NIES GOSAT PROJECT NEWSLETTER

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Independent Administrative Institution
National Institute for Environmental Studies (NIES)
A newsletter on the Greenhouse gases Observing SATellite (GOSAT, "IBUKI") project from the NIES GOSAT Project Office.
http://www.gosat.nies.go.jp/

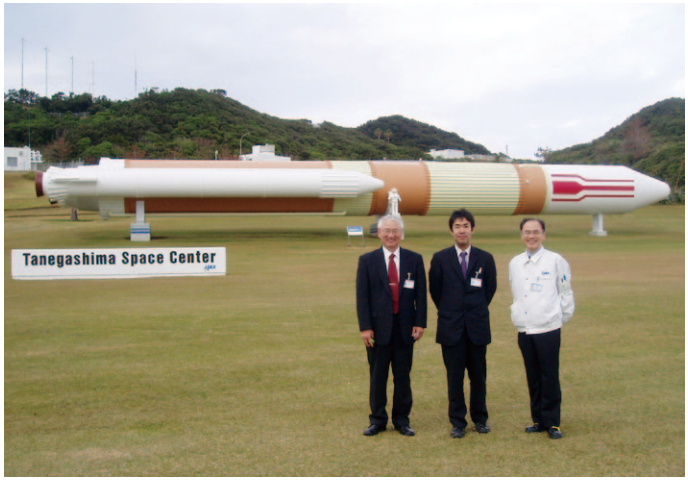
Greetings -

Looking Back on My Term as "IBUKI"'s Officer

- Mr. Toru Hashimoto
Section Chief, Administration Division, Global Environment and Marine Department, Japan Meteorological Agency (JMA)

From April 2008 to March 2010, I was concerned with the Greenhouse gases Observing SATellite (GOSAT, "IBUKI") during my term at Office of Research and Information, Global Environment Bureau at the Ministry of the Environment (MOE). While I was there, I had a pleasure of being involved in a number of big events such as the launch and the first public data release.

"IBUKI" is a cooperative project among three parties, Japan Aerospace Exploration Agency (JAXA), National Institute for Environmental Studies (NIES), and MOE, in other words, a collaboration among three institutions different in their character, a space agency, a research institution, and a government institution. For this reason, the representatives from each institution, including I, had to put in various efforts for coordination among them. I remember that I was responsible for responding to various inquiries and organizing counsels for the officials from many different fields. This was because "IBUKI" is the first and only satellite in the world that is dedicated to observe greenhouse gases, and the fact that there is a range of vigorous discussions going on regarding global warming nowadays attracts great attention from the standpoint of public administration.



At JAXA Tanegashima Space Center. Photographed together with the former JAXA GOSAT Project Manager Takashi Hamazaki (right) and NIES GOSAT Project Office Validation Manager Osamu Uchino (left) on December 9, 2009, during "IBUKI"'s press preview event. (Photo: courtesy of Toru Hashimoto)

Fortunately enough, I had a background in data processing for the weather satellites at JMA before I moved to this position at Office of Research and Information. So, I found it interesting to sit in on heated debates among the scientists at the meetings of "IBUKI"'s scientific advisory board, GOSAT Science Team. In fact, there were some occasions when the debates among the prominent scientists went out of our control, but I feel that it shows how much was expected out of "IBUKI" from the science side.

"IBUKI"'s launch was also an event that drew attention of various sectors since it was the first satellite launch since the enactment of the Basic Space Law in Japan in August 2008, and also because several other piggyback satellites were launched along. I had the fortune to be present at the scene of launch, which was an incredible experience. It was also a great experience even just as an officer, to have sat at the post-launch press conference and shared the joy of success with representatives from JAXA and NIES.

Since April 2010, I am back at JMA where I am originally from, and continue working on climate and environment related affairs. My relationship with "IBUKI" has become just "an user" from "an officer" but I still cannot take my eyes off of great success of "IBUKI." I am looking forward to seeing "IBUKI" contribute to the accumulation of scientific knowledge such as on carbon cycle, thus to the climate change prediction with higher accuracy.

NEWS

New Mobile LIDAR for GOSAT Data Products Validation Installed

- Osamu Uchino, Validation Manager, NIES GOSAT Project Office

Photos: Osamu Uchino

GOSAT data products such as the column amounts of carbon dioxide (CO_2) and methane (CH_4) are estimated from the observational data of "IBUKI," but these column amounts are affected by aerosols such as yellow sand and cirrus clouds. In order to understand these effects and improve the accuracy of GOSAT data products, it is vital to observe the vertical profile of aerosols and clouds as well as their optical properties during "IBUKI"'s observation.

For this purpose, a mobile LIght Detection And Ranging (LIDAR) was installed at NIES in the early 2010 (Image 1). This LIDAR consists of a laser transmitter (Image 2), telescope (Image 3), spectrometer/detection unit (Image 4), signal/data-processing unit (Image 5), and they are all packaged inside a container. On the rooftop of the container, there are two observation windows that protect the equipment from unexpected rains and prevent sun heat from impinging on the optical axis alignment of the laser transmitter and the receiving telescope.

The observation flow is as follows: A laser emits light into the atmosphere, the telescope receives the scattered light from the atmospheric molecules (mainly nitrogen and oxygen)/aerosols/ cirrus clouds, the spectrometer/detection unit separates the light into respective wavelengths then converts it into electric signals, then save it as a raw data in signal/data-processing unit. By analyzing the saved data, it is possible to acquire the information on vertical distribution and optical characteristics of aerosols and clouds at a high range resolution.

We are currently conducting the fine-tuning to optimize the LIDAR equipment. As soon as the tuning is finished, we are going to start the observation in synch with "IBUKI" over-passing as well as the ground-based Fourier Transform Spectrometer here at NIES that observes the column amount of CO_2 and CH_4 at a high accuracy. We are planning to compare these observational results carefully with the GOSAT data products and to apply the results to improve their accuracy.

Image 1. Exterior view of the LIDAR container.

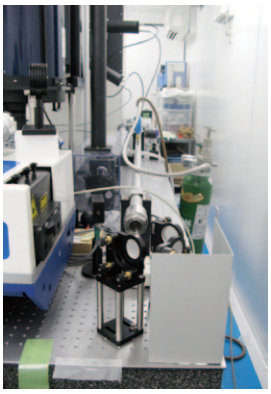


Image 2. Laser transmitter unit

Image 3. Telescope

Image 4. Spectrometer/detection unit

Image 5. Signal/data-processing unit

NEWS

NVIDIA Chief Scientist Dr. Bill Dally Visits GOSAT RCF

Dr. Bill Dally, the chief scientist of NVIDIA Corporation visited GOSAT Research Computation Facility (GOSAT RCF) on June 3, 2010. NVIDIA Corporation developed the General Purpose computing on Graphics Processing Units (GPGPU), a core part of GOSAT RCF featured in April issue. After the slide presentation by NIES Fellow Kaduo Hiraki of the Office for Global Environmental Database at CGER, NIES, Dr. Dally toured GOSAT RCF, and discussed the possibility of further refinements.

Dr. Bill Dally, the Chief Scientist of NVIDIA Corporation. during the discussion.

(from left) Dr. Bill Dally of NVIDIA Corporation and NIES Fellow Kaduo Hiraki of Office of Global Environmental Database, CGER NIES inside GOSAT RCF.

Dr. Dally commented, "I am very impressed with the GPU cluster built to process GOSAT data. While small, it is completely state of the art. We expect this cluster to be one of the greenest high-performance computing installations and to lead the way in environmental computational science on GPUs."

NEWS

CAI L1B+ Browse Images Now Released – How to Search and Display Images

- Nobuyuki Kikuchi, Specialist, NIES GOSAT Project Office

The website, GOSAT User Interface Gateway, where you can download "IBUKI""s data products, now offers a new function, "CAI L1B+ Browse Image Search." With this function, anyone can quickly search for and find the images acquired by Cloud and Aerosol Imager (CAI) onboard "IBUKI."

Here are step by step guides to search for CAI L1B+ browse images acquired on May 18, 2010, and to search for the images acquired over the central part of Japan.

<How to Access the Website>

(1) Click on "Observation data distribution and Observation request service are here" or "GOSAT User Interface Gateway" logo on the top left corner of NIES GOSAT website (http://www.gosat.nies.go.jp/index_e.html).

(2) Click on "Gallery" under "Menu," then click on "CAI L1B+ browse"

<Search Images from a Specific Date>

(3) Specify the date to search images from a period of one day of May 18, 2010. Under the "Specify an Observation Period (UTC)" set the Start Date to 2010/05/18 and End Date to 2010/05/18. Leave Start Time 00:00:00 and End Time 23:59:59 as they are. (Image 1)

(4) Click on "Search" and then the page changes to "CAI L1B+ Browse Image Search Result."

(5) There are 465 results, and 10 images are displayed in each page. If you move to the eighth page among the 47 pages in total, you can find an image that shows the Tokyo metropolitan area, numbered as 75.

If you click on the "Detail," a larger image will open in a new window. In Windows Internet Explorer, you can right click on the image to save it by choosing "Save Picture As." With Mac OS X Safari, you can control-click the image to save it by choosing "Save to Download Folder" etc.

(7)Now, we are going to continue with other search conditions. Click on "Back to Search Condition"

<Search Images from a Specific Location>

(8) Click on "Yes" button under "Specify Area." A new window, "Map Search CAI" will open.

(9) Click on "Clear" at the "Ope:" in the middle of window.

(10) Select the central part of Japan; place the mouse pointer over the top left side of the area, then click and drag towards bottom right to create a rectangle of red line. The area is set when you release the mouse button. You can redo this process by clicking on "Clear."

(11) If you click on "List>," paths and frames in which GOSAT observed the selected area appear on the map and in the table. If you check on "Off," this path and frame are removed from the search. Here, we are going to leave the path 5, frame 25, and check on "Off" for the rest.

(12) Click on "OK" and close the "Map Search CAI" window. Then, go back to the "CAI L1B+ Browse Image Search" window. Path 5, Frame 25 that was selected in the map is shown in a table.

(13) In order to expand the observation period, modify

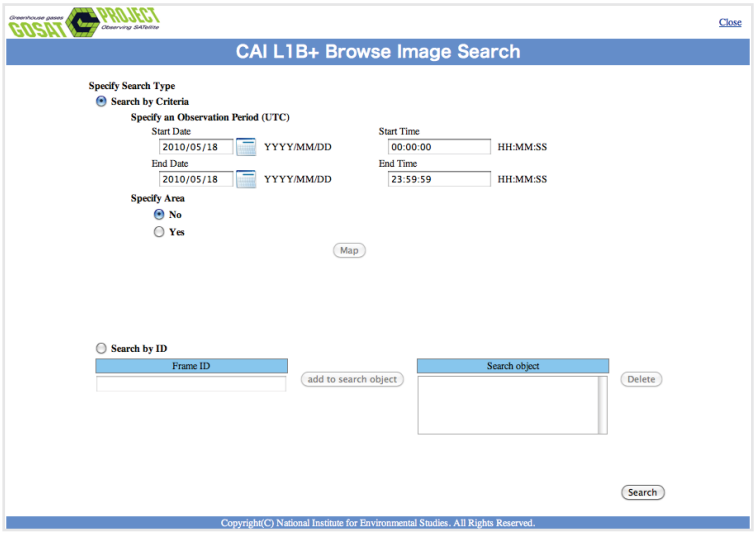


Image 1. Specifying search conditions. An example of setting the date as May 18, 2010.

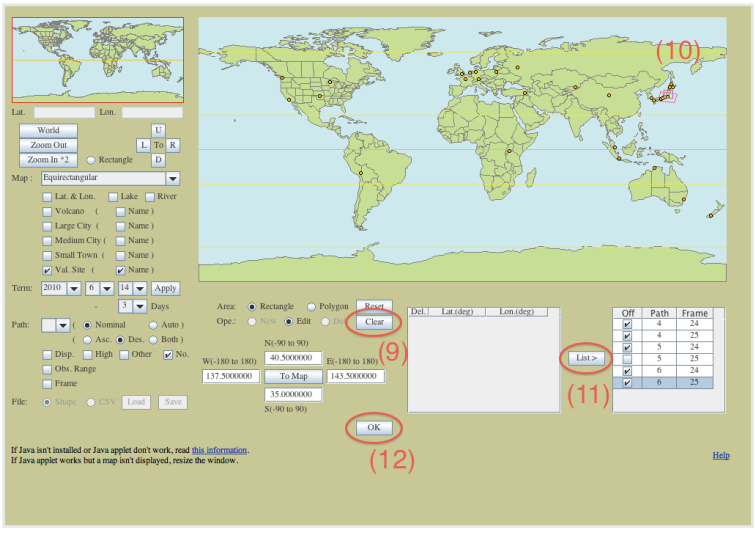


Image 2. Specifying areas using a map. An example of selecting the central part of Japan.

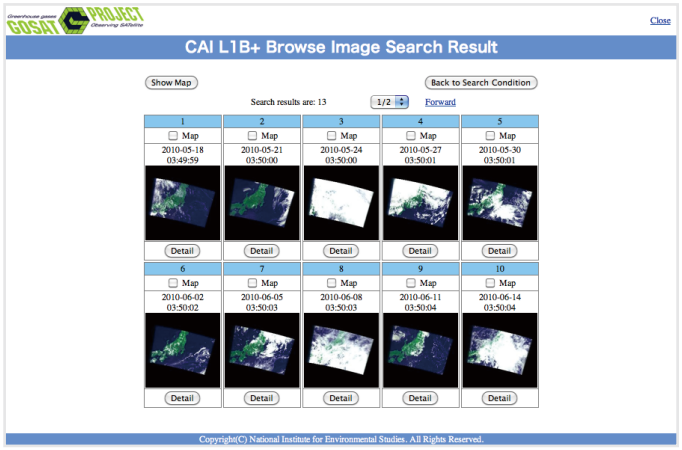


Image 3. Displaying a search result. An example of search results for the central part of Japan.

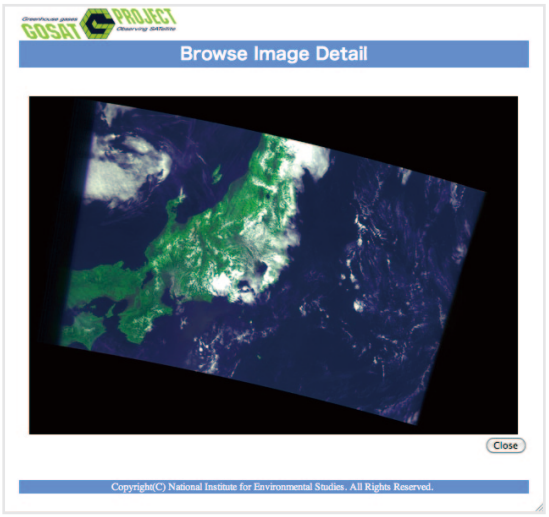


Image 4. An example of a large image of the central part of Japan from June 11, 2010.

the Start Date to 2010/05/17, and End Date to 2010/06/14.
(14) A search result will appear if you click on "Search." Only the images of the central part of Japan will be displayed in the result.
(15) If you click on "Detail," a larger image will open in a new window. (Image 4)
(16) If you are finished, click on the "Close" in the top right and the window will close.

<CAI L1B+ Browse Image Usage Reminder>

(1) The browse images for the observation period after May 17, 2010 are available for search.
(2) Observation period need to be specified in Coordinated Universal Time (UTC). 9am in Japanese Standard Time is midnight in UTC.
(3) As many as 500 images can be displayed in one search. Search within a period of one day will not return more than 500 images. If you get a message, "over the limit,' either shorten the observation period or specify the search area and select paths and frames.
(4) The browse images can be used solely for academic research or educational purposes. If you wish to use the images for commercial and other purposes, please contact GOSAT Project Office.
(5) Please specify the citation clearly such as "Images courtesy of JAXA/NIES/MOE" if you publish the results using the browse images.
(6) It is prohibited to distribute or to give away any browse images to a third party. If asked, please refer to NIES GOSAT Project Office website.

NEWS

Report : The 48th Meeting of the Remote Sensing Society of Japan

The 48th (2010 Spring) Meeting of the Remote Sensing Society of Japan was held during May 27 -28, 2010 at National Institute of Advanced Industrial Science and Technology (AIST) Tsukuba Center, in Tsukuba, Japan. NIES GOSAT Project spoke at a lecture named "GOSAT data processing and distribution status" and reported the current status of the project. Other than this lecture, NIES GOSAT Project hosted an exhibition booth during the two days of meeting to display examples of data products on a poster and monitor, and to answer researchers' questions on "IBUKI"'s observation. Some people stopped by at the booth to look at the CAI images of Iceland from April, 2010, and others listened to the explanation on the seasonal results of global distribution of CH_4 and CO_2 concentrations of "IBUKI's FTS Level 2 data and asked about "IBUKI"'s observational points.

NIES GOSAT Project Office staff explains about the project.
The NIES GOSAT Project booth at the 48th Meeting of the Remote Sensing Society of Japan.

INTERVIEW

DR. HARTMUT BÖSCH

Research Fellow,
Earth Observation Science group,
Space Research Centre,
Department of Physics and Astronomy,
University of Leicester, United Kingdom

Dr. Hartmut Bösch of Earth Observation Science group, Space Research Centre, Department of Physics and Astronomy at the University of Leicester in United Kingdom sat down for an interview to talk about how he became involved in the greenhouse gas measurement and his impression on current GOSAT project. The interview was conducted in Kyoto, Japan after Sixth International Workshop on Greenhouse Gas Measurement from Space (IWGGMS-6).(Interviewer : NIES GOSAT Project Leader Tatsuya Yokota. Jan. 28, 2010.)

Yokota: Thank you for coming here today. First of all, I would like to ask you your personal history and how you were involved in the carbon cycle or greenhouse gas measurement.

Bösch: Ok. I received my doctoral degree from the Institute of the Environmental Physics at Heidelberg University in Germany. My supervisor was Professor Ulrich Platt. He is one of the pioneers of differential optical absorption spectroscopy (DOAS) technique. My doctoral study was on stratospheric chemistry using balloon borne instruments. It is not related to greenhouse gases at all, but it gives you a very good background in instrumentation and retrieval techniques.

Y: What was the target gas species?

B: Most species were related to ozone chemistry, so the targets were halogen oxides, nitrogen dioxide, and ozone (O_3).

Y: When was this?

B: This was in early 2000. We launched multiple stratospheric balloons, which went up to 40 km altitude from high latitude locations like Kiruna in northern Sweden.

Y: So you have been to Kiruna, Esrange[1]?

B: Yes, that's correct. Actually, I have been involved in the validation study for the ILAS[2] instrument.

Y: Oh, really?

B: I am a co-author on the validation paper[3] on O_3.

Y: You were one of the co-authors?

B: Yes, well it was a very long list of authors. We have contributed our ozone profile measurements.

B: Then, after my PhD, I went from Heidelberg University to the Jet Propulsion Laboratory (JPL)[4] as a postdoctoral researcher for the Orbiting Carbon Observatory (OCO)[5] project. This was together with Dr. Geoffrey Toon. At this stage, OCO project was very small and very strongly focused on building the instrument.

Y: Geoffrey Toon was operating the Mark IV instrument[6].

B: Yes, he was, but he was also in charge of the retrieval algorithm development. My job was to develop the retrieval algorithm for the OCO instrument, or it was more to develop a research algorithm that can be used to test the basic features and test your approach, and optimize your approach to carry out the simulations and characterize the quality of the retrieval. Then, after two and a half years, I became a permanent staff scientist at JPL.

Y: So you were promoted?

B: Yes, I was promoted, but then I decided to leave JPL to go to University of Leicester as a research fellow. Right now, I have a five-year research fellowship. My focus is still on greenhouse gas retrievals. And of course, I continue working for the OCO project, which became Atmospheric Carbon Observations from Space (ACOS)[7] project after the failure of the launch. It's a fantastic

1 Esrange Space Center: built by European Space Agency now owned by Swedish Space Corporation. Reference: http://www.ssc.se/esrange

2 The Improved Limb Atmospheric Spectrometer (ILAS), the first ozone layer monitoring sensor of Japan. The interviewer Yokota was a part of the project. It was launched aboard Advanced Earth Observing Satellite (ADEOS, "MIDORI") in August 1996.

3 Sugita, T., T. Yokota, H. Nakajima, H. Kanzawa, H. Nakane, H. Gernandt, V. Yushkov, K. Shibasaki, T. Deshler, Y. Kondo, S. Godin, F. Goutail, J.-P. Pommereau, C. Camy-Peyret, S. Payan, P. Jeseck, J.-B. Renard, H. Bösch, R. Fitzenberger, K. Pfeilsticker, M. von König, H. Bremer, H. KÃŒllmann, H. Schlager, J.J. Margitan, B. Stachnik, G.C. Toon, K. Jucks, W.A. Traub, D.G. Johnson, I. Murata, H. Fukunishi, and Y. Sasano, Validation of ozone measurements from the Improved Limb Atmospheric Spectrometer (ILAS), J. Geophys. Res., 107, D7, 10.1029/2001JD000602, 2002.

4 JPL is a federally funded research and development facility managed by the California Institute of Technology for NASA.

5 The Orbiting Carbon Observatory (OCO) was a NASA Earth System Science Pathfinder Project (ESSP) mission designed to make precise, time-dependent global measurements of atmospheric carbon dioxide (CO_2) from an Earth orbiting satellite. On February 24, 2009, OCO failed to reach orbit.

6 JPL MkIV Balloon Interferometer: The MkIV interferometer is a high resolution (0.01 cm^{-1}) Fourier Transform Infra-Red (FTIR) spectrometer, built at JPL in 1984 to remotely sense the atmospheric composition. Reference: http://cloud1.arc.nasa.gov/solve/balloon/mkiv.html

7 ACOS is a group formed around the OCO Science Team, including the research members from NASA's JPL, Caltech, and Colorado State University. Using "IBUKI"' s data, ACOS team has collaborated with the GOSAT project to develop and enhance the CO_2 retrieval algorithm for both GOSAT and OCO-2 projects.

opportunity that there were actually two projects, OCO and GOSAT at the same time. Now there is only GOSAT, but I still think that it is a great advantage that we can apply all the tools we developed for OCO to study the GOSAT instrument. So, this is how I became involved in greenhouse gases, through being hired as a post doc at JPL. Since then, I continue doing the related work.

Y: Which field are you interested in? Are you interested in climate change, carbon cycle, or just retrieval of the radiative transfer?
B: My major interest is on more of the retrieval side. I am interested in how well we can retrieve the data and how we have to treat the different aspects like aerosols and clouds. However, at the end, I am also quite interested in applying these data to study the carbon cycle. We have to carry on carbon cycle studies together with modeling groups since we do not operate any models ourselves. So, we will collaborate with University of Edinburgh on carbon cycle studies.

Y: I remember you organized a retrieval code comparison group two years ago at the Fourth International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-4) in France.
B: Yes, there was a breakout session on retrieval algorithms and comparison. We still continue doing these activities. We have a poster at this IWGGMS-6 on retrieval comparisons, and the PhD student from University of Leicester, Austin Cogan will be at NIES next week, and we hope to continue this work.
Y: Yes, it is very interesting.
B: It is a very interesting and very important work. I hope we can actually do it more vigorously than we have done in the past. I hope we can really understand the differences between the different approaches to characterize the uncertainties introduced by different retrieval methods.

Y: What is your impression on the present GOSAT data?
B: I think this is the first kind that such a measurement has been made. This means that there is always a very large challenge to really fully understand the data before it can be used for science. I think current results look very promising.
Y: Promising, I see.

"The way the GOSAT team operates currently is fantastic by including a large community of researchers from different areas and continuously organizing international meetings."

B: I think, as expected, there are various problems that can be fixed hopefully. As with any data set, it takes years until you finally reach the accuracy and goals that you have set yourself. It is a big community effort, and I am very optimistic that we can reach the goal a bit earlier because we already have very very optimistic results and we are actually getting closer very quickly to the targets.

Y: What is your plans on using the GOSAT data in the near future?
B: I think GOSAT offers a large number of possibilities even beside CO_2. The fact that it measures thermal infrared and short wavelength infrared offers unique possibilities. As I am more of a retrieval person, I am actually very interested in exploring these new possibilities. I would like to explore the polarization and combining the thermal and short wavelength infrared. I am also interested in trying to explore additional gases, with which I think GOSAT has opportunities. The combination of the Cloud and Aerosol Imager of GOSAT that offers high spatial resolution, with the high spectral resolution has quite opportunities as well.

Y: Do you have some recommendation, comment, suggestion, or expectation to our GOSAT team?
B: First of all, I think the way the GOSAT team operates currently is fantastic, by including a large community of researchers from different areas and continuously organizing international meetings. My suggestions would be to continue doing that and to collaborate with various researchers. We have done this in the past very successfully but I hope that we can continue doing that by exchanging researchers, for example. This would be one suggestion, but I think you are already doing that.
B: A key issue will be that everybody who works with the data has to understand what the potential problems are, how they can be fixed, and what has to be taken into account when using the data. I think this information has to be provided very clearly to the users; otherwise there is a large risk of misused data or maybe that people draw very wrong conclusion because they used the data wrongly.

Y: Do you have any requests to us?
B: I currently do not have specific requests, but I am actually looking forward to make requests in order to make observation requests to GOSAT. (*RA users can make such requests) I think it is fantastic that GOSAT offers this possibility to track cities or volcanoes, which I think will be very interesting.

Y: Thank you for your time today, and we would like to collaborate with you for mutual success.
B: Thank you very much.

NEWS

SWIR CARBON OBSERVATION RETRIEVAL MODEL INTERCOMPARISON PROJECT (SCORE-MIP)

Several researchers incluing Dr. Hartmut Bösch, as featured in this issue's interview, have been working on comparative studies on the retrieval methods of atmospheric CO_2 column concentrations from satellite observations. Based on this research activity, a project named "SWIR Carbon Observation Retrieval Model Intercomparison Project" (SCORE-MIP) was initiated at the Sixth International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-6). This is a report from the project.

- Dr. Hartmut Bösch (Hartmut.boesch@le.ac.uk)
Research Fellow, Earth Observation Science group, Space Research Centre,
Department of Physics and Astronomy, University of Leicester, United Kingdom
- Dr. André Butz (a.butz@sron.nl)
Research Scientist, Earth and Planetary Science,
Netherlands Institute for Space Research (SRON), the Netherlands
- Yukio Yoshida (yoshida.yukio@nies.go.jp),
NIES Special Researcher, Satellite Remote Sensing Research Section,
National Institute for Environmental Studies, Japan

Retrieving carbon dioxide (CO_2) from space-based shortwave infrared observations is a difficult task due to the complex interaction of sunlight with the atmosphere and surface. Retrieval methods need to take into account subtle effects such as scattering of light by atmospheric particles and polarization of radiation. The retrieved CO_2 column concentrations will – to some extent - depend on the applied method and the respective assumptions and approximations. Such retrieval-specific differences, if not removed or taken into account, can eventually lead to ambiguous estimates for CO_2 surface fluxes and thus, to ambiguous conclusions on regional carbon budgets.

At IWGGMS-6 in Kyoto, it had been recognized that there is an urgent need for a detailed characterization of the retrieval algorithms applied to GOSAT shortwave infrared (SWIR) spectra and the SWIR Carbon Observation Retrieval Model Intercomparison Project (SCORE-MIP) had been created. The main objectives of SCORE-MIP are to intercompare retrieval methods and to diagnose their differences, to provide guidance for algorithm improvement, and finally to estimate the uncertainty going along with algorithm-specific implementations and approximations.

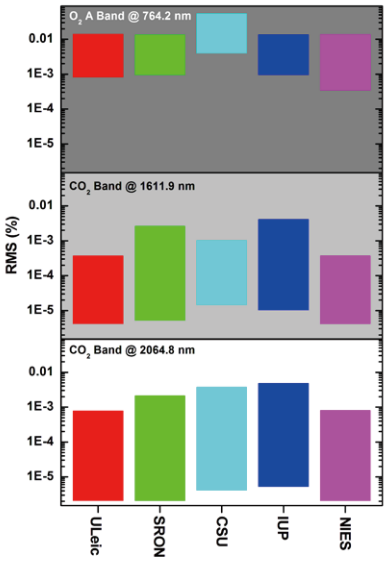


Figure: Comparison of radiative transfer codes for nadir geometry. The bars give the range of the root-mean square (RMS) deviation from the mean of the calculated spectra by all five groups for 27 geophysical scenarios and three spectral ranges in the shortwave infrared region.

The shown results are from:
ULeic - University of Leicester (H. Bösch)
SRON - Netherlands Institute for Space Research (A. Butz)
CSU - Colorado State University (C. O'Dell)
IUP - University of Bremen (M. Reuter)
NIES - National Institute for Environmetal Studies (Y. Yoshida).

The first step of the SCORE-MIP directly aims at evaluating the performance of the radiative transfer codes embedded into the various retrieval schemes for a number of well defined scenarios. This will be followed by a comparison of CO_2 retrievals for a range of synthetic observations and finally by a retrieval comparison for a selection of GOSAT observations over ground-based validation sites.

The radiative transfer comparisons are currently carried out within SCORE-MIP and five groups have submitted their results so far. To specifically address the needs of the GOSAT and OCO-2 missions for fast and polarized radiative transfer schemes, we consider vector radiative transfer codes and approximate methods in our intercomparison. The results of this intercomparison have been discussed during a first progress meeting at the European Geoscience Union (EGU) conference in Vienna in May 2010. The radiative transfer codes have been compared for nadir observation geometry for 27 different geophysical scenarios. In general, the results agree very well (see figure) implying that the use of different radiative transfer codes does not result in significant differences in retrieved CO_2. The comparisons for ocean sunglint conditions and for approximate methods are still on-going.

SCORE-MIP is open to all researchers who are interested in SWIR retrievals of greenhouse gases. Please contact the authors if you want to join the project. More details on SCORE-MIP can be found at http://sites.google.com/site/scoremip.

SMALL AHA! OF THE MONTH

- Yukio Yoshida
NIES Special Researcher,
Satellite Remote Sensing Research Section, CGER, NIES

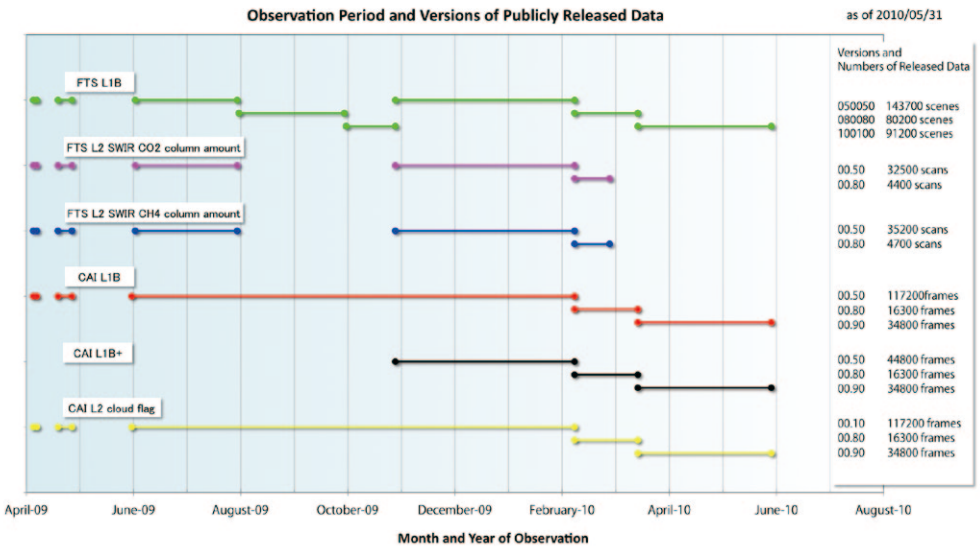
What is a radiative transfer code?
It is a software that calculates the state of light (radiation) observed under the specified conditions from the geophysical scenario input such as the concentration of gases, vertical profiles of clouds and aerosol and the conditions of land surface. The software that calculates only the intensity of light is classified as a scalar radiative transfer code, while the other software that calculates the state of polarization in addition to the intensity of light is classified as vector radiative transfer code. If the condition of atmosphere is specified in detail or the status of polarization is solved for, approximation methods are applied for reducing computational complexity (to the extent that the calculation is still accurate enough).

DATA PRODUCTS UPDATE

Data Processing Status Update from GOSAT Project Office

- Fumie Kawazoe, Specialist, NIES GOSAT Project Office

Here we report an update on data processing status for the month of May, 2010. Continued from April, FTS L1B data were processed as V100100; and CAI L1B, L1B+, and L2 cloud flag were processed as V00.90. FTS L2 SWIR CO_2 and CH_4 column amounts for the month of March will be released shortly. The release is being delayed because we have been working to clarify the quality check points, and are getting ready to start attaching "Important Notice" to the products. The notice will include issues that need special attention. As it is reported in this issue, browse images for the CAI L1B+ data products obtained after May 17, 2010 are being processed and released to the public. Please visit the GOSAT Users Interface Gateway webpage, and you can view the browse images by accessing "Gallery" section under "Menu." Also, if you log in and search for CAI L1B+ data products, the corresponding browse images are available for view. The number of registered users reached 804 as of June 11, 2010.



INFORMATION Lecture

Title: Measurement of greenhosue gases using Fourier Transform Spectrometer onboard GOSAT and validation of GOSAT data.

Speaker: Isamu Morino, Senior Researcher, Satellite Remote Sensing Research Section, CGER, NIES

Date and Time: 2010/07/09 14:00-15:00

Location : Third Lecture Room, Department of Chemistry, Faculty of Sciences, Kyushu University, Fukuoka, Japan

For more information please contact: **gosat_newsletter@nies.go.jp.**

INFORMATION Symposium

GOSAT Project is hosting a symposium this summer.

Title : A Symposium on Greenhouse Gases Measurement from Space
- A Role of the Greenhouse gases Observing SATellite, "IBUKI" (GOSAT) -

Date/Location: August 25, 2010 (Wed)13:00~ Kokuyo Hall, Tokyo, Japan

The content is suited for highschool students or older.

More details will be posted in the next issue.

CALENDAR Other Future Events

2010/07/05-09

Participation at the 7th Annual Meeting and Geosciences World Community Exhibition(AOGS 2010) held in Hyderabad, India.

2010/07/18-25

Participation at the 38th COSPAR Scientific Assembly held in Bremen, Germany.

INFORMATION

NIES SUMMER OPEN HOUSE

National Institute for Environmental Studies is hosting the annual NIES Summer Open House on July 24, 2010, Sat, 9:30-16:00 (reception closes at 15:00). We are opening up our research facilities to the public to introduce the front line of environmental research. NIES GOSAT Project is going to host an exhibition booth as a part of this open house. We are looking forward to seeing you all!

Earth's Breathing Seen from Space!
"On Observational Research Using Greenhouse Gases Observing Satellite "IBUKI" (GOSAT)"

Location : Exchange Meeting Room, Climate Change Research Hall, NIES.

The exhibition is to introduce "IBUKI" and the current status of research on global warming based on its observation. Researchers will directly explaina about the project at the booth using one sixteenth scale model of "IBUKI," a spherical screen display of "IBUKI" data and simulation results, and a observation instrument similar to the sensor onboard "IBUKI."

Further details on "NIES Summer Open House" can be found on NIES website. (in Japanese)
http://www.nies.go.jp/event/kokai/2010/

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