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/

ISSUE # 25
DECEMBER 2012

CONTENTS

NEWS Public Release of Level 4 Product and its Brief Overview

(L4A global CO_2 flux, L4B global CO_2 distribution)

Hiroshi Takagi Junior Research Associate,
Biogeochemical Cycle Modelling and Analysis Section, Center for Global Environmental Research at NIES

The data of regional CO_2 flux estimates and global CO_2 distributions, both of which obtained by analyzing GOSAT observational data, were made available to the general public on December 5th, as GOSAT Level 4A and 4B data products (version 02.01).

Level 4A data product stores monthly CO_2 flux estimates for 64 regions of the globe (42 terrestrial and 22 oceanic regions). The CO_2 flux estimates are net values, which were calculated as the difference between the total amount of CO_2 absorbed by terrestrial vegetation and oceans and that emitted by anthropogenic activities, biomass burning, respiration of soil and plants, and oceans. The released data product covers a one-year period from June 2009 to May 2010.

Level 4B data product stores six-hourly CO_2 concentrations simulated on a 2.5-degree horizontal grid over the one-year analysis period. The concentration data are available at 17 vertical levels between near the surface and the top of the atmosphere.

Currently, the data for June 2010 and onward are being analyzed, and extended Level 4A and 4B data products will be released to the general public upon completion of the analysis.

Level 4 data product can be downloaded from GOSAT User Interface Gateway (GUIG: https://data.gosat.nies.go.jp/).

Background - the global cycle of CO_2

Mauna Loa Observatory is one of the atmospheric observatories located around the globe for monitoring the long-term trend of atmospheric CO_2 levels. Figure 1 shows the result of the CO_2 measurement there that began in 1958 and continued ever since. The figure indicates a steady rise in atmospheric CO_2 concentration over the past half century. From data collected at these global atmospheric monitoring stations between 2001 and 2010, the global-mean annual increase of CO_2 concentration was found to be 1.97 ppm[*1]. The unit "ppm" represents how much volume of CO_2 in cm^3 occupies in 1 m^3 (1 million cm^3) of dry air (parts per million by volume).

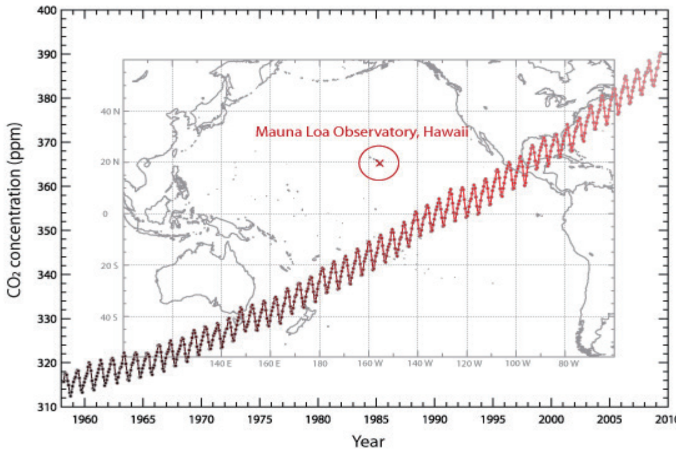


Fig. 1: Long-term CO_2 observation at Mauna Loa Observatory.
Data: US NOAA Earth System Research Laboratory
(http://www.esrl.noaa.gov/gmd/ccgg/trends/mlo.html)

Based on an estimate for the total mass of the atmosphere, the global-mean annual growth rate (1.97 ppm/year) can be expressed as the amount of CO_2 that was left in the atmosphere, which was calculated to be approximately 15.3 billion tons of CO_2 per year.

Since CO_2 in the atmosphere is inert, and the amount of CO_2 emitted through human activities, based on national fossil fuel consumption statistics, is known to be about 29.6 billion tons per year(*2), the amount of CO_2 uptake by terrestrial vegetation and oceans can be estimated as about 14.3 billion tons per year.

As shown above, it is possible to obtain an approximate global estimate of the amount of CO_2 exchanged between the atmosphere and the ground surface (this is also called surface CO_2 flux and will be used hereafter). However, questions such as how the surface CO_2 flux is spatially distributed, how it changes with time, and what controls it remain unanswered. Ascertaining these details is key to understanding the global carbon cycle and is an important research topic for predicting CO_2 rise in the future and evaluating the degree of impact the CO_2 rise has on climate.

GOSAT's contribution to understanding global carbon cycle

Two methods have been used so far in estimating the spatial distribution of CO_2 flux in nature. One is the "bottom-up" method in which CO_2 flux distribution is obtained by summing up the estimates of CO_2 fluxes based on on-site observations and forestry statistics and those simulated by computer models of terrestrial biosphere and oceans. This method is good for the detailed estimation of CO_2 fluxes of particular regions, but not for estimation on a global scale because available source data are localized.

The other is called the "top-down" method (also known as atmospheric inverse modeling) with which CO_2 fluxes are estimated from the distribution of CO_2 concentrations observed at fixed sites such as Mauna Loa Observatory as well as airborne and shipborne monitoring locations. This approach allows for global-scale CO_2 flux estimation, but because the most of the CO_2 monitoring stations are centered within or near the developed nations, CO_2 flux estimates for other regions where CO_2 concentrations are poorly sampled suffered from large uncertainties. It was therefore desired to expand the existing CO_2 monitoring network, however, setting up new monitoring stations in those regions is quite challenging because of funding and staffing issues.

To solve these issues, space-based monitoring was suggested. With the advent of GOSAT, specializing in observing CO_2 and CH_4, plenty of data on those poorly sampled regions has become available since its launch in January 2009. In August 2010 (1.5 years after the launch), the column-averaged CO_2 concentrations(*3) data, retrieved from GOSAT data, was released to the general public (GOSAT FTS SWIR Level 2 data product, version 01). Later, thanks to improvement in the data quality and retrieval algorithms, bias and spread associated with Level 2 CO_2 concentrations were reduced significantly and that enabled Level 4A CO_2 flux estimates to be opened to the general public.

Figure 2 presents part of the CO_2 concentration distribution data (July 2009) used for the estimation of fluxes. Circles/squares denote monthly average CO_2 concentrations of ground-based(collected at 220 locations including airborne and shipborne sites)/Level 2 column-averaged CO_2 gridded to 5ºx5º cells, respectively. Level 2 data are seen to fill out gaps in the ground-based network, such as South America, Africa, Middle/Near East, and Siberia. Though Level 2 data covers many of the dataless regions, there still remain gaps, such as Amazonia and some part of central Africa, where quality Level 2 data were not obtainable due to perturbation by clouds and atmospheric aerosol particles.

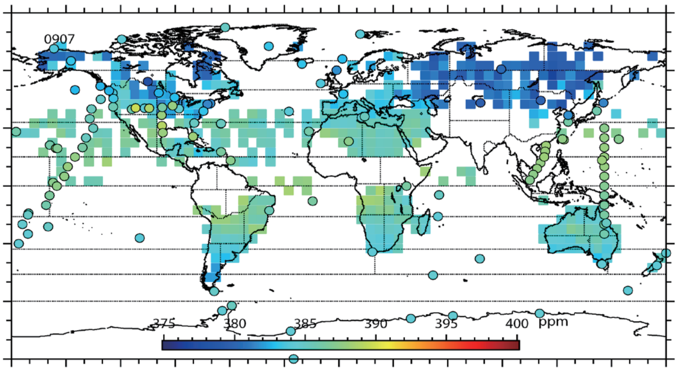


Fig. 2: CO_2 distribution data used for CO_2 flux estimation (July 2009)

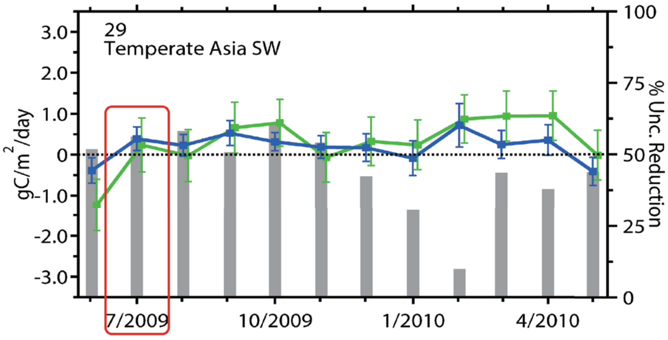


Fig. 3: Time series of monthly net CO_2 flux for Middle/Near East. The green/blue solid lines: CO_2 flux estimates from the ground-based CO_2 data only/ground-based and Level 2 CO_2 data, respectively (left ordinate; in $gC/m^2/day$(*5)). Emission when > 0, absorption when < 0. I-shaped bars: range of flux uncertainty. Gray bar: reduction of uncertainty achieved by adding GOSAT-based CO_2 data (right ordinate; in percent).

To see how beneficial the GOSAT data are for the estimation, let's have a look at the Middle/Near East region without ground-based data within or nearby, but with a large number of Level 2 concentration data throughout the one-year analysis period.

Figure 3 shows the one-year time series of net flux estimated for the Middle/Near East region. The green/blue solid lines denote estimates from the ground-based CO_2 only/from both the ground-based and Level 2 data, respectively. The I-shaped bar attached indicates the range of uncertainty. The left ordinate shows positive quantities as emission and negative as absorption. The green line shows the flux estimate for July 2009 (in the red box) as 0.2 ± 0.7 $gC/m^2/day$. The large uncertainty made it unclear whether the region this month was a net source or sink of CO_2, which was because there were no ground-based data within and near the region and the flux was estimated based on CO_2 data collected at distant locations.

The blue line, on the other hand, shows 0.4 ± 0.3 $gC/m^2/day$, much smaller uncertainty than the green. This is because, as indicated in Figure 2, there were numerous GOSAT-based data available. With the reduced uncertainty, it is possible to determine that this region acted as a weak net source of CO_2 this month.

The gray vertical bar in Figure 3 indicates how much the uncertainty of green value was reduced by adding GOSAT-based CO_2 data to the ground-based data. The right ordinate shows the uncertainty reduction in percent. The uncertainty of July 2009 flux was reduced by 56%, and 43% in annual average. The annual-mean uncertainty reduction rates for other regions are shown in Figure 4.

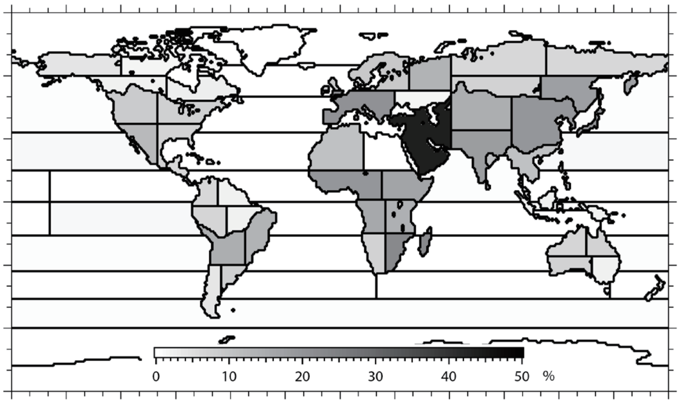


Fig. 4: Annual-mean uncertainty reduction rate for 64 regions (%).

Level 4A and 4B data product

As a sample of Level 4A data product, Figure 5 shows the global distribution of net CO_2 flux estimates for July 2009. Figure 6 presents the estimation uncertainties of the same month.

Figure 5 shows strong net absorption in many regions north of 50 degrees north latitude where boreal forests grow. Regions in between 20 and 40 degrees north latitudes (North America and Asia including Japan, China, and Korea) are weak sources, weak sinks, or neutral, considering the range of uncertainty. The Amazon regions were also shown to be weak source or weak sink. However, because none of the ground-based or GOSAT-based data were available near these regions, as indicated in Figure 2, the flux estimates there are associated with large uncertainties (Figure 6).

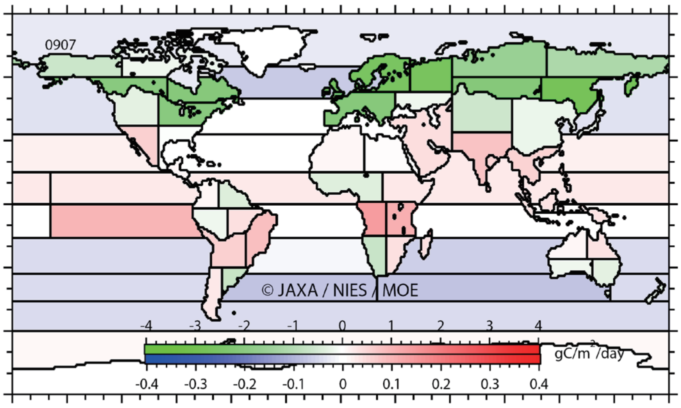


Fig. 5: Global distribution of Level 4A CO_2 flux (July 2009). Upper color scale: terrestrial flux. Lower color scale: oceanic flux.

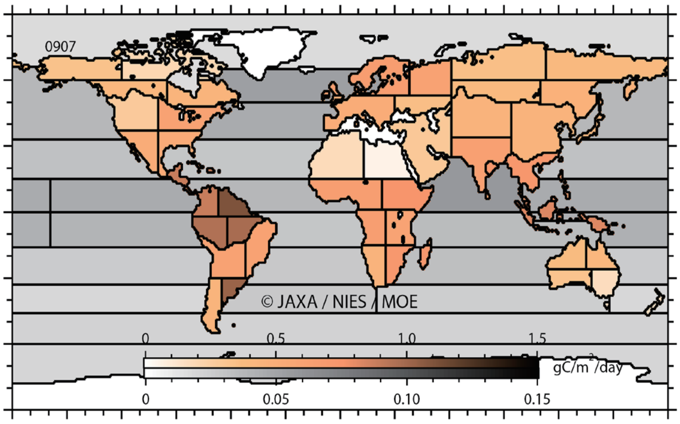


Fig. 6: Uncertainty of Level 4A CO_2 flux (July 2009). Upper color scale: terrestrial flux. Lower color scale: oceanic flux.

Level 4B data product stores CO_2 concentrations obtained by performing computer simulations of global atmospheric transport. The simulations predict global CO_2 distributions and their temporal changes based on the one-year distribution of the surface CO_2 fluxes estimated from both the ground-based and GOSAT-based CO_2 concentration data (Level 4A data product).

Figure 7 presents the distribution of simulated CO_2 concentrations (monthly average) for July 2009 at altitudes of approximately 800m and 5000m. The concentration distributions at levels closer to the ground surface reflect the patterns of CO_2 absorption by terrestrial plants and emission by human activities and biomass burning. On the other hand, the distribution at 5000m level appears much smoother in appearance because the air goes through diffusion and mixing processes as it ascends to higher altitudes. These results are expected to be used for carbon cycle studies in regions where neither ground-based nor GOSAT-based CO_2 data are available.

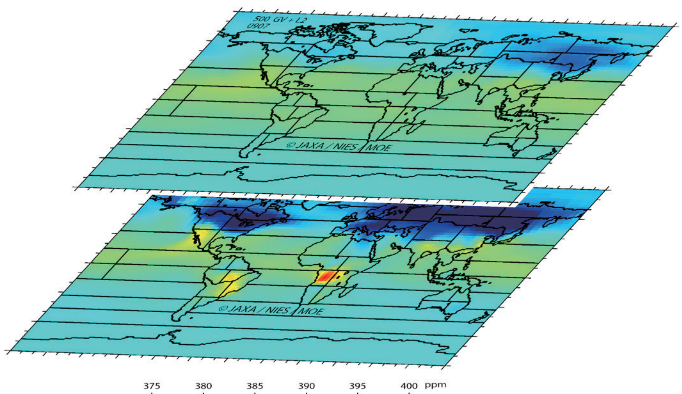


Fig. 7: Global distribution of Level 4B CO_2 concentration (July 2009).

With the advent of GOSAT and the subsequent improvement in the flux estimation, now a new era has come to the research of the global carbon cycle. I strongly hope that the continuation of the space-based CO_2 observation by GOSAT will contribute to deeper understanding of carbon cycle mechanisms and mitigation of further global warming.

*1 Reference: The World Meteorological Organization Greenhouse Gas Bulletin (November 2011 issue). http://www.wmo.int/pages/prog/arep/gaw/ghg/documents/GHGbulletin_7_en.pdf

*2 Based on the ODIAC anthropogenic emission data, CO_2 emissions via cement production included. Reference: T. Oda and S. Maksyutov, Atmos. Chem. Phys. (Volume11, pages 543-556, 2011)

*3 Column-averaged CO_2 concentration: the ratio of the number of CO_2 molecules to that of dry air molecules in a column above a unit surface area.

*4 The CO_2 concentration data GLOBALVIEW provided by the U.S. National Oceanic and Atmospheric Administration. Reference: GLOBALVIEW-CO_2 (2011), Cooperative Atmospheric Data Integration Project - Carbon Dioxide. CD-ROM, NOAA ESRL, Boulder, Colorado (Also available on Internet via anonymous FTP to ftp.cmdl.noaa.gov, Path: ccg/co2/GLOBALVIEW).

*5 Amount of CO_2 (converted to carbon amount in grams) emitted or absorbed per one square meter in a day.

NEWS

CAI L3 NDVI Product Released

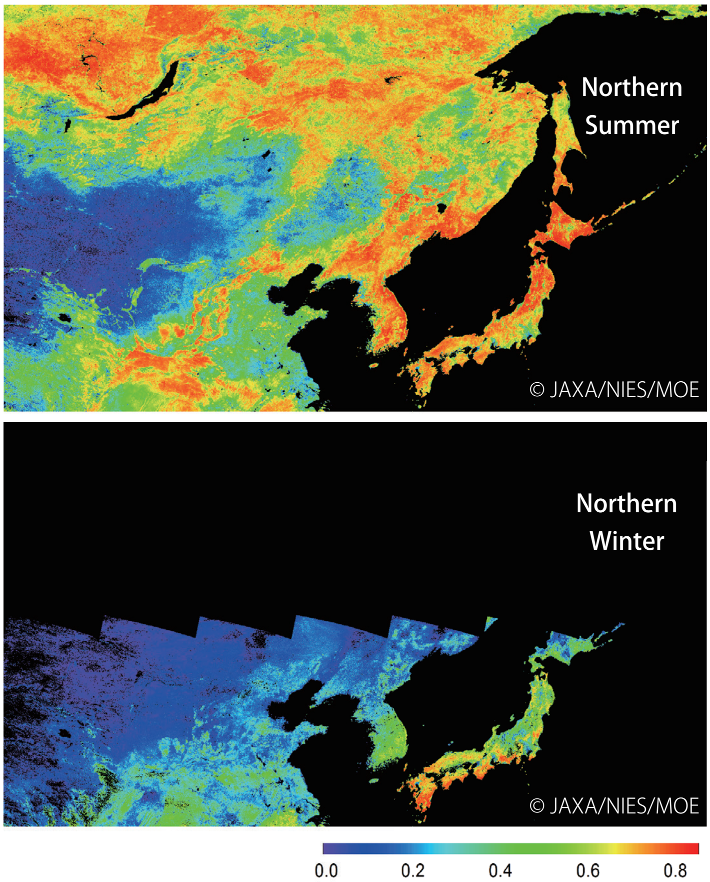
Hiroshi Watanabe, Office Manager, NIES GOSAT Project Office

CAI L3 NDVI (Normalized Difference Vegetation Index) product was released to general public on Nov. 9, 2012. NDVI is calculated based on reflectances ref2 and ref3; the former uses band 2 (0.674μm visible red light) of TANSO-CAI, the latter, band 3 (0.870μm near-infrared light). The formula is

$$\mathbf{NDVI = (ref\ 3 - ref\ 2) / (ref\ 3 + ref\ 2)}.$$

Vegetation uses visible red light for photosynthesis to make its reflectance low, whereas near-infrared light reflectance becomes rapidly high when vegetation activity is high, which results in large NDVI value with high activity, and small with low. The value, calculated by various satellites with those kinds of bands, provides us with general tendency, though the absolute value itself may differ between different sensors using different wavelength bands.

The product is provided per 36 rectangles of global division in mesh of 1/30 degree latitude and longitude, excluding 6 rectangles near the Antarctic with little vegetation. Please refer to "Important Notes at Releasing" and ATBD in GUIG(*1) for more details. On right are samples of northern summer (Jun. 3 – Jul. 2, 2009) and winter (Dec. 3, 2009 – Jan. 2, 2010), showing great NDVI change between the two seasons at high latitude region due to greater change in seasonal vegetation activity.



*1 GOSAT User Interface Gateway (GUIG) is the name of the site where GOSAT observation data is provided: https://data.gosat.nies.go.jp/

NEWS

Challenge : Automatic CO_2/CH_4 Observation by Compact Shipboard Equipment

Shuji Kawakami, Associate Senior Engineer and Hiroshi Ohyama, Engineer, JAXA Yoshiyuki Nakano, Researcher, JAMSTEC

Column amounts of CO_2 and CH_4 were measured for validation of GOSAT data over the ocean. Recently we adopted new compact equipment to automate and streamline the measurement activity and tested its operability and functionality.

GOSAT observes ground surface scattered light over the land area to retrieve CO_2 etc., whereas we use sunglint region for the same purpose over the ocean area because the reflectance is higher than other ocean region. We had used a high resolution FTS on research ships of JAMSTEC (Japan Agency for Marine-Earth Science and Technology), KAIYOU, KAIREI, and MIRAI (see GOSAT Newsletter#20), which is large, expensive to carry, and hard to automate making operators indispensable. We are now trying the first observation with new compact, unmanned, fully-automatic equipment over the ocean.

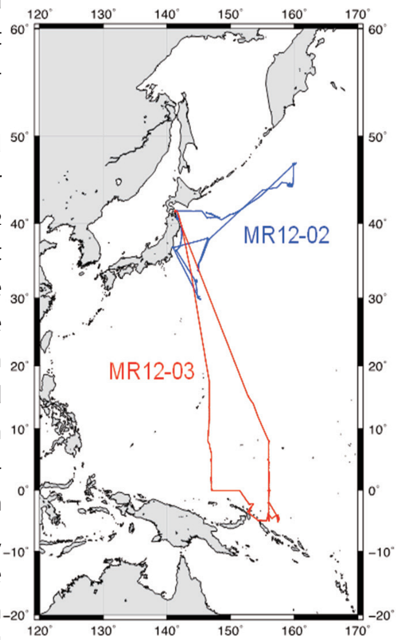


Fig. 1 Observation route

This challenge was one of adopted applications to public offering for research use of JAMSTEC's ships, which included two cruises on MIRAI (MR12-02 (Leg1(Jun. 4 – 24, 2012) and Leg2 (Jun. 25 – Jul. 12)) and MR12-03 (Jul. 17 – Aug. 29, 2012)) as shown in Fig. 1. Please see MIRAI observation cruise report for its whole objectives and activities, etc. (http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR12-02_leg1-2_all.pdf) MR12-03 was made mainly for installation/collection of TRITON buoys in the west pacific tropical sea area (http://www.jamstec.go.jp/e/hot_pictures/?264), where the CO_2 sensor developed by Mr. Nakano was collected with the buoy (Photo 1).

Photo1 A CO_2 sensor collected (the orange object at the bottom)

The new compact equipment consists of a solar tracker and an optical spectrum analyzer (OSA: Yokogawa AQ6370C); the former was

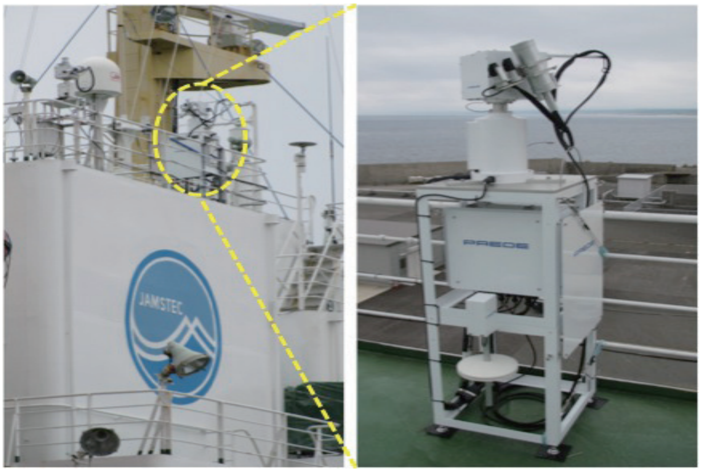


Photo 2a Solar tracker installed on MIRAI

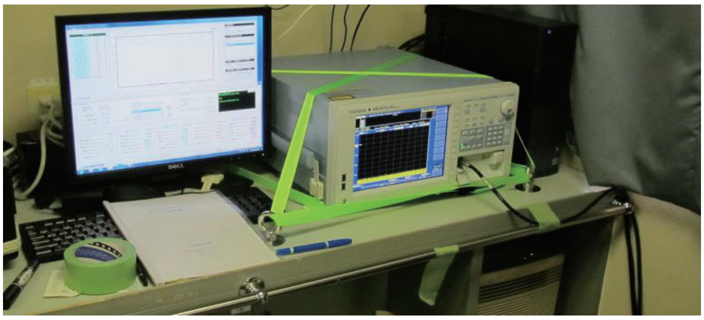


Photo 2b Spectrometer installed on MIRAI

set on the exposed deck (photo 2a) insulated by a hybrid anti-rolling system, the latter in common observation room (photo 2b). Sunlight was led via optical fiber (for more details about instrument, see Kobayashi et al., 2010(*1), Kawasaki et al., 2012(*2)). We asked the crew to turn the ship for the equipment not to be overshadowed by masts etc., at GOSAT passing times so far as it's not inconvenient for other researches, and we also obtained solar spectra whenever the solar elevation angle was greater than 10 degrees other than the passing times, to check the data consistency. We obtained atmospheric temperature and humidity profiles too with a radiosonde synchronizing the passing times (photo 3).

The new equipment was unmanned in nature, however, was accompanied by Ohyama (MR12-02 Leg1), Nakano (MR12-02 Leg2), and Kawakami (MR12-03) for supervision, maintenance, and data processing of the direct solar light spectra, because it's the first unmanned operation on a ship. Leg1 went in bad weather with consecutive two storms and huge waves sometimes higher than 10m. Leg2 saw breakdown of the tracker to lose some observation opportunities due to broken wire stressed by repeated rotation for tracking, which Nakano first aided with a help from Prede Co., Ltd., the maker of the new equipment, on the windy deck to resume observation. MR12-03 went down to the equator through calm sea. Almost no land was seen after leaving Sekinehama except some islands near Papua New Guinea; just sea all around you. And we were surprised to notice "in service" on our cellphone brought from Japan near a seemingly deserted island, last place to find a "civilization". Several researchers were on board with their own purposes, however, we had a pleasure in common, the sunset to watch floating on limitless sea (photo 4).

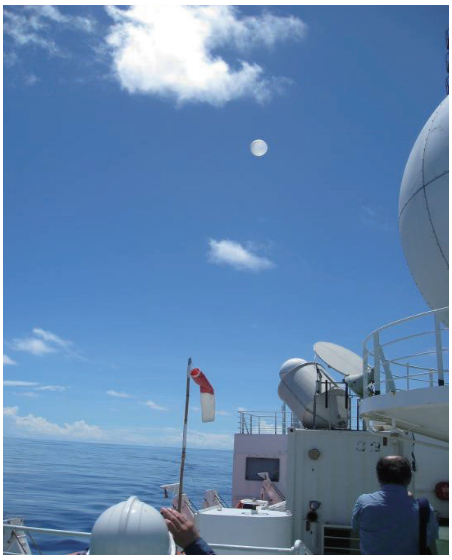


Photo 3 Radiosonde released


Photo 4 Researchers' pleasure #1: Sunset watching (Aug. 1)

MR12-03 obtained data for 41 days during 44 days' cruise, or synchronized data for more than 10 GOSAT passing days (it depends on the condition of Level 2 processing). Solar tracking was successful in general, but it was found that measurement accuracy was reduced by big rolling or solar zenith angle below 20 degrees because of shaking transmitted from the ship or insufficient tracking performance, which is the issue to be improved.

In closing, let me introduce "Dried Curry", the specialty of MIRAI (photo 5). That dish is after the style of Nippon Yusen, the owner of luxury liner ASUKA, and was really special to eat on MIRAI, though served also at a certain restaurant in Yokohama, I hear.
(http://www.nyk.com/rekishi/knowledge/museum/index.htm (described only in Japanese))


Photo 5 Pleasure #2: Specialty "Dried Curry"

We hope to expand the opportunity to obtain validation data by installing the compact equipment on various vessels based on this experience.

[Acknowledgment] We are deeply grateful to persons involved in the research vessels for our experimental trial, and to Prede Co., Ltd and Prof. Norio Ibuki of Kyoto University of Education, for manufacturing of the equipment.

*1 Kobayashi et al., Atmos. Meas. Tech. (Volume 3, pages 1103–1112, 2010)
*2 Kawasaki et al., Atmos. Meas. Tech. (Volume 5, pages 2593-2600, 2012)

GOSAT PEOPLE

A Series : Supporting GOSAT Project

Big Stagehands in Mission *IBUKI*

Toshiaki Takeshima, Director, Mission Operations System Office, JAXA

It's almost 4 years since the launch of *IBUKI* (GOSAT) on Jan. 23, 2009. Most part of 5 years' mission period has already past. Time really flies! During the period, MOE, NIES and JAXA have cooperated on this collaborative project to fulfill the great responsibilities as the owner of GOSAT, the only satellite (as of Dec. 2012) dedicated on greenhouse gases observation, and have done their best in data analysis and its enhancement every day, with utilization and feedback from NASA/JPL, ESA, and other users all over the world.

JAXA is working on a wide variety of tasks every day: to make a plan to operate the satellite and observation equipment, to send operation messages to the satellite, to transmit acquired data to the ground, to process/store/provide Level 1 data, to check/maintain health of the satellite and equipment by monitoring telemetry data, to monitor/predict/control the orbit, etc.

This kind of tasks, like "lifeline" of gas/water/electric supplies or public transportation, is infrastructure of mission continuity AND that is a kind of thankless job left unnoticed as far as nominal operation is kept, and is rushed up with complaints once any deviation happens, which forces the staff to devote themselves entirely for the earliest possible recovery to the nominal operation. This is how infrastructural tasks go, therefore we thought we should send a hearty cheers to them for their ceaseless support in realizing the scientific/social accomplishment of the mission. This time, two groups are introduced: Mission Operation System operators who are responsible for Level 1 processing and provision, and Satellite Control System operators, who are responsible for monitoring and control of *IBUKI*.

Mission Operation System operators to process/provide Level 1 data

Many computers work as a coordinate system to process/provide the observation data, which is automated in JAXA for the sake of stable operation. However, there is no faultless system as is the case with your PC or other appliances, which sometimes need to be rebooted or repaired. The coordinate system is monitored everyday with the knowledge of how it should run normally to notice the slightest deviation and the staff to locate where and what is happening to recover and keep stability. This task requires deep and specialized knowledge as the system becomes more complex and highly automated, which are met by the staff in everyday operation. This group also handles data reprocessing. The process is required for past data when processing algorithm is improved for better accuracy of the product and runs under the updated algorithm in parallel with everyday real-time data processing. There occurs additional task of computer scheduling considering the limit of the computing power, not to affect the current processing by occupying too much resources of the system. This is also a task of those operators with enough experience.

Members supporting Level 1 processing/provision, smiling but a bit shadowed with lack of sleep? (from left, Mr. Suetake, Mr. Tanabe, Mr. Tanaka, Mr. Shinotsuka)

The system sends out an urgent alert mail via the embedded system when it recognizes something wrong in its operation. As the urgent mail is sent out by the system mechanically, it never considers what is going on the receivers' side. It interrupts the receivers' lives regardless of their situation, whether it's so late in the night with no one awake, some of them may be on a date, or a someone's child may be just blowing out candles on his/her birthday cake, to get them back to tough reality. They begin to examine, diagnose, and recover the system just after confirming the alert message. Thanks to the contribution of this group, *IBUKI*'s data can be kept its nominal processing and provision (photo 1).

Satellite Control System operators to monitor/control *IBUKI*

The task of this group is more demanding than processing and provision of the observation data. They always monitor *IBUKI* whether it's in a good status to execute normal observation, and at the same time, they keep *IBUKI* in good condition, make a plan for observation, and control *IBUKI* for its nominal operation. It's a task of great responsibility that can lead to discontinuation of *IBUKI* operation/function in the worst case if you happen to make an operation mistake or overlook any symptom of a problem. Therefore you can never say, "Let's give a day-off to our observation and monitoring. It's happy holiday season!" and you continue your task 7 days a week on a round-the-clock basis. Yes, some of the operators are always confirming the normal operation of the monitoring/control system of the satellite, evaluating the satellite's data on the monitor, and sending out messages to make the satellite and observation sensors work for the sake of data to be collected and sent to users, when you were exchanging presents, having a festive party, hugging each other wishing a happy new year.

IBUKI was kind of a newborn baby just after it was sent out to space, and it was raised carefully under many people's vigilant eyes of JAXA personnel and a number of partners, however, it was required to operate the observation effectively, safely, and reliably with fewer people once the nominal operation was realized after the functions of the satellite and observation equipment were confirmed. That meant the staff should cover wider range of specialist knowledge not only for the ground system but for the satellite system. The operators are always ready to be called by emergency contact day and night, and handle any troubles literally in round-the-clock manner, once something wrong or unusual happens to *IBUKI* or the ground system, never to halt *IBUKI* data to be delivered to users. That is the way how *IBUKI* keeps its health.

The staff of this group devote the days of their youth with enthusiasm and commitment to keep the *IBUKI*'s health for its productive work, making this hard work "nothing special" and keeping it as it is for the sake of users around the world.

[Acknowledgment] We are deeply grateful to the everyday support and cooperation at *IBUKI* operation tasks, as introduced in this article, provided by General Incorporated Foundation Remote Sensing Technology Center of Japan, Space Engineering Development Co., Ltd., and other partners.

(photo 2: Satellite operation room just after the launch of *IBUKI*: so crowded then, but it is operated with some ten people, 24 hours/7 days, now.)

(photo 3: Members supporting Satellite operation now, hardworking in the backstage to help generate the project outcomes. Back row from left, Mr. Tsukahara, Mr. Kato, Mr. Izumito, Mr. Hirabayashi, Mr. Nawata; front row from left, Mr. Sogawa, Mr. Watanabe, Mr. Katagami, Mr. Aketa, Mr. Funaki, Mr. Miyashita; upper right in circular window, Mr. Yagi, the photographer)

*1 NASA/JPL : NASA/Jet Propulsion Laboratory

*2 ESA : European Space Agency

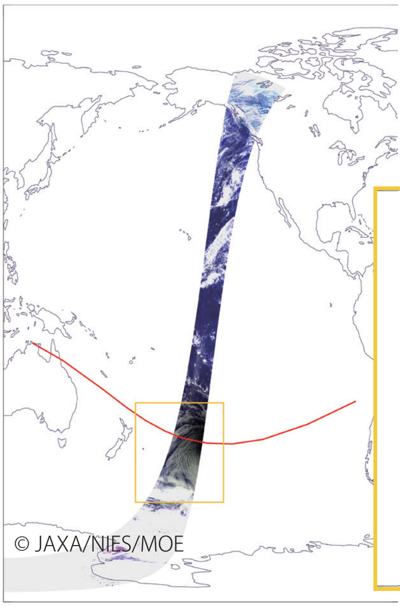
ANNOUNCEMENT Accepting Applications of GOSAT RA#5

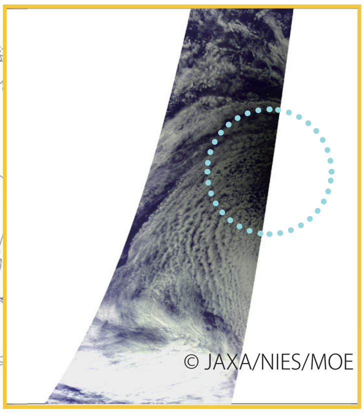
We hope many proposals to come with inventive, cutting-edge, and ambitious ideas which are aware of characteristics of GOSAT data. For more details, please refer to:
http://www.gosat.nies.go.jp/eng/proposal/proposal.htm

IMAGE OF THE MONTH

IBUKI Caught Total Solar Eclipse

- Yukio Yoshida,
Researcher,
Satellite Remote Sensing Research Section,
Center for Global Environmental Research, NIES





IBUKI caught a total solar eclipse on South Pacific Ocean. The image was taken from space by the CAI (Cloud and Aerosol Imager) on-board *IBUKI* on Nov. 13, 2012.

A solar eclipse, usually understood as a phenomenon of the Moon masking the Sun, can be seen as a shadow of the moon thrown on the Earth. The total solar eclipse this time was observed in the regions along the red line on which vaguely outlined black circle passed from west to east in about 3 hours; on the other hand, *IBUKI* orbits once in about 90 minutes moving from east to west. That meant the photo-opportunity was only once, of which *IBUKI* took advantage successfully.

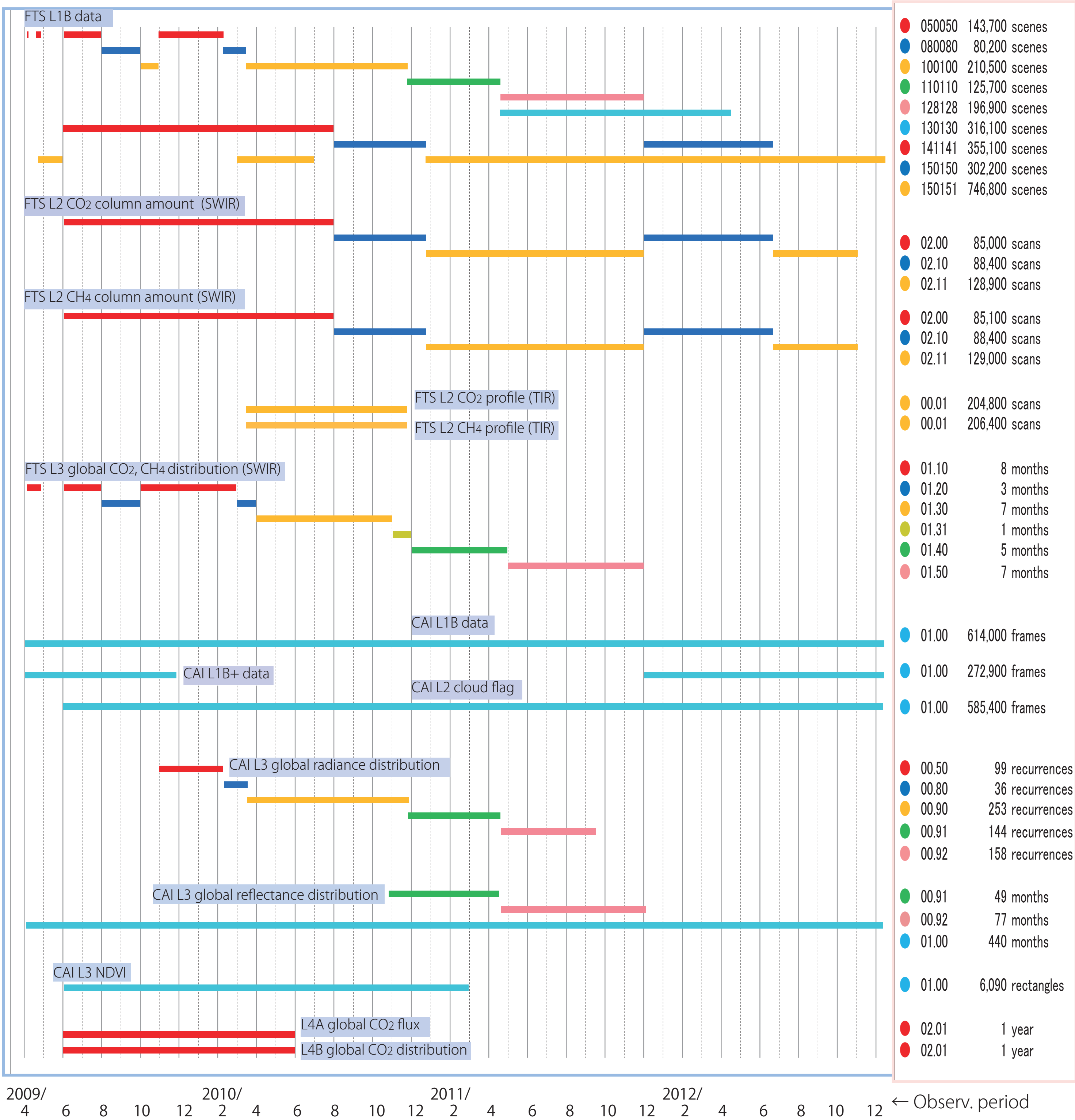
("Photo" by *IBUKI* on Nov. 13, 2012, a pseudo-color image created by assigning band 2 to red, band 3 to green, and band1 to blue. The observed part of the shadow is enlarged and marked with a bit larger dotted line circle. The left end of the red line = 20:37 UT, the right end = 23:48 UT; the top of the orange box = 22:42 UT, the bottom = 22:51 UT.)

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 December 17, 2012



The chart above is as of Dec. 17, 2012. The latest processed and released on are: FTS L1B in V150.151; CAI L1B/L1B+/L2 cloud flag in V01.00; FTS L2 CO_2/CH_4 column amount (SWIR) in V02.10 and V02.11.

We have released to general public CAI L3 global reflectance distribution V01.00 on Nov. 27; CAI L3 NDVI (a new product) V01.00 on Nov. 9; L4A global CO_2 flux and L4B global CO_2 distribution (new products) V02.01 on Dec. 5. Please refer to Product Notes, Product Format Descriptions, and Algorithm Theoretical Basis Documents (ATBD) in GUIG before using those new products.

V02.10 FTS L2 CO_2/CH_4 column amount (SWIR) for Sep. 1 to Oct. 10, 2010, which were under reprocessing, began provision again. We are very sorry for any inconvenience it may have caused to users.

The number of registered users is 1364 as of Dec. 17, 2012.

NEWS

Visit to NIES by Mr. Kevin O'Flaherty, Prosperity Counselor, British Embassy Tokyo

Mr. K. O'Flaherty, Prosperity Counselor, British Embassy Tokyo, visited NIES on Sep. 28. His brief includes climate change, energy, science, innovation and others. He began at the Climate Change Research Hall where he heard details of the GOSAT Project from Dr. T. Yokota, the project leader, including global scale collaboration in data validation and use, taking in British universities and information provision to the British Government in response to inquiries on diffusion status of the plume from a volcano which erupted in Iceland in Apr. 2010 (see GOSAT Newsletter#12). He asked such pointed questions as to whether the extensive methane in the northern hemisphere is of anthropogenic origin.

PUBLISHED PAPERS

Field of Research: data processing algorithm, validation
Name of Journal: IEEE Transactions on Geoscience and Remote Sensing (Volume 50, pages 1770-1784, 2012)
Title: Retrievals of Total and Tropospheric Ozone From GOSAT Thermal Infrared Spectral Radiances
Authors: H. Ohyama, S. Kawakami, K. Shiomi, K. Miyagawa

Field of Research: calibration, data processing algorithm
Name of Journal: Atmospheric Measurement Techniques (Volume 5, pages 2447-2467, 2012)
Title: Level 1 algorithms for TANSO on GOSAT: processing and on-orbit calibrations
Authors: A. Kuze, H. Suto, K. Shiomi, T. Urabe, M. Nakajima, J. Yoshida, T. Kawashima, Y. Yamamoto, F. Kataoka, H. Buijs

Field of Research: calibration
Name of Journal: Atmospheric Measurement Techniques (Volume 5, pages 2515-2523, 2012)
Title: On-orbit radiometric calibration of SWIR bands of TANSO-FTS on-board GOSAT
Authors: Y. Yoshida, N. Kikuchi, T. Yokota

Field of Research: data processing algorithm, validation
Name of Journal: Journal of Geophysical Research (Volume 117, D21301, 2012)
Title: Atmospheric carbon dioxide retrieved from the Greenhouse gases Observing SATellite (GOSAT): Comparison with ground-based TCCON observations and GEOS-Chem model calculations
Authors: A. J. Cogan, H. Boesch, R. J. Parker, L. Feng, P. I. Palmer, J.-F. L. Blavier, N. M. Deutscher, R. Macatangay, J. Notholt, C. Roehl, T. Warneke, D. Wunch

Field of Research: validation
Name of Journal: Scientific Online Letters on the Atmosphere (Volume 8, pages 145-149, 2012)
Title: Comparisons between XCH_4 from GOSAT Shortwave and Thermal Infrared Spectra and Aircraft CH_4 Measurements over Guam
Authors: N. Saitoh, M. Touno, S. Hayashida, R. Imasu, K. Shiomi, T. Yokota, Y. Yoshida, T. Machida, H. Matsueda, Y. Sawa

EDITOR'S NOTE

A new series "Supporting GOSAT Project" has started this month. There will be 5 to 6 articles coming from JAXA and NIES.

We appreciate readers' voices, such as "I want to read articles on ...", "The ... was really interesting," or any other comments you like to make. Please feel free to contact : gosat_newsletter@nies.go.jp.

Thank you for supporting the newsletter. S. Aikawa

NIES GOSAT PROJECT NEWSLETTER ISSUE #25 DECEMBER 2012 Issued On : 2013/1/11

edited and published by : NIES GOSAT Project Office

email : gosat_newsletter@nies.go.jp
website : http://www.gosat.nies.go.jp/eng/newsletter/top.htm
address : 16-2 Onogawa, Tsukuba-City, Ibaraki, 305-8506 Japan
GOSAT Project Office
Center for Global Environmental Research
National Institute for Environmental Studies

You can download this newsletter here:
URL : http://www.gosat.nies.go.jp/eng/newsletter/top.htm

If you would like to receive an email notification when each issue is published, please send us an email with your name, email address, and preferred language (English or Japanese) at:
gosat_newsletter@nies.go.jp