens China's Carbon Reduction (Fenjuan Wang, NIES, Japan)

6-10. Evaluation of GOSAT-2 SIF with ground-based SIF in three common vegetation types (Tomoki Morozumi, NIES, Japan)

16:45 – 17:00 Break

17:00 – 18:00 Session 5. Observations to quantify hot spots and local/urban emissions

Chairs: Hannakaisa Lindqvist (FMI, Finland) & Naoko Saitoh (Chiba Univ., Japan)

5-7. Detectable Weekly Cycle of Urban CO₂ Emissions from Satellite Observations: A Case Study in Los Angeles (Zhao-Cheng Zeng, Peking Univ. China)

5-8. The impact of viewing geometry on the interpretation of high-resolution measurements of CO₂ plumes (Nicolas Tufel, DLR, Germany)

5-9. Urban XCO₂ gradients from space: results from OCO-3 SAM's and a dense network of EM27/SUN over Mexico City (Ke Che, CAS, China)

5-10. The Greenhouse gas Observations of Biospheric and Local Emissions from the Upper sky (GOBLEU): New multi-species observations from passenger aircrafts in support of monitoring of Japan's anthropogenic carbon emissions (Hiroshi Suto, JAXA, Japan)

18:00 – Poster session and/or Break

Day 3 (Thursday, July 14)

8:00 – 9:00 Session 2. Status of / Results expected from future missions

Chairs: Yasjka Meijer (ESA) & Yi Liu (CAS, China)

2-2. The MicroCarb CO₂ mission : status and technical insight (Denis Jouget, CNES, France)

2-3. Quantifying localized carbon dioxide emissions from space: the CO2Image demonstrator (Julia Marshall, DLR, Germany)

2-4. The Copernicus Anthropogenic CO₂ Monitoring (CO2M) Mission - Recent Progress (Yasjka Meijer, ESA & Ruediger Lang, EUMETSAT, Germany)

2-5. The GeoCarb Mission: Progress and Future Plans (Sean Crowell, Univ. Oklahoma, US)

2-6. The GOSAT-GW greenhouse gases observing mission: Updates (Hiroshi Tanimoto, NIES, Japan)

9:00 – 9:15 Break

9:15 – 9:30 (continued from previous session)

Chairs: Yasjka Meijer (ESA) & Sean M. Crowell (Univ. Oklahoma, US)

2-7. The future China's greenhouse gas monitoring satellite missions (Yi Liu, CAS, China)

9:30 – 10:00 Invited Talk

Chairs: Sean M. Crowell (Univ. Oklahoma, US) & Akihiko Kuze (JAXA, Japan)

A Role for Space-based CO₂ and CH₄ observations in Greenhouse Gas Emissions Monitoring (David Crisp, Crisp Spectra LLC, US)

10:00 – 16:00 Poster session and/or Break

16:00 – 16:50 Session 7. Towards an international space-based GHG emission monitoring system

Chairs: Richard Engelen (ECMWF, UK) & Akihiko Kuze (JAXA, Japan)

7-1. The US Plan for Measuring, Monitoring, Reporting, and Verifying (MMRV) GHG emissions (Ken Jucks, NASA, US)

7-2. Mapping Emissions Over Offshore Oil and Gas Platforms Using Sun Glint with Carbon Mapper (Alana K Ayasse, Univ. Arizona, US)

7-3. Building a validation support service for CO2M and other GHG satellite missions (Mahesh Kumar Sha, BIRA-IASB, Belgium)

7-4. Non-local metrics applied to the comparison of CO₂ plumes and their sensitivities to

mesoscale meteorology (Pierre J. Vanderbecken, CERE, France)

7-5. CO₂ plume detection using deep neural networks: application to synthetic images of the XCO₂ field over the Paris area (Joffrey Dumont Le Brazidec, CERE, France)

16:50 – 17:00 Break

17:00 – 17:30 Session 8. Stakeholder needs and engagement for the Global Stocktake

Chairs: Riley Duren (Carbon Mapper, US) & Kazuhito Ichii (Chiba Univ., Japan)

8-1. CO₂ Budget (2015-2020) constrained by space-based and ground-based atmospheric CO₂ data in support of the Global Stocktake (Brendan Byrne, JPL, US)

8-2. Using Remote Sensing to Detect and Mitigate Methane Plumes in California (Jorn Herner, CARB, US)

8-3. Linking regional to global greenhouse gas budgets in RECCAP2 (Prabir K. Patra, JAMSTEC, Japan)

17:30 – 18:00 Closing Session

Poster Presentations

Note: Poster Session times are not fixed. The poster session venue at Gather town is always open. Please present and/or view the posters at your convenience.

Poster Num.	Speaker	Presentation title
Session 1. Results from current missions		
1-P01	Abhishek Chatterjee (JPL, US)	Advancing Arctic-Boreal carbon cycle science using OCO-2 retrievals
1-P02	Christopher Chan Miller (Harvard CFA, US)	XCH ₄ retrieval from MethaneAIR using the CO ₂ -Proxy Approach: First results over major US oil and gas basins
1-P03	Dmitry Belikov (Chiba Univ., Japan)	An analysis of GOSAT-TIR observation sensitivity to the near-surface CH ₄
1-P04	Luis Guanter (IIAMA, Spain)	Satellite-based detection of methane plumes from offshore platforms
1-P05	Robert Rosenberg (JPL, US)	Evaluating OCO-2 & OCO-3 Retrospective Calibration Using Dark, Lamp, and Science Spectra
1-P06	Lu, Yao (CAS, China)	Retrieval of solar-induced chlorophyll fluorescence (SIF) from satellite measurements: comparison of SIF between TanSat and OCO-2
1-P07	Matthäus Kiel (JPL, US)	An overview of the new and improved OCO-3 ACOS v10 XCO ₂ data product
1-P08	Sébastien Roche (Harvard Univ., US)	Using the O ₂ column from the O ₂ singlet delta band to derive proxy XCH ₄ from MethaneAIR observations
1-P10	Susan S. Kulawik (BAER Inst., US)	Validation of TROPOMI Methane in the GeoCarb Domain

1-P11	Thomas E. Taylor (CSU, US)	Evaluation of XCO ₂ estimates from OCO-2 and OCO-3 observations using the NASA ACOS version 10 retrieval algorithm
Session 2. Status of / Results expected from future missions		
2-P01	Hisashi Yashiro (NIES, Japan)	Overview of GOSAT-GW TANSO-3 data processing and product distribution in NIES
2-P02	Jonathan E. Franklin (Harvard Univ. US)	MethaneSAT: A new approach to quantifying area and point source methane emissions
2-P05	Ray Nassar (ECCC, Canada)	Overview of the proposed Arctic Observing Mission (AOM)
2-P06	Amir H. Souri (Harvard CFA, US)	MethaneSAT OSSE Simulation to Assess Errors in XCH ₄ Derived from the CO ₂ and O ₂ Proxy Methods
2-P07	Dongxu Yang (CAS, China)	IAPCAS supports TanSat (-2) missions
2-P08	Jonas Wilzewski (Harvard Univ., US)	Development of the MethaneSAT cloud and aerosol filter
Session 3. Retrieval algorithms and methods for inter-instrument and product Cal/Val		
3-P01	Antti Mikkonen (FMI, Finland)	The potential and feasibility of improved glint observations over snow for CO ₂ M
3-P02	Christopher O'Dell (CSU, US)	Solving scene inhomogeneity-induced errors without a slit homogenizer: application to GeoCarb
3-P03	Mukunda M. Gogoi (ISRO, India)	Satellite (GOSAT-2 CAI-2) and surface (ARFINET) observations of Aerosol Black Carbon over India: Regional and Global Inferences
3-P04	Peter Somkuti (Univ. Oklahoma, US)	Biases in XCH ₄ retrievals from the 2.3 μm spectral band
3-P05	Bingkun Luo (Harvard CFA, US)	Development of the MethaneSAT L0-1B processor
3-P06	Fabiano Oyafuso (JPL, US)	Updates to the Spectroscopic Model for the OCO-2 Retrieval Algorithm: ABSCO v5.2 for Level 2 v11
3-P07	Joseph Mendonca (ECCC, Canada)	A Neural Network Approach to Filtering OCO-2 Retrievals Over Snow
3-P08	Kei Shiomi (JAXA, Japan)	Recent status of GOSAT calibration and validation activities in 2022
3-P09	Le Kuai (JPL, US)	An overview of the tests and evaluations of the OCO-2 version 11 retrieval algorithm
3-P10	Makiko Hashimoto (JAXA, Japan)	Comparison of aerosol properties between GOSAT-2/TANSO-CAI-2 and ground-based observations and other satellites
3-P11	Nicole Jacobs (CSU, US)	Exploring the sensitivity of northern high latitude retrievals from OCO-2 to the referenced digital elevation model
3-P12	Rigel Kivi (FMI, Finland)	Carbon dioxide and methane measurements at Sodankylä, Finland and comparisons with satellite borne observations
3-P13	Robert R. Nelson (JPL, US)	Water and Temperature SVD Estimates to Improve OCO-2 XCO ₂ Errors

3-P14	Yu Someya (NIES, Japan)	Update on the retrieval algorithm for the NIES TANSO-FTS/GOSAT SWIR L2 product
3-P15	Yu Someya (NIES, Japan)	Design of the retrieval algorithm and level 2 product for greenhouse gases from GOSAT-GW
3-P16	Yukio Yoshida (NIES, Japan)	GOSAT-2 TANSO-FTS-2 SWIR L2 Version 02 Products
3-P17	Kang Sun (Univ. Buffalo, US)	Oxygen Airglow Studies in Support of the MethaneSAT Mission
Session 4. Uncertainty quantification and bias correction techniques, including in situ measurements		
4-P01	Ryoichi Imasu (Univ. Tokyo, Japan)	XCO ₂ observation network for verification of Kanto intensive observations and sun-glint observations by GOSAT and GOSAT-2
4-P02	Jonas Hachmeister (Univ. Bremen, Germany)	Improvements of S5P methane retrievals by using updated digital elevation models
4-P03	Takashi Maki (JMA/MRI, Japan)	Comparison of GOSAT-2 XCO ₂ and an independent inversion analysis
4-P04	Yukitomo Tsutsumi (NIES, Japan)	Validation of recent results of the GOSAT-2 FTS-2 SWIR L2 products
Session 5. Observations to quantify hot spots and local/urban emissions		
5-P01	Dustin Roten (Univ. Utah, US)	The Information Content of Dense Carbon Dioxide Measurements from Space: A Case Study with OCO-3
5-P02	Jianping Mao (Univ. Maryland)	Accurately Measuring Atmospheric CO ₂ Enhancements and Quantifying CO ₂ Emissions from Wildfires – an Airborne Demonstration
5-P03	Matthias M. Frey (NIES, Japan)	Urban Greenhouse Gas Emission Monitoring in Seoul and Tokyo
5-P04	Tonghui Zhao (CAS, China)	Development of an integrated lightweight multi-rotor UAV payload for atmospheric carbon dioxide mole fraction measurements
5-P05	B. Fuentes Andrade (Univ. Bremen, Germany)	Deriving CO ₂ emissions of localized sources from OCO-3 XCO ₂ and TROPOMI NO ₂ data
5-P06	Omid Moeini (ECCC, Canada)	Quantification of CO ₂ emissions over the Greater Toronto Area: Comparison of model simulations with OCO and EM27/SUN measurements
5-P07	Raquel Serrano-Calvo (TU Delft, Netherlands)	Analysis of methane mitigation actions in the Permian basin using TROPOMI: drastic reduction of oil and gas activity scenario
5-P08	Steffen Vanselow (Univ. Bremen, Germany)	Detection of locally elevated methane concentrations by analyzing Sentinel-5 Precursor satellite data

Session 6. Flux estimates and atmospheric inversions from space-based GHG measurements and solar-induced chlorophyll fluorescence (SIF)

6-P01	Audrey Fortems-Cheiney (LSCE, France)	NO _x and CO inversions for the derivation of FFCO ₂ emissions in Europe
6-P02	Aki Tsuruta (FMI, Finland)	Spatial distribution and Seasonal cycle of northern high latitudes CH ₄ fluxes inferred from an atmospheric inverse model using TROPOMI XCH ₄
6-P03	Brendan Byrne (JPL, US)	How does the ability to recover CO ₂ flux anomalies scale with observational coverage?
6-P04	Dien Wu (Caltech, US)	Informing sector characteristics of urban CO ₂ emissions using co-emitted trace gases
6-P05	Eva-Marie Schömann (Heidelberg Univ., Germany)	Seasonal and Interannual Variability of Australian Carbon Fluxes Seen by GOSAT
6-P06	Masataka Watanabe (Chuo Univ., Japan)	Estimation of GHG emission/absorption using GOSAT satellite data in Mongolia
6-P07	Pascal Prunet (SPASCIA, France)	Plume detection and characterization from XCO ₂ imagery: Evaluation of Gaussian methods for quantifying plant and city fluxes
6-P08	Shamil Maksyutov (NIES, Japan)	Regional land carbon sink estimates with NIES inverse model using ground-based, GOSAT and OCO-2 data
6-P09	Zhiqiang Liu (CAS, China)	Global (2°×2.5°) and regional (0.5°×0.625°) daily surface CO ₂ flux inferred from in-situ and OCO-2 B10 observations based on the Carbon in Ocean-Land-Atmosphere (COLA) system
6-P10	Jin Ma (Utrecht Univ., Netherlands)	Global carbonyl sulfide budgets constrained by NOAA surface network and MIPAS satellite

Session 7. Towards an international space-based GHG emission monitoring system

7-P01	Benedikt Herkommer (KIT, Germany)	Using a portable FTIR spectrometer for intercalibration of TCCON stations: The COCCON travel standard
7-P03	Rajesh Janardanan (NIES, Japan)	Observations of atmospheric CH ₄ enhancements due to anthropogenic emissions by the GOSAT-2 satellite