Independent Administrative Institution
National Institute for Environmental Studies (NIES)
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http://www.gosat.nies.go.jp/

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CONTENTS

NEWS 5th Japan-US Joint Vicarious Calibration of GOSAT in Railroad Valley, NV, USA

Yu Oishi, Research Associate,
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The 5th vicarious calibration*[1] was carried out from June 16 to 21, 2013 jointly with US ACOS*[2]/OCO-2*[3] team in Railroad Valley (RRV, map right), NV, USA. 13 people joined this time, 7 from Japan, 6 from US.

Group photo on the 1st day of observation (back row from left, Mr. Nelson, Ms. Kataoka, Dr. Kawakami, Mr. Roby, Dr. Schwandner, Mr. Wetzel; front row from left, Dr. Oishi (writer), Dr. Kuze, Dr. Yokota, Dr. Bruegge, Ms. Yang, Dr. Shiomi, Dr. Kato)

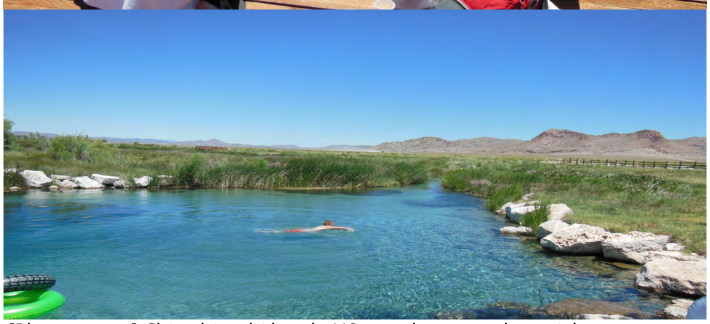
Sensitivity of sensors onboard satellites degrades by aging due to the space environment, requiring the degree of degradation to be verified periodically. The degradation is evaluated by comparing radiances between one observed by the satellite and the other calculated by radiative transfer code. This campaign observes surface reflectance and vertical profiles of temperature, humidity, etc., all of which are input for the radiative transfer code. RRV is a vast, physically almost homogeneous dried-up lake (playa) with high surface reflectance, 1400m above sea level, broader than the observation footprint of TANSO-FTS (approx. 10km) onboard GOSAT; these make RRV best for vicarious calibration (photo right).

We from Japan went to RRV from Los Angeles or Las Vegas, divided in 3 groups. My group of 3 members moved to Pasadena from Los Angeles International Airport first. At NASA JPL*[4] (Jet Propulsion Laboratory) in Pasadena, we checked the operation of observation instruments sent from Japan and put everything necessary on a freight truck. Then we drove all the way of 600km north to Tonopah, and then 150km east to RRV (from the next day on, we commuted from Ely, 150km north-east of the site). Now we are ready for vicarious calibration!

There were many observations conducted other than ground surface reflectance by spectroradiometer (photo right); vertical distributions of atmospheric pressure, temperature, and humidity by radiosonde (photo left); vertical distributions of CO_2, CH_4, O_3, atmospheric temperature, and humidity by NASA Alpha Jet; column amounts of CO_2 and CH_4 by Optical Spectrum Analyzer*[5] (OSA); solar flux by pyranometer; anisotropy of ground surface reflectance by PARABOLA (Portable Apparatus for Rapid Acquisition of Bidirectional Observation of Land and Atmosphere); O_3 column amount by ozonometer (Microtops II); soil moisture content by soil moisture sensor. I was directly involved with the observation of surface reflectance by spectroradiometer, which was installed on the baby carriage to observe reflected radiances from the ground and spectralon diffuser plate: both data are required for the calculation of the ground reflectance. We helped each other whenever available, manpower being limited for a lot of task.

RRV is located 1400m above sea level, very dry and hot (about 35℃ during the day) and too flat to escape from occasional strong wind with sand, which made it indispensable for us to cover our skin with sunblock cream, clothes, and hats/caps (clips required to keep them on). Water and mineral supplementation were fatally important to avoid heat stroke, and we prepared plenty of sports drinks in a cold box for everyone when needed.

On those days not synchronizing with GOSAT, we were divided into 2 groups, one staying with observation task and the other going on a day off. The latter enjoyed a very short vacation at a hot spring in Duckwater, taking Chirashizushi (Sushi rice bowl with toppings – not hand-shaped individually) and swimming with freshwater fish in the spring, which is cool enough for them to live in, a kind of swimming pool for us. It was really nice for a change.



[Photo upper] Chirashizushi lunch. US members use chopsticks beautifully. [Photo lower] Mr. Wetzel, the swimmer.

In the evenings, we tried supersized steaks at a restaurant in Ely, had a potluck party beside Cave Lake, and others giving variety for the sake of refreshing ourselves.

Blessed with fine weather through the period this time, we were able to get good data at every observation and got back safe and sound to Pasadena via Tonopah as on the first day. At JPL, they continued observation to compare ground-based FTS and OSA, whose installation only I helped and left for Japan from Los Angeles Airport a little earlier than the others.

I am very grateful for the opportunity to be given this valuable experience, the collaborative vicarious calibration under the scorching sun. I thank you all, everyone in Japan team, US team, and who supported our activities there.

<< Our typical day >>

06:30 Wake-up, check e-mail
07:00 Breakfast, preparation for the day
(sunblock cream for strong UV, etc.)
08:20 Leave hotel, refueling and drink shopping
10:00 Arrive at RRV base camp
10:30 Meeting (analyses of the previous day explained),
prepare instruments
12:30 Help release radiosonde
12:45 Move to the site, instruments installed on the baby carriage
13:15 Start observation
13:45 GOSAT passed over
14:15 End observation,
instruments uninstalled from the baby carriage
15:00 Back to base camp, copy data, cleanup instruments
16:30 Cleanup base camp (pack and pickup things except tent,
put the toilet in order)
17:00 Leave base camp
18:30 Arrive at hotel, upload data,
charge batteries, shower
19:30 Go out for dinner
21:30 Get back to hotel, preparation
for the next day, check e-mail
24:00 Go to bed

[Photo right] Observation's over. Last shot at base camp.

*1 Atmospheric CO_2 Observations from Space team is a group organized around OCO (Orbiting Carbon Observatory) science team involving researchers of JPL*4, Caltech, and Colorado State University.
*2 Orbiting Carbon Observatory 2 is a CO_2 observing satellite of the US to be launched in 2014.
*3 Please refer to #7, #19, and #24 newsletters for the 2nd, 3rd, and 4th RRV Vicarious Calibration Campaigns.
*4 Jet Propulsion Laboratory is a federally funded research and development center and operated by Caltech for NASA.
*5 An instrument to observe spectra using a grating, which was used in the ship-based observation reported on #25 newsletter.

ANNOUNCEMENT

Accepting Applications of GOSAT RA#6

GOSAT PEOPLE A Series: Supporting GOSAT Project (5)

Big Stagehands in System Operation for Higher Level Data Processing

Masataka Ajiro, GOSAT Project Office Manager, Center for Global Environmental Research, NIES

This time let us introduce how GOSAT Data Handling Facility (GOSAT DHF) is operated and maintained: how their work is going.

The hardware maintenance and system operation of GOSAT DHF are handled by NS Solutions Corporation and its affiliated companies. The system offers data provisioning services to users all over the world, GOSAT DHF being basically required 24x7 operation except for regular maintenance. The system is designed and developed based on automatic operation, however, some unexpected circumstances may happen to come up like hardware faults, performance limitations of introduced commercial applications, etc. The people at DHF are in charge of emergent measures of these issues and thorough investigation of their causes. Also, they cover the window functionality for users' Q&A and communication with other organizations.

How data products offered from the system

For the processing of GOSAT observation data, not only GOSAT Level 1 data from JAXA, but also auxiliary data such as meteorological data provided by Japan Meteorological Agency (JMA) are required. The DHF operators (hereafter "Operators") check the data acquisition status periodically and get data manually if needed. As you may know, some products are generated "on demand" based on users' specified region and time of their interest; in the case of FTS Level 2 products, all the scans of interest are recorded in a file as a product. This on-demand provision through GOSAT User Interface Gateway (GUIG) is a unique function of GOSAT DHF. Other higher level products are ready to be downloaded from prepared data.

Operators watch all the status of product generation, data processing, and data transmission between JAXA and GOSAT DHF. Because the automation of operation has made very complicated relationships between system modules, Operators have to have a wide variety of professional knowledge on system operation and data processing flow to locate abnormality and prevent it from spreading to affect subsequent processes.

GOSAT DHF processes Level 1 data from JAXA on a near-real-time basis and also reprocesses the existing GOSAT observation data when Level 1 and/or higher level processing algorithms are updated.

Operators were initially worried about the system resource allocation (scheduling) between near-real-time processing and reprocessing to improve the operation efficiency, monitoring the resource status at the same time. The problem originated in the discrepancy between the operation estimated by the system developer and the real one, which was solved by proposals from Operators including closer information exchange to improve the system. 4 years' experience and continuous improvements have also contributed to stable operation of the system and the Operators' skill upgrading.

How Level 1 data examined

GOSAT Level 1 data, obtained automatically from JAXA every day, happen to carry identical or undefined file names for some reasons. There are 3,200 to 3,600 files every day for GOSAT Level 1 data and catalogue information in near-real-time processing. It is necessary for all the Level 1 data to check the total count and consistency between data to find and handle any abnormal data immediately, because once the abnormality is overlooked, data processing proceeds towards the generation of higher level products to register them, the incorrect products, on the catalogue. Thus careful data examination at the upstream is quite important to ensure both products' reliability and efficient use of system resources.

How to realize stable products provisioning

There were continuous trials and errors in improving operation and maintenance of the system as in repeated enhancement of its design and development to establish stable organization as a whole. 2010 was the year of hard times to handle many version updates and related reprocessing including Level 1 data, which obliged us to execute complicated parallel control of versions. The situation was dealt one by one by NIES project members working together to find issues, propose and discuss improvements, and modify processes, and now we are able to provide products to users routinely.

Improvement of data processing control function and renovation of GUIG

We have had two major improvements on the system function. The first one occurred in May, 2010, to improve data processing control function. Once some particular error occurred, all the subsequent processes must have been halted. It made available machine time wasted if the error occurred with no Operators attended on holidays/midnights. However, now it is possible to continue processes automatically judged not to be affected by the preceding error. Another example of improved control function is the automatic start of data reprocessing under predefined conditions: there is no need of complicated preparation/setting of parameters, which once required about one month, to start the processing. That was enabled by e-mail notification function telling the status and progress of data processing and monitoring function to get system load and history instantly. Now it's possible to run near-real-time processing and reprocessing efficiently, with much reduced load on Operators.

The second is GUIG renovation on October, 2010. The front page was renewed and product search function (simplified search) added. The simplified search requires only product category, observation date, version, etc., to produce a product, whereas detailed parameters were once required to order products you want. We will do our best to improve the convenience of users.

How GOSAT DHF equipment renewed and enhanced

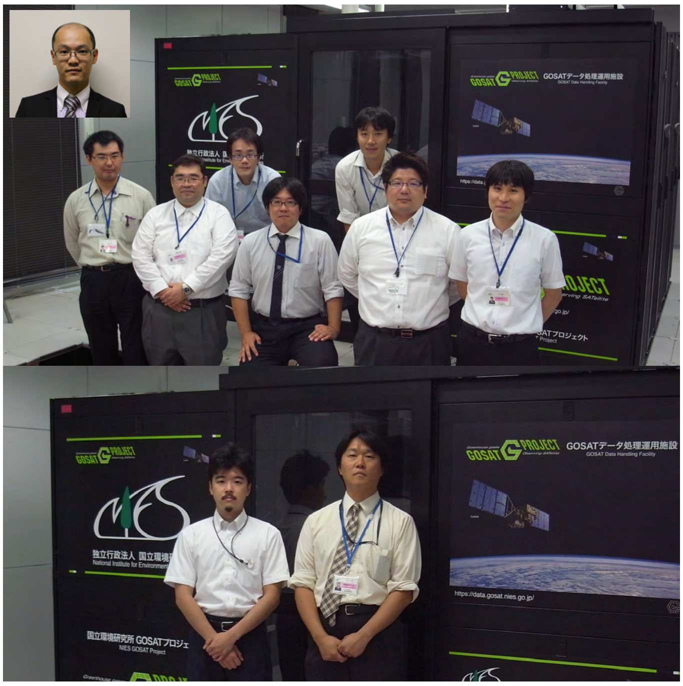
GOSAT DHF was introduced in 2007 and 2008 in a phased manner and in 2011 - 2012, the existing equipment was renewed, realizing improved availability by adopting virtual system, better reliability by redundant server configuration, and smaller footprint and increased maintainability by equipment integration, to enable more stable and uninterrupted operation.

During the renewal, we conducted a parallel operation of existing and introduced equipment as much as possible to expedite and complete data migration and cutover in (1) having all back-ups, (2) stopping distribution of old version products and listing their corresponding data source, (3) data migration of requisite minimum, (4) confirming all system functions. We carried out system halt and system work as planned to minimize migration effect on daily operation through repeated discussion by GOSAT project office, equipment personnel, system developers, and Operators, to accomplish all the work successfully. That really was a valuable experience for us all.

There is another plan to upgrade control equipment of the system. We are determined to complete the work without any troubles and keep stable operation of GOSAT DHF.

Kaizen*1 activity to be continued

We will continue information sharing and kaizen activity between Operators to keep stable and efficient system operation. We know it is uninterrupted provisioning of GOSAT products that contributes most to users and researchers around the world who are at the other end of the system. We are very happy to support you all.



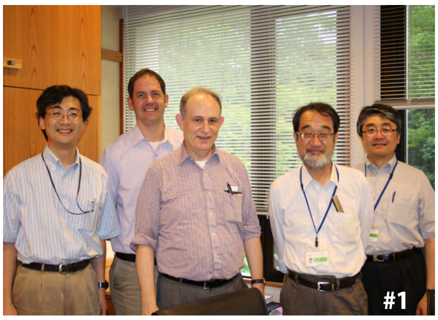
[Photo upper] Operation personnel: front row from left, Mr. Watanabe, Mr. Kurotaki, Mr. Usuzuki, Mr. Mochizuki, Mr. Ichijo; back row from left, Mr. Suzuki, Mr. Takubo; upper left corner, Mr. Tojima.
[Photo lower] Maintenance personnel: from left, Mr. Makino, Mr. Miyata.

*1 This Japanese word literally means "improvement" with connotation of bottom-up activation by proposals and discussion from any person in and "around" (not necessarily "in charge of") the work, sometimes beyond his/her job description, when used in business context.

NEWS

Visit to NIES by Dr. Kaye, Associate Director, NASA

Tsuneo Matsunaga, Leader, GOSAT-2 Project Team, Center for Global Environmental Research (CGER), NIES

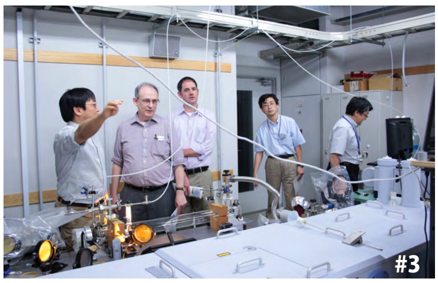


Dr. Jack A. Kaye, Associate Director for Research, Science Mission Directorate, NASA, visited NIES on July 10, 2013 on the occasion of his presence in Japan to participate in the 41st meeting of the Coordination Group for Meteorological Satellites (CGMD-41). During his visit Dr. Kaye toured three facilities of CGER - the Aircraft Monitoring Laboratory, the Atmospheric Constituents Spectra Laboratory, and the GOSAT Research Computation Facility (RCF). He was also shown the lidar facilities of the Center for Environment Measurement and Analysis at NIES, which are employed in the observation of atmospheric aerosols.

Dr. Kaye remarked on the high-level and precise measurements of greenhouse gases (GHGs) at NIES, utilizing our various platforms, which include ground-based systems, shipping, aircrafts and satellites - whereby our institute is currently central to the measurement of GHGs in Asia.

Following the tour, Dr. Kaye and Dr. Akimasa Sumi, President of NIES, engaged in a lively talk focused on the differences between the respective space policies of Japan and US; the division of roles and responsibilities between national ministries and space agencies for satellite missions; and future visions for GHG observation by satellites.

Dr. Kaye also touched on the scheduled launch of a NASA satellite, the OCO-2 (Orbiting Carbon Observatory-2) in July 2014.



[Photo#1] Form left, Dr. Matsunaga, Mr. Blackerby, Dr. Kaye, NIES President Dr. Sumi, Dr. Yokota.
[Photo#2] Dr. Machida showing the Aircraft Monitoring Laboratory around.
[Photo#3] Dr. Morino showing the Atmospheric Constituents Spectra Laboratory around.

INTERVIEW

A Series: *IBUKI* 's PI Interview

No.10 University of Bremen, Physics

Prof. Justus Notholt

Prof. Justus Notholt visited Japan this May to attend the 5th GOSAT RA PI Meeting and IWGGMS-9 as an RA PI. This interview was held at the time in Yokohama, which is famous for its big Chinatown with long history, where we took advantage of this beautiful opportunity to talk over good Chinese lunch.

He seemed to be a man of quiet conscience, and of clarity, serious enthusiasm and patience as well, to answer plainly everything we asked.

(Interviewers: I. Morino, O. Uchino, et al, NIES GOSAT Project)

Morino (hereafter **M**) Thank you for coming, Dr. Notholt. To begin with, may we ask about your personal history: where you were born and grew up?

Notholt (hereafter **N**) I was born in southern Germany but at the age of one we moved to Düsseldorf, and from there, at the age of 16, we moved to Kassel. I studied in Göttingen and Kassel, and did also my Ph.D. in Kassel. But I studied something completely different, solid state physics, X-ray spectroscopy, and I got my Ph.D. in surface science and electrochemistry in 1989.

Uchino (hereafter **U**) What kind of instrument did you use?

N: In my Ph.D. I did Raman spectroscopy.*1 I investigated one specific new effect which is called "surface enhanced Raman scattering" by laser. I forgot the company, a very big laser, continuous blue light laser. As a postdoc I moved to Italy to join the European Research Center in Ispra in northern Italy and started with atmospheric physics. There I started with DOAS*2 spectroscopy (Different Optical Absorption Spectroscopy). I measured pollution in the troposphere and developed the instrument further for simultaneous measurements of droplets, like fog. I stayed in Italy for one and a half years until 1990. Then I moved to Bremerhaven, to the Alfred-Wegner-Institute for Polar and Marine Research as a senior scientist and there I started with the FTIR*3 spectroscopy. I set up the FTIR-site in Ny-Ålesund in Spitzbergen, Norway. The research at the beginning was mainly connected to the polar ozone loss.

U: So you measured trace gases like the CFCs?

N: Yes, and for example HCl, HF, ozone, HNO_3. I developed measurement and analysis techniques to use the moon as light source during the polar night. After 2 years I moved to the Alfred-Wegner-Institute in Potsdam, where I got a permanent job as a group leader. There I stayed for nearly ten years, from 1992 to 2002, to continue working in Spitsbergen and also performed the first observations during ship cruises and I was once also in Antarctica for the FTIR-observations.

U: So I found your ship cruises paper by FTS*4?

N: Yes, by FTS. In the meantime, I also did my Habilitation in 2000 at the Free University Berlin, and finally in 2002, I moved to Bremen to become there Professor for earth remote sensing.

U: I hear it's very difficult to become a professor in Germany.

N: Yes and No. "Difficult" is a wrong word. It would say, you need "a lot of luck." You must be good in science, but you must also able to lead a group, to get money. But finally, you must be at the right time at the right place and I was at the right time at right place. I was lucky. In Bremen we are now running the FTIR stations in Ny-Ålesund, Bremen, Bialystok, Orleans, Surinam, and during ship cruises. But we also study the sea ice from satellite, sea ice remote sensing and have a small mesospheric modeling group. And we are also working on FTIR in-situ measurement, measuring directly the fluxes of trace gases, the exchange between water and atmosphere.

M: Where is the site?

N: This is done by my coworker, Thorsten Warneke, he is currently in Malaysia to perform these measurements.

*1 Raman spectroscopy is a method to analyze spectra obtained from Raman scattering which produces a particular wavelength change according to the substance.

*2 DOAS is a method to measure gaseous substance which has a particular photoabsorption spectrum in UV-visible region.

*3, *4 Fourier Transform InfraRed spectrometer obtains interfering light by moving one of a pair of 2 mirrors and observes spectra in infrared region after Fourier transformation. It's also called FTS (Fourier Transform Spectrometer) when the wavelengths to observe are not limited. The instrument has advantages that (1) it can observe a wider range of wavelengths at one time, (2) it can handle a higher light intensity, compared to grating spectrometer (*6).

U: What kind of concentrations do you measure?

N: We measure CO_2, CH_4, CO, H_2O and different isotopes. Malaysia is one site, but we are also interested in the big rivers. The best would be the Amazon, or the big Russian rivers, but this is difficult. We would like to go there, but that's not easy because of import, export, research permissions, all these problems.

M: You are European co-chair of TCCON*5 and you have made a great contribution to validate the GOSAT data. Please tell us how your sites and group are promoted.

N: Yes. We have several sites which participate to the GOSAT validation. That's good. The instrument onboard GOSAT and the FTS spectrometer is very good. I am convinced, for this spectral region an FTS spectrometer is much better than a grating spectrometer*6. When using an FTS spectrometer you understand the instrumental behavior, which means the spectral line shape function, very good. And the problems GOSAT has with these microvibrations, this can be solved, because you understand it, and you can correct for it. But every satellite instrument needs a validation. If you want to measure CO_2 or CH_4, the natural variability is very small. The seasonal variability of CO_2 is 10 ppm to 20 ppm: you have concentration of 380 ppm. So this is around a few percent. Therefore if you want to measure CO_2, you must be better than 1% and also if you want to compare different regions, you must have a very high accuracy. Therefore, you need a good validation and the TCCON sites are the only sites that can do this. During the last years, the GOSAT results became better and better because the analysis of satellite spectra is an iterative process. You learn a lot during the flight time of the satellite and you can improve the retrieval so the results are becoming better and better. I think at the moment, there is no better satellite than GOSAT for CO_2 and CH_4. Therefore GOSAT is really necessary. The launch of the NASA instrument failed (OCO*7), hopefully there will be a second launch (OCO-2*8), and the lifetime of the European instrument SCIAMACHY*9 is over. What I think most important is, quantifying the fluxes of CO_2 and CH_4. Measuring concentration is one thing, but finally we need the fluxes to the strengths of the sources and sinks.

U: But to get CO_2 fluxes, we usually have to solve the regional bias.

N: Yes, to understand the regional bias, you need a validation at many different sites. So far, you have in-situ instruments, and they are very good, very accurate and there are lots of sites worldwide measuring for a long time. But these in-situ instruments measure only at the surface. If you want to interpret the data, and get the fluxes, you have to make assumptions on the vertical mixing, and this is the problem, because you do not understand the vertical mixing very well. Total column measurements are much easier to be used, because with this technique you get all the molecules in the atmospheric column, doesn't matter at which altitude. And we saw from the results in the last years that the total column data really helped and improved the results for the fluxes. This is also what has been said today during the meeting, and the final statement, the uncertainty of the fluxes reduced by 50%. This is for me the main result. But there are many, many other important things because GOSAT also measures other trace gases, for example H_2O. When you study H_2O, you need to study its isotopes. And HDO can be measured by GOSAT and when you have both H_2O and HDO, you learn something about the history and the sources of H_2O.

U: So what is your feeling about present GOSAT status?

N: It's very good. The instrument is running nearly perfect. Nearly every satellite has, or will become problems throughout the lifetime, but so far, the GOSAT instrument is very good. But you should try that GOSAT is running as long as possible so that it has an overlap with the next satellite: OCO-2, GOSAT-2, CarbonSat*10, or whatever. From a scientific point of view, you need to have an overlap to study the long term evolution of the trace gases.

M: Do you have any comment or recommendation on present GOSAT project?

N: The communication with the GOSAT PIs is very good, and lot of e-mail exchange, this works very good, and also the web page is helpful. For us it's important, that there are persons of the GOSAT team that we can contact if we have questions. But a few more web pages could be translated to English.

Aikawa (hereafter **A**) I hear some people get GOSAT data from ACOS*11.

N: Yes, but I think this is good. There is a very good cooperation between the US and Japan. When OCO failed, there was a whole NASA science team without work, which now works with GOSAT. I think this is very good, the GOSAT people are very open to give the spectra to other people. This is not normal, but it is very good, because this helped not only the US scientists but the whole community. If two or more, somehow competing agencies are working both on GOSAT, that's perfect. It's always good to have some competition, because

*5 Total Carbon Column Observing Network is a network of the ground-based high-resolution FTSs observations. Currently, its observations are carried out in more than ten locations worldwide. TCCON's column-averaged volume mixing ratios of greenhouse gases are used for validating greenhouse gases observation by satellites and other carbon cycle studies.

*6 An instrument to observe spectra utilizing the phenomenon that the location of strongest interference of light diffracted by grated pattern varies according to the wavelength.

*7, *8 Please refer to *2 in page 2.

*9 SCanning Imaging Absorption spectroMeter for Atmospheric CHartographY is the sensor mounted on the ESA satellite Envisat, which was in operation from March 2002 to April 2012.

*10 Carbon Monitoring Satellite is planned and led mainly by Bremen University in the ESA's Earth exploration project, targeting at global observation of CO_2 and CH_4 concentrations, to be launched in 2018.

*11 Please refer to *1 in page 2.

*12 Conference Of the Parties is a general term, but in this context that means COP-FCCC (Framework Convention on Climate Change).

then the scientific output becomes better and more clear and open.

U: So what do you expect from GOSAT-2; do you have any request?
N: I hope it will be an FTS instrument.

M: What is the future plan for your research?
N: I don't fully know. Regarding my research, more and more people are working now in the area of carbon studies, the carbon cycle. The amount of funding is the same, but more and more people are working in this area, therefore the funding per group is decreasing, and we have to look what will come up soon. But still, for a long time, in my group it will be ground-based spectroscopy connected to satellites. The combination of ground base and satellite instruments is still quite good. What I also do besides research at the University are physics shows. That's some kind of education, entertainment to the public, with a lot of experiments. That's fun.

A: How about political activities? Carbon cycle is a very political matter, as you know as seen in the series of COP*12 conferences …so how about yourself, your activities?
N: The big problem I see is that the mankind does not take climate change serious enough. And the number of people who say, that there is no anthropogenic greenhouse effect, is increasing, especially in the US. But even if you do not believe in anthropogenic global warming caused by CO_2, there are some numbers which demonstrate the danger of the current situation. Throughout the last 600,000 years, the maximum change in CO_2 was 1 ppm in 200 years. But now we have an increase of 2 ppm per year. So, what is happening now is 400 times faster than what happened in the past. And the earth cannot react so fast. The system earth, with the atmosphere, the ocean, the land and the ice, is very complex, and we do not understand all processes and feedbacks. What we are currently doing is an experiment with our earth where we do not know how it will end. This is very dangerous.


From left, Dr. Morino, Prof. Notholt, Dr. Uchino

M: This year, Mauna Loa CO_2 concentration is recorded over 400 ppm.
N: But other developing countries, like China or India, have the right to get the same lifestyle as we have. The emission per person in China is still much less than in the US. But the total emissions from China are extremely large, because they have so many people. Those countries who have a high living standard must make the first step. They have the responsibility to start to change the lifestyle and decrease the CO_2 emissions.

A: Germany have abandoned nuclear power plant. It decided to abolish every nuclear power plant in 15 years, I hear.
N: Yes, but let's wait. The politicians change (laughter). They wanted to stop in, I've forgotten, in 10 years or so, but now, they are already enlarging the period to 20 years and so on. That's politics.

M: Yes, you are right. Thank you very much.
N: Thank you.

PUBLISHED PAPERS

Field of Research: data application
Name of Journal: Geophysical Research Letters (Volume 40, pages 2829-2833, 2013)
Title: Interpreting seasonal changes in the carbon balance of southern Amazonia using measurements of XCO_2 and chlorophyll fluorescence from GOSAT
Authors: N. C. Parazoo, K. Bowman, C. Frankenberg, J.-E. Lee, J. B. Fisher, J. Worden, D. B. A. Jones, J. Berry, G. J. Collatz, I. T. Baker, M. Jung, J. Liu, G. Osterman, C. O'Dell, A. Sparks, A. Butz, S. Guerlet, Y. Yoshida, H. Chen, C. Gerbig

Field of Research: data processing algorithm, validation
Name of Journal: Journal of Geophysical Research (Volume118, pages 4887–4905, 2013)
Title: Impact of aerosol and thin cirrus on retrieving and validating XCO_2 from GOSAT shortwave infrared measurements
Authors: S. Guerlet, A. Butz, D. Schepers, S. Basu, O. P. Hasekamp, A. Kuze, T. Yokota, J.-F. Blavier, N. M. Deutscher, D. W.T. Griffith, F. Hase, E. Kyro, I. Morino, V. Sherlock, R. Sussmann, A. Galli, I. Aben

Field of Research: calibration
Name of Journal: Applied Optics (Volume 52, pages 4969-4980, 2013)
Title: Characterization and correction of spectral distortions induced by microvibrations onboard the GOSAT Fourier transform spectrometer
Authors: H. Suto, J. Yoshida, R. Desbiens, T. Kawashima, A. Kuze

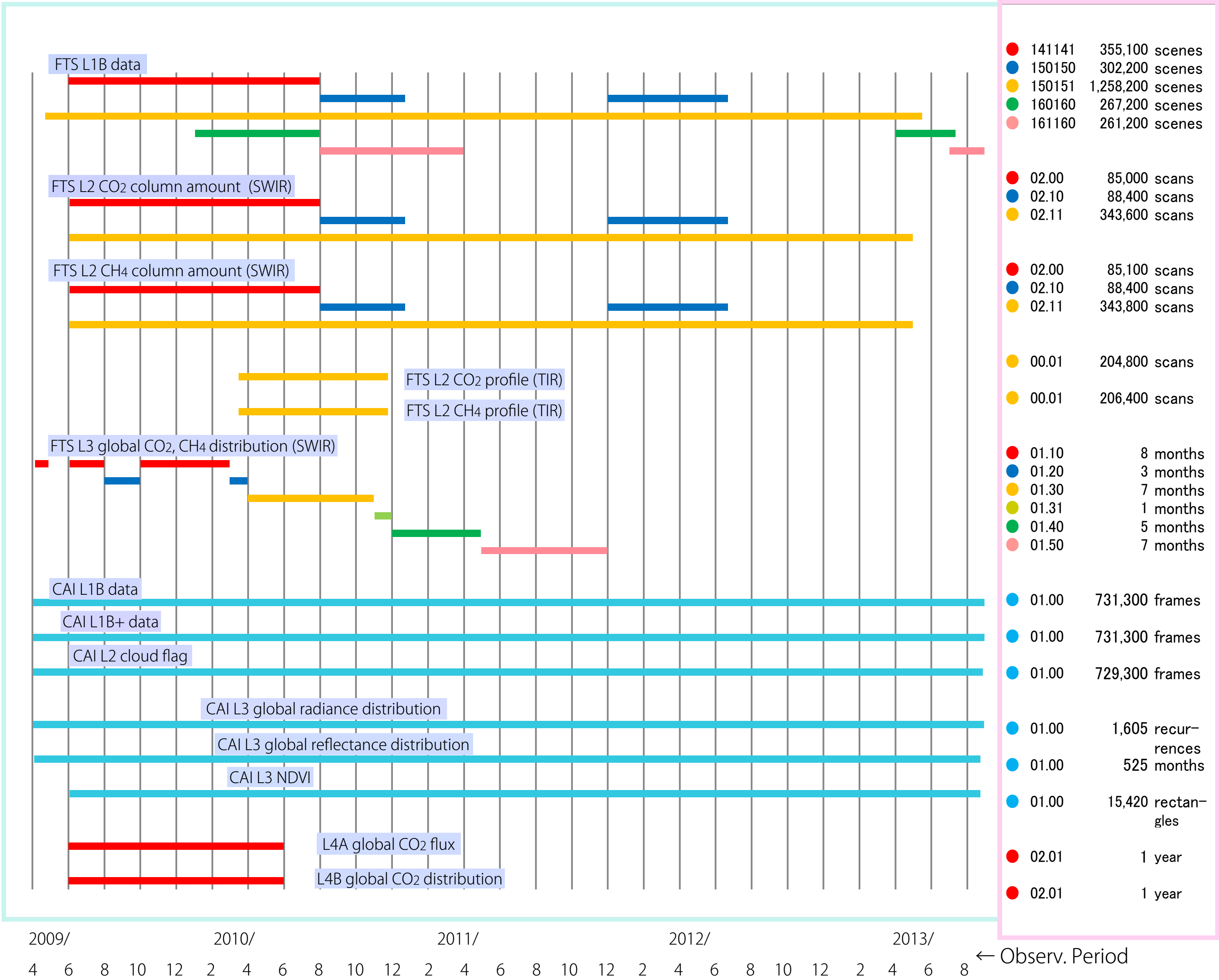
Field of Research: data application
Name of Journal: Geophysical Research Letters (Volume 40, pages 4098–4102, 2013)
Title: First satellite measurements of carbon dioxide and methane emission ratios in wildfire plumes
Authors: A. N. Ross, M. J. Wooster, H. Boesch, R. Parker

DATA PRODUCTS UPDATE

Data Processing Status Update from GOSAT Project Office

Fumie Kawazoe, Specialist, NIES GOSAT Project Office

Observation Period and Versions of Publicly Released Data   As of August 30, 2013



The chart above is as of August 30, 2013. The latest processed and released on are: FTS L1B in updated V161.160 (for more detail, please refer to "Release Notes on GOSAT FTS L1 Products (Ver.161.160)" on GUIG); CAI L1B/L1B+/L2 cloud flag/L3 global radiance and reflectance distribution, and NDVI in V01.00. The version names of FTS L2 CO_2/CH_4 column amount (SWIR) will be changed into V02.21 according to the FTS L1B update.

FTS L1B is being reprocessed for the data after January 1st, 2010 under the new version names of V160160 and V161160, which will be released additionally anytime completed.

The number of registered users is 1526 as of August 29, 2013.

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