



Photo: Samuli Siltanen

13th International Workshop on Greenhouse Gas Measurements from Space on June 6 – 8, 2017

University of Helsinki, Pieni Juhlasali – Small Hall, Fabianinkatu 33, Helsinki

Invited presentations 20 + 5 min, Contributed presentations 12 + 3 min

Poster boards are in portrait format and can fit a poster up to a standard A0 size (841 x 1189 mm)

JUNE 6, 2017

TIME

PRESENTATION

09:00 to 09:15

Opening Remarks, Kristiina Pietikäinen, Ministry of Traffic and Communications

09:15 to 09:20

Practical information, Johanna Tamminen

09:20 to 10:30

Session 1: Ongoing and near-term satellite missions and calibration (Chair Tamminen)

09:20 (20+5min)

Opening Talk: David Crisp, NASA Jet Propulsion Laboratory, Overview on existing satellite measurement capabilities and near term plans

09:45 (12+3min)

Matsunaga, T.: Recent Progress in NIES GOSAT and GOSAT-2 Projects

10:00

Landgraf, J.: Sentinel 5 precursor and the TROPOMI shortwave infrared total column products

10:15

Durak, O.B.A.: Progress report from GHGSat-D: Towards commercial high spatial resolution CH₄ and CO₂

10:30 to 10:55

Coffee

10:55 to 12:05

Session 1 continue: Ongoing and near-term satellite missions and calibration (Chair Eldering)

10:55 (20+5min)

Invited talk: Yi Liu, Institute of Atmospheric Physics of Chinese Academy of Sciences, China, First observations of TanSat satellite

11:20 (12+3min)

Bi, Y.M.: TanSat ACGS instrument prelaunch performance evaluation of radiometric calibration

11:35

Yang, Z.: Preliminary assessment of TanSat Atmospheric Carbon Dioxide Grating Spectroradiometer on-orbit Performance

11:50

Crisp, D.: OCO-2: A progress report at the end of the prime mission

12:05 to 13:20

Lunch

13:20 to 15:15	Session 4 – Part 1: Greenhouse gas observations for emission hot spots and flux inversions on regional and global scales (Chair Houweling)
13:20 (20+5min)	Invited talk: Anna M. Michalak , Carnegie Institution for Science and Stanford University, USA, Key opportunities and challenges in using space-based observations for greenhouse gas flux estimation at regional to global scales
13:45 (12+3min)	Crowell, S.: Were Tropical Land Ecosystems a Source of CO ₂ in 2015? The View from OCO-2 and GOSAT
14:00	Hakkarainen, J.: Direct space-based observations of anthropogenic CO ₂ emission areas from OCO-2
14:15	Lin, B.: Regional atmospheric greenhouse gas distributions observed during ACT-America field campaigns
14:30	Liu, J.: Responses of tropical terrestrial biosphere carbon cycle to the 2015-2016 El Nino
14:45	Wang, J.: Chinese CO ₂ fluxes inferred from OCO-2 and GOSAT and from in situ data during the 2015 El Nino event
15:00	Butz, A.: Remote sensing of volcanic CO ₂ , HF, HCl, SO ₂ , and BrO in the downwind plume of Mt. Etna
15:15 to 15:40	Coffee
15:40 to 16:55	Session 2 – Part 1: Retrieval algorithms and uncertainty quantification (Chair Boesch)
15:40 (12+3min)	ODell, C.W.: Recent improvements in XCO ₂ measurements from the Orbiting Carbon Observatory-2
15:55	Natraj, V.: Improved Orbiting Carbon Observatory-2 (OCO-2) Retrievals Using a BRDF Model for the Surface
16:10	Braverman, A.: Uncertainty quantification for OCO-2 remote sensing retrievals via Monte Carlo simulation
16:25	Serio, C.: Assessment of a physically-based simultaneous retrieval for CO ₂ , CH ₂ and N ₂ O from IASI observations and inter-comparison with in situ observations and AIRS, GOSAT, OCO-2 satellite products
16:40	Xiong, X.: CO ₂ , CH ₄ and CO Retrievals and Validation at NOAA using CrIS on S-NPP and JPSS-1
16:55 to 17:00	Short break
17:00 to 18:15	General discussion on requirements of future greenhouse gas missions (Discussion led by D. Crisp)
18:30 to 20:00	Icebreaker – Säätytalo – State of Estates, Snellmaninkatu 9-11 , Helsinki (walking distance from the meeting room)

JUNE 7, 2017

TIME

PRESENTATION

09:00 to 10:25

Session 5 – Global observations of greenhouse gases for process studies and interactions of carbon cycle and climate (Chair Aben)

09:00 (20+5 min)

Invited talk: Martin Heimann, Max Planck Institute for Biochemistry & Univ. Helsinki, Quantifying regional biogeochemical budgets: the scientific challenges

09:25 (12+3 min)

Bloom, A.A.: Atmospheric CO₂ constraints on tropical carbon cycle processes

09:40

Detmers, R.G.: RemoTeC GOSAT retrievals and the 2011 La Nina: Terrestrial CO₂ flux variations over the Southern Hemisphere

09:55

Parker, R.J.: Assessing the inter-annual variability of wetland methane emissions

10:10

Nechita-Banda, N.: A joint CO-CO₂ inversion system for studying the effect of drought on the carbon cycle

10:25 to 10:35

Coffee

10:35 to 12:15

Poster session (posters with odd numbers)

12:15 to 13:45

Lunch

13:45 to 14:40

Session 2 – Part 2: Retrieval algorithms and uncertainty quantification (Chair Cortesi)

13:45 (20+5 min)

Invited talk: Michael Buchwitz, Institute of Environmental Physics of the University of Bremen, Germany, Overview and latest results of ESA's GHG-CCI project and Copernicus Climate Change Service (C3S) operational continuation

14:10 (12+3min)

Gordon, I.: Highlights of the HITRAN2016 database

14:25

Yang, D.: TanSat retrieval algorithm and its application on global carbon monitoring from space

14:40 to 15:40

Session 4 – Part 2: Greenhouse gas observations for emission hot spots and flux inversions on regional and global scales (Chair Matsunaga)

14:40 (12+3 min)

Nassar, R.: Quantifying CO₂ emissions from individual coal power plants using OCO-2 observations

14:55

Weir, B.: Disentangling GEOS model biases from those of retrieved column carbon dioxide

15:10

Saigusa, N.: Monitoring carbon cycle change using an integrated observation, modeling and analysis system

15:25

Stanevich, I.: Characterizing atmospheric transport errors in models using GOSAT XCH₄ retrievals

15:40 to 16:05

Coffee

16:05 to 17:20

Session 3 – Part 1: Validation and supporting observations including ground based, aircraft and in situ observations (Chair Meijer)

16:05 (12+3 min)

Camy-Peyret, C.: Thermal infrared measurements of CO₂ from IASI over the Arctic Ocean in summer and comparison with the CAMS CO₂ inversion product

16:20

Houweling, S.: Bias correction in CH₄ flux inversions using satellite data and the role of atmospheric transport

16:35

Masiello, G.: Validation of physical inverse products from IASI spectra: the case of Carbonyl Sulphide (OCS)

16:50

Nagel, J.: GreenLITE(TM): A Novel Approach to Ground-Based Quantification and Mapping of Greenhouse Gases with Potential for Validation of Low Bias Lidar Measurements Needed for Space

17:05

Kivi R.: FTS measurements of Greenhouse gases over Sodankylä

JUNE 8, 2017

TIME

PRESENTATION

09:00 to 09:45

Session 3 – Part 2: Validation and supporting observations including ground based, aircraft and in situ observations (Chair Aalto)

09:00 (12+3 min)

Bovensmann, H.: Using airborne remote sensing observations to determine emissions of complex CH₄ and CO₂ localised sources

09:15

Mao, J.: Atmospheric CO₂ Concentration Measurements to Cloud Tops from an Airborne Lidar

09:30

Suto, H.: Airborne-based demonstration of intelligent pointing onboard GOSAT-2

09:45 to 09:55

Short break

09:55 to 10:50

Session 6 – Solar induced fluorescence for identifying natural sources and sinks (Chair Noda)

09:55 (20+5 min)

Invited talk: Ying Sun, Soil and Crop Sciences Section, Cornell University, Ithaca, USA, OCO-2 advances photosynthesis observation from space via solar-induced chlorophyll fluorescence

10:20 (12+3 min)

Norton, A.J.: Using solar-induced chlorophyll fluorescence (SIF) to constrain global gross primary productivity in the process-based terrestrial biosphere model BETHY-SCOPE

10:35

Xiao, X.: Seasonal dynamics and inter-annual variation of solar-induced chlorophyll fluorescence and gross primary production in North, Central, and South America during 2000-2016

10:50 to 11:00

Group photo

11:00 to 11:10

Coffee

11:10 to 12:30

Poster session (posters with even numbers)

12:30 to 13:50

Lunch

13:50 to 15:50

Session 7 – Future missions and observing strategies (Chair Crisp)

13:50 (12+3 min)

Eldering, A.: The OCO-3 Mission: Updated Overview of Science Objectives and Status

14:05

Buisson, F.: An Update of MicroCarb project progress and perspective

14:20

Meijer, Y.J.: State of play for a European operational monitoring system for fossil CO₂ emissions

14:35

Moore, B.M. : The GeoCarb Mission

14:50

Ott, L.: NASA's Carbon Cycle OSSE Initiative - Informing future space-based observing strategies through advanced modeling and data assimilation

15:05

Dinelli, B.M.: OXYCO₂: A New Experiment for the Measurement of the CO₂ Distribution in the Stratosphere and the Upper Troposphere

15:20

Pierangelo, C.: Status of MERLIN mission

15:35

Rayner, P.J.: The Role of CO observations in source attribution for the GEOCARB Mission

15:50 to 16:10

Coffee

16:10 to 17:00

Wrap up of meeting outcomes and discussions

16:10

Discussion / all

16:35

Wrap up by 13th IWGGMS Scientific Organizing Committee

16:50

Presentation by the host of 14th IWGGMS

17:00

Adjourn

POSTERS

Session1

NUMBER	POSTER
1.2	Buisson, F.: An Update of MicroCarb project progress and perspective
1.7	Kataoka, F.: Inter sensor comparison between GOSAT and OCO-2 spectral radiance and retrieved carbon dioxide
1.8	Knuteson, R.: Application of PCA to the GOSAT TIR Data for Noise Filtering and Calibration Monitoring
1.10	Lichtenberg, G.: SCIAMACHY: Spectral Calibration in the SWIR Channels
1.13	Payan, S.: Comparison of thermal infrared measurements of CO ₂ from GOSAT and IASI over the Arctic Ocean in summer
1.14	Pradines, D.: Overview of MicroCarb operations concepts
1.15	Wang, Q.: Prelaunch Spectral Calibration of the TanSat's Atmospheric Carbon Dioxide Grating Spectroradiometer

Session2

NUMBER	POSTER
2.1	Anand, J.S.: Latest developments of the University of Leicester XCO ₂ and XCH ₄ retrieval algorithms for GOSAT- Support for ESA's GHG-CCI and Copernicus C3S programmes
2.3	Bril, A.: EOF-based XCO ₂ /XCH ₄ retrieval algorithm: Towards global GOSAT data processing
2.5	Chen, X.: Analysis of aerosol information content in CAPI/TanSat observation over land and induced error in CO ₂ retrieval from aerosol
2.6	Dinelli, B.M.: AIRWAVE: an algorithm for the retrieval of the total column of water from the measurements of the ATSR series and Sentinel 3/SLSTR
2.8	Hashimoto, M.: Accelerated aerosol retrieval algorithm MWPM-EXAM for GOSAT/TANSO-CAI and GOSAT-2/TANSO-CAI-2
2.9	Kangah, Y.: Study of IASI nitrous oxide (N ₂ O) retrievals: application to long-range transport during the Asian summer monsoon
2.10	Kulawik, S.S.: Validation of OCO-2 and ACOS-GOSAT using HIPPO and TCCON
2.11	Lamminpää, O.: Dimension reduction methods for remote sensing of methane profile
2.13	Nelson, R.R.: Using GEOS-5 Aerosols to Inform the OCO-2 CO ₂ Retrieval
2.15	Payne, V.H.: Spectroscopy for remote sensing of greenhouse gases: Recent advances and outstanding issues
2.16	Ramanathan, A.K.: CO ₂ Sounder Multiwavelength Lidar Measurements: Retrievals, Spectroscopy, Biases and Vertical Information
2.18	Someya, Y.: Ammonia detection using TIR band of GOSAT
2.19	Somkuti, P.: Implementing a PCA-based Fast Radiative Transfer Method for XCO ₂ Retrievals
2.20	Sundström, A.-M.: Assessment of the aerosol induced biases in the ESA Greenhouse Gas CCI satellite CO ₂ products
2.22	Yamada, A.: The impact on CH ₄ retrieval of GOSAT/TANSO-FTS TIR band from differences in line parameter databases and from the uncertainty of the continuum absorption
2.24	Yoshida, Y.: Progress status of the GOSAT/GOSAT-2 SWIR L2 retrievals

Session 3

NUMBER	POSTER
3.1	Backman, L.B.: Influence of atmospheric conditions on Arctic column-averaged dry-air mixing ratios of atmospheric methane
3.2	Boesch, H.: Towards a UK TCCON Station
3.5	D'Amato, F.: Terrestrial and airborne optical analyzers for the detection of greenhouse gases
3.6	Deutscher, N.M.: Comparison of XCO ₂ and XCH ₄ measurements from three solar FTIR instruments at Wollongong
3.7	Dils, B.: The CCI-GHG CRDP#4 : Validation using TCCON
3.8	Hochstaffl, P.: Validation of Carbon Monoxide Total Columns from SCIAMACHY mission with

NDACC/TCCON

- 3.11 **Kivi, R.:** Fiducial Reference Measurements for Ground-Based Infrared Greenhouse Gas Observations (FRM4GHG) campaign at the Sodankylä TCCON site
- 3.12 **Laurila, T.:** Integrated Carbon Observation System (ICOS) Research Infrastructure provides atmospheric GHG data for scientist
- 3.13 **Lindqvist, H.:** Assessment of the satellite-measured seasonal cycles of XCO₂ from GOSAT and OCO-2
- 3.16 **Morino, I.:** Philippines TCCON installation: towards quantifying atmospheric carbon in Southeast Asia
- 3.18 **Natraj, V.:** Aerosol Scattering Effects on Water Vapor Retrievals over the Los Angeles Basin
- 3.19 **Qin, X.C.:** Ground-based measurement of column-averaged mixing ratios of carbon dioxide in Tokyo by a portable optical spectrum analyzer
- 3.20 **Roehl, C.M.:** Update on OCO-2 Validation Using TCCON
- 3.21 **Saitoh, N.:** Validation of Level 2 CO₂ and CH₄ products of GOSAT/TANSO-FTS thermal infrared band and future algorithm improvement
- 3.23 **Tukiainen, S.:** Vertical distribution and time-series of Arctic methane
- 3.24 **Uchino, O.:** Lidar observation at TCCON sites to investigate the influence of particles for GOSAT data
- 3.25 **Velazco, V.A.:** Validation of GOSAT Products in the Southern Hemisphere: Alice Springs Desert M-Gain Comparisons
- 3.26 **Yue, T.X. :** An Introduction to a Carbon Verification System for TanSat

Session 4

NUMBER

POSTER

- 4.4 **Hedelius, J.K.:** Estimate of the SoCAB CO₂ flux using a Lagrangian-based method and TCCON and OCO-2 observations
- 4.5 **Ialongo, I.:** Monitoring anthropogenic CO₂ signatures using OCO-2 observations: an application to US power plants
- 4.6 **Imasu, R.:** Gross Primary Production (GPP) calculation component to estimate CO₂ emissions from Mega-cities using regional transport models
- 4.7 **Jones, D.B.A.:** Quantifying regional fluxes of CO₂ using lower tropospheric partial columns of CO₂ retrieved from GOSAT measurements
- 4.8 **Kangasaho, V.:** Methane emissions from northern wetlands during soil freezing period estimated by atmospheric inversion modelling
- 4.9 **Kasai, K.:** A study on regional emission events of greenhouse gases with GOSAT and OCO-2 for classification into anthropogenic and biogenic sources
- 4.10 **Labzovskii, L.D.:** The contribution of large urban areas to enhancements in local CO₂ concentrations based on OCO-2 observations
- 4.12 **Lindqvist, H.:** The potential of satellite-measured XCO₂ to evaluate land surface models
- 4.14 **Maki, T.:** Observing System Experiments with Multiple Satellites for CO₂ Analysis using the LETKF
- 4.15 **Maksyutov, S.:** Interannual variability of the surface carbon dioxide and methane fluxes inferred from GOSAT observations
- 4.16 **Marshall, J.:** Nested regional CO₂ inversions over Europe using OCO-2 and GOSAT measurements
- 4.21 **Tsuruta, A.:** Towards assimilation of XCH₄ GOSAT observations to global CH₄ emission estimates by CTE-CH₄ data assimilation system
- 4.24 **Yang, S.:** Monitoring Anthropogenic CO₂ Emissions by the Seasonal Changes of Atmospheric Xco₂ from Satellite Observations
- 4.25 **Zadvornyykh, I.V.:** The joint methane retrieval from GOSAT SWIR and TIR spectra over Western Siberia

Session 5

NUMBER

POSTER

- 5.3 **He, Z.:** Investigating Biosphere-Atmosphere Interactions using XCO₂ and MODIS vegetation parameters: A comparison study of GOSAT retrievals and model simulations
- 5.5 **Kivimäki, E.:** Seasonal cycle and variability of the trend of column-averaged methane from GOSAT observations

- 5.6 **Laeng, A.:** Global CFC-11, CFC-12, HCFC-22, CCl₄, CH₄, N₂O measurements with MIPAS: validation, climatologies and trends
- 5.7 **Murakami, K.:** High Resolution Global Terrestrial Carbon Flux: Evaluations and Applications
- 5.10 **Shi, Y.:** Relationship between biomass burning emissions and GOSAT XCO₂ and MOPITT CO changes over fire affected regions
- 5.11 **Tamminen, J.:** Carbon Balance under Changing Processes of Arctic and Subarctic Cryosphere (CARB-ARC project)
- 5.12 **Wei, J.:** GES DISC Greenhouse Gas Datasets and Associated Services

Session 6

- | NUMBER | POSTER |
|---------------|--|
| 6.1 | Noda, H.: On-going challenges and future perspective of SIF monitoring by GOSAT and GOSAT-2 |
| 6.3 | Oshio, H.: Radiance offset correction for observing solar-induced chlorophyll fluorescence from GOSAT |
| 6.5 | Thum, T.: Assessing seasonal cycle of photosynthesis by solar induced fluorescence in Fenno-Scandinavia |

Session 7

- | NUMBER | POSTER |
|---------------|---|
| 7.1 | Abshire, J.B.: Advances in Pulsed Lidar Measurements of XCO ₂ from Aircraft and in Scaling for Space |
| 7.4 | Grandmont, F.: Optimising Imaging Fourier Transform Spectrometer for GHG from LEO |
| 7.5 | Julien, E.: Level 2 processing of MERLIN mission data |
| 7.6 | Kawa, S.R.: Updated Global Error Characterization for a CO ₂ Lidar Space Mission |
| 7.7 | Landgraf, J.: The spectral sizing of ESA's future CO ₂ observing space mission |
| 7.10 | Nassar, R.: Recent studies on high latitude greenhouse gas observations from a highly elliptical orbit (HEO) mission |
| 7.14 | Saito, M.: GOSAT observations and global carbon cycle |
| 7.15 | Sierk, B.: Elements of a future Sentinel mission for imaging fossil fuel CO ₂ emissions |
| 7.16 | Tirelli, C.: Advanced tropospheric ozone monitoring by data fusion and assimilation |