The Third Research Announcement on Greenhouse gases Observing SATellite Series

(3rd GOSAT RA)

November 13, 2020

Japan Aerospace Exploration Agency (JAXA)

National Institute for Environmental Studies (NIES)

Office of Global Environment and Decarbonizing Innovation Research, Policy and Coordination Division, Global Environment Bureau, Ministry of the Environment (MOE)

Japan

Research Announcement
on Greenhouse gases Observing SATellite Series

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Appendices

September 21, 2018
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1. Introduction

The Fifth Assessment Report issued by the Intergovernmental Panel on Climate Change (IPCC) in 2013 and 2014 states, "Warming of the climate system is unequivocal," considering the climate changes observed in the past hundred years and their trend such as increasing atmospheric carbon dioxide (CO_2) concentration, atmosphere and ocean surface warming, sea level rise, and reduction of snow and ice. The drastic increase in the concentration of greenhouse gases (GHGs), particularly CO_2, caused directly and indirectly by human activities, is attributed to the fact that the emission of CO_2 into the atmosphere in the process of the mass consumption of fossil fuel, deforestation, etc., significantly surpasses the absorption by the land ecosystem and ocean. Thus, it is imperative to balance the emission due to human activities and the absorption by the nature, in order to stabilize the climate for the future. In the meantime, however, we, humans, have not grasped, to a sufficient level, the mechanisms of the absorption by the land ecosystem and ocean, and the climatological feedback in the carbon cycle involving the atmosphere, land ecosystem and ocean. This lack of understanding comprises a substantial part of the uncertainty in predicting future climate change.

The clarification of these problems involves not only an ascertainment of the spatial and temporal variations in the CO_2 emission from human activities but also calculations of the spatial distribution and temporal variation of CO_2 and also methane (CH_4), which is the second largest contributor to global warming after CO_2, and the spatial distribution and temporal variation of the source and sink in the land ecosystem and ocean, based on earth observations, and ultimately an attainment of adequate scientific knowledge on the underlying mechanisms. The efforts to observe GHG concentrations and to analyze the causes of their variations have already been in progress although still at a small number of locations on the earth. On top of these attempts, it is vital to observe the distributions of CO_2, CH_4, and other GHG concentrations, which fluctuate both spatially and temporally, on a global scale, using satellite platforms, in a continuous and systematic manner, and to elucidate the current issues, with a goal to elevate the reliability of prediction of future climate change and climate system models effective for assessing the consequences of climate change.

Under such circumstances, the GOSAT Project and GOSAT-2 Project (hereinafter referred to as the "Projects" collectively) were initiated and have been promoted jointly by the Japan Aerospace Exploration Agency (JAXA), the National Institute for Environmental Studies (NIES) and the Ministry of the Environment (MOE) (hereinafter referred to as the "Three Parties" collectively). The primary objective of the Projects is to contribute to the policies concerned with the climate change and the science concerned with the carbon cycle through estimating atmospheric concentration and flux (source and sink) of CO_2 and CH_4, two of the major GHGs, using data acquired by the satellites. Especially, it's keenly anticipated to obtain data concerning the anthropogenic emission of CO_2 and CH_4 on the basis of the Paris Agreement adopted at the 21st Conference of Parties (COP) of the United

Nations Framework Convention on Climate Change (UNFCCC) in 2015.

To achieve goals noted above, in the Projects, JAXA takes charge of developing and launching the satellites with the sensors on board, calibrating and operating the sensors, acquiring observation data, and processing the acquired data to Level 1 (spectral) products (in the GOSAT Project, MOE shares the development of the sensors), whereas NIES takes charge of the development and operation of the higher-level product processing system (generation of the higher-level products), development of the data processing algorithms, validation of data quality, and archive and provision of the generated data products. Furthermore, MOE takes the responsibility for utilization of the GOSAT and GOSAT-2 data in its environmental administration. In terms of drafting and implementing validation plans for data products, MOE and NIES jointly take the charge, and the specification requirements of the sensors are reviewed by the Three Parties. In addition, the Three Parties established the GOSAT Science Team and GOSAT-2 Science Team which consist of Japanese scientists, and promoted collaborations and joint researches with scientists from Japan and overseas under the framework of Thermal And Near infrared Sensor for carbon Observation (TANSO) onboard the Greenhouse gases Observing SATellite (GOSAT) Research Announcement (GOSAT/TANSO RA) first issued in 2008.

The Research Announcement on Greenhouse gases Observing Satellite Series (abbreviated GOSAT RA) to be made herein (hereinafter referred to as the “RA”) solicits research proposals on the data processing algorithms, calibration, validation, carbon balance estimation/atmospheric transport models, and scientific use with respect to the GOSAT and GOSAT-2 data from the public, on top of the basic research and development topics to be performed by the Three Parties, with an aim to make the outcomes of the Project more effective. All research teams responding to this RA whose proposals are selected by the Three Parties based on the results of evaluation by the Research Announcement on Greenhouse gases Observing SATellite Series (GOSAT RA) Selection and Evaluation Committee (hereinafter referred to as the “Committee”) will be granted a priority in data distribution, the right to make observation requests (within a predetermined scope), accommodation in obtaining other related data, and so forth. Incidentally, the Committee will consist of the members selected and requested by the Three Parties from among Japanese and non-Japanese experts and specialists.

The succeeding chapters in this document describe the outlines of the Projects and the contents of this RA in detail. Applicants to the RA are encouraged to read this document carefully and make active efforts to write research proposals.

2. Outline of GOSAT Research Announcement (RA)

2.1 GOSAT and GOSAT-2 Projects

Greenhouse gases Observing SATellite (GOSAT) is the first Earth observation satellite in the world dedicated to the greenhouse gases (GHGs) observation and has continued observing the distribution of global atmospheric CO_2 and CH_4 concentration for over eleven years since its launch in January 2009. Please refer to the following documents for more details about GOSAT and its observation results.

・GOSAT/IBUKI Data Users Handbook
https://data2.gosat.nies.go.jp/doc/GOSAT_HB_E_1stEdition_for_HP.pdf
・NIES GOSAT Project Pamphlet
http://www.gosat.nies.go.jp/eng/GOSAT_pamphlet_en.pdf
・Latest GOSAT Data
http://www.gosat.nies.go.jp/eng/gosat_leaflet_en.pdf

Greenhouse gases Observing SATellite-2 (GOSAT-2) is the successor to GOSAT and was launched in October 2018. Please refer to the following sites for more details and results of GOSAT-2.

・JAXA's Homepage regarding "IBUKI-2" (GOSAT-2)
http://global.jaxa.jp/projects/sat/gosat2/
・NIES's Homepage regarding GOSAT-2 Project
http://www.gosat-2.nies.go.jp/
・GOSAT-2/IBUKI-2 Data Users Handbook
https://prdct.gosat-2.nies.go.jp /en/documents/GOSAT-2_Data_Users_Handbook_1stEdition_en.pdf

2.2 Purpose of the RA

The purpose of the RA is to open opportunities to the public for researching on data processing algorithms, calibration (limited to Cloud and Aerosol Imager 2 (CAI-2)), validation, carbon balance estimation/atmospheric transport models, and scientific use of the GOSAT and GOSAT-2 data, in addition to the research and development topics to be performed by the Three Parties, with a goal to make more use of the outcomes from the Projects. The research proposals selected by the Committee and adopted by the Three Parties will be subject to preferential data distribution, the grant of the right to make observation requests (of reasonable amount), and accommodations in obtaining other related data, etc.

The implementation of the RA is expected to bring about additional researches by other parties than JAXA and NIES, which will supplement the research to be conducted in accordance with the calibration and validation plans of the Projects, facilitation of studies on the data processing algorithms, carbon balance estimation/atmospheric transport models, and utilization of the GOSAT and GOSAT-2 data, objective evaluation of the research concerning the effectiveness and usefulness of the GOSAT and GOSAT-2 data, expansion of opportunities for researchers and scientists inside and outside Japan to access the GOSAT and GOSAT-2 data, and so on.

2.3 Scope of the RA

The RA is open to all countries across the world, not limited to Japan. All individual researchers, educational organizations, research institutes, and governmental bodies who are willing to use the GOSAT and GOSAT-2 data are entitled to participate in the RA. In this manner, private companies are also qualified for submitting research proposals.

Investigators involved in carrying out the research themes selected in the RA are called "RA Investigators". A team of RA Investigators working on a research theme will select one principal

investigator (hereinafter referred to as “PI”) who will represent the team. The PI will always be the point of contact with the Three Parties in carrying out the research on the selected theme, such as communication, data transfer, and submission of necessary documents. The research organization (hereinafter referred to as “RO”) to which the PI belongs shall agree on the General Terms and Conditions for the Joint Research Agreement in accordance with the Research Announcement on Greenhouse Gases Observing Satellite Series (hereinafter referred to as the “Terms and Conditions”) and submit the Joint Research Application Form (Appendix C-1). The joint research agreement under the RA between the Three Parties and the RO shall be entered into force with the issuance of the written notice from NIES in response to the RO’s application, which notice shall confirm the approval of the Three Parties. The agreement may be made between a PI and the Three Parties only in case the PI does not belong to any organization.

2.4 Basic Policies of the RA

The RA will be conducted based on the following policies:

1) The Selection of research proposals submitted in response to the RA shall be determined by the Three Parties based on the evaluation results of the Committee. The Committee shall be responsible for not only evaluating the submitted proposals but also evaluating the progress and adequacy of the adopted researches.
2) The research period shall be within five years, in principle. Any long-term research to be conducted, which goes beyond one year, will be subject to submitting Progress Report or Interim Report to the Three Parties, basically once a year.
3) The GOSAT RA will be released on a regular basis.
4) PI of a research team may make multiple research proposals on different themes during the mission period. (In other words, a single person may submit proposals on more than one research themes to be carried out under this RA scheme.)
5) The PI may submit observational requests to the extent determined by the Committee per research proposal. However, upon termination of the joint research agreement with the RO to which the PI is affiliated, the observation request applications from the PI will be cancelled or not accepted even before the final report is submitted/approved, except for those that have already been entered into the system. In the case that a new proposal of the same PI is adopted, the observation requests made for the former proposal can be carried over to the new proposal as long as the necessity for the research is recognized.
6) The PI may request for distribution of GOSAT and GOSAT-2 data free of charge to the extent designated by the Committee per research proposal.
7) Joint Research Application Form (Appendix C-1) shall be duly signed and the original shall be submitted to GOSAT RA Secretariat by post, whereas the research proposal (Appendix C-2) to the RA shall be submitted in PDF by e-mail, in principle. Progress Report, Interim Report and Final Report of Research Results shall be submitted by e-mail, in principle. However, those documents sent by post or other means may also be accepted according to the situation.
8) The selection of the research proposals to be conducted under the RA scheme will be administered at the Committee meeting to be scheduled after reviewing the proposals.
9) Proposal titles and names of PIs and their ROs will be disclosed on the websites run by the NIES Satellite Observation Center when their research proposals are selected under the RA.

10) Outcomes of the RA must, in general, be disclosed to the public in the form of papers published on academic journals and other media and at the same time be reported at the research result reporting meetings held by the Three Parties.
11) The RO shall agree on the Terms and Conditions and submit the Joint Research Application Form (Appendix C-1) to the Three Parties. NIES shall issue the written notice after the Three Parties select the proposal under the RA based on the Committee's evaluation. The joint research agreement under the RA between the Tree Parties and the RO (or the PI in case the PI does not belong to any organization) shall take effect from the date NIES issues the notice.

2.5 Secretariat Implementing the RA

The Three Parties have set up a secretariat in charge of administrative procedures of the RA within the NIES Satellite Observation Center (hereinafter referred to as "GOSAT RA Secretariat") for firm and efficient implementation of the RA. GOSAT RA Secretariat carries out the following tasks:

1) Prepares the RA procedures and releases them in Japan and overseas.
2) Carries out administrative works as the secretariat of the Committee.
3) Receives proposals submitted in response to the RA and requests the Committee for due evaluation for selecting research proposals.
4) Notifies the selection results to all PIs who submitted research proposals.
5) Receives the outputs of the research from the PIs by the deadline and distributes them among the Three Parties.
6) Assists in organizing the research result report meetings to be held by the Three Parties.
7) Notifies the completion of the joint research agreement to the RO (or the PI in case if the PI does not belong to any organization) in writing when the Committee confirms and accepts the Final Report of Research Results submitted by the PI in accordance with Section 7.2.2 of this Research Announcement.

3. GOSAT/GOSAT-2 Data Policy

Refer to Appendix A

4. Distribution of GOSAT and GOSAT-2 Products and Standards for their Use

4.1 List of Products

Table 1 and 2 in Appendix A outlines the GOSAT and GOSAT-2 products, respectively, for which RA Investigators can submit data distribution requests.

4.2 Data Format and Distribution Media

1) Data format

   Of the GOSAT and GOSAT-2 data, L1 to L3 products will be provided in the following format, which is commonly used for distributing earth-observing sensor data.

   - HDF 5 (Hierarchical Data Format 5)

   L4 products of GOSAT and GOSAT-2 will be provided in either of the following formats, considering the formats used by TRANSCOM.

   - NetCDF
   - Text (limited to GOSAT L4A products)

2) Distribution media

   The GOSAT and GOSAT-2 data will be distributed online via the Internet, in general.

5. Funding

The Three Parties do not provide any kind of financial assistance to PIs, in principle.

6. Qualifications

Any research institute, educational organization, governmental body, private company or individual researcher who belongs or does not belong to any sort of organization, in any country, can apply for the RA, regardless of nationality, either in a group or in a person.

7. Rights and Obligations of Principal Investigator (PI)

The PI (one person) shall be responsible for communicating with the Three Parties when applying for the RA and conducting the research selected under the RA. Furthermore, the Three Parties and the RO to which the PI belongs (or the PI in the case the PI does not belong to any organization) shall make the agreement in accordance with the Terms and Conditions. The agreement shall take effects with the issuance of a written notice from NIES. NIES shall issue the notice to RO whose research proposal is selected by the Three Parties based on the evaluation result of the Committee.

7.1 Rights of PI

The PI shall be entitled to the following rights to the extent not violating the Foreign Exchange and Foreign Trade Act:

1) Submitting observation requests necessary for the implementation of the research on the selected theme.
2) Requesting a delivery of standard products without any cost, before the release to the public. (This

applies when major updates of the products are implemented.)

3) Requesting a delivery of research products without any cost. However, note that the number of such requests will be determined in consideration of the conformity to the research purpose.
4) Requesting a delivery of internal products without any cost. However, note that the acceptance or refusal of the request, and the number of products to be delivered will be determined in consideration of the conformity to the research purpose.
5) Requesting a "forced" processing of Fourier Transform Spectrometer (FTS) Level 2 (L2) products and a distribution of their results for the observation points of which data are not processed in the operational data processing at NIES and no L2 products are produced for any reasons; however, such request can be made under the condition that no cloud over the points are confirmed by the visual interpretation of CAI.
6) In addition to the GOSAT and GOSAT-2 L2 products, PIs can obtain additional information and the technical materials related to the products. However, note that the information included in the "sub-datasets" and the technical materials to be delivered will be determined in consideration of the conformity to the research purpose.
7) Requesting a delivery of the FTS L2 products generated with less strict screening criteria than the products for general users.
8) PIs are entitled to participate in the "PI Meeting" being held by the Three Parties.

Note: PIs' rights over the products, which will be defined after the release of this document, will be announced via appropriate means such as the NIES GOSAT Project webpage, NIES GOSAT-2 Project webpage or e-mail.

7.2 Obligations of PI

7.2.1 Interim Reporting

PI shall report the progress of the proposed RA research, once a year in principle, in the way designated by the Three Parties, such as submitting the report in writing or presenting the report at GOSAT Series-related workshops, symposiums, interim report meetings, and conferences held by the Three Parties. In addition, PI shall submit Progress Report or Interim Report written in either Japanese or English once a year to the Three Parties through the RO in accordance with the instructions provided in the written notice issued from NIES at the conclusion of the joint research agreement under the RA. The Three Parties shall evaluate the Interim Report and the Progress Report based on the review results by the Committee and notify the evaluation results to the RO (or the PI if the PI does not belong to any organization). Moreover, if the Committee deems the research purpose or data application of the RA Investigators as deviant from the initial research plan or in breach of the joint research agreement after examining the progress reported, the Three Parties may terminate the joint research agreement.

7.2.2 Final Reporting and Termination of the Joint Research Agreement

At the expiry of the effective term of the agreement, as written on the notice issued from NIES at the conclusion of the agreement, the PI shall submit the Final Report of Research Results to the Three Parties in accordance with the Terms and Conditions. The deadline of the submission is roughly within three months after the term of the agreement ends. The RO will be informed (or the PI if the PI does not belong to any organization) of the completion of the joint research agreement in writing after the

Three Parties confirms and accepts the Final Report of Research Results based on the Committee's review results. The final report shall be prepared in either English or Japanese.

8. Preparation and Submission of Research Proposal and Joint Research Application Form

8.1 Notes for Preparation and Submission of Research Proposal

The research proposals to be submitted in response to the RA must be prepared in accordance with the following conditions. Those proposals that are prepared in disregard of these conditions may be excluded from the succeeding evaluation process. In addition, none of the submitted research proposals will be returned to the proposers for any reason whatsoever.

- Prepare a research proposal in accordance with the procedure for submission defined in this Chapter and the “Guidelines for research proposal and related forms” provided as Appendix C-2 hereto.
- Submit your research proposal in the PDF format, in the way that it is ready for printing in A4 or letter size, together with necessary references, such as relevant theses, via e-mail to GOSAT RA Secretariat’s e-mail address (gosat-prj1[at]nies.go.jp). Note that the size of the submission e-mail should not exceed 10 MB, including the main text. Should your proposal exceed this limit, contact GOSAT RA Secretariat and follow their instructions.
- All documents should be prepared using the word processor and letters on the documents should all be typed in 10- to 12-point size.
- Indicate the page number at the bottom center and the name of applicant in the upper right corner on each page of the documents.

8.2 Language

The research proposal and accompanying reference documents must all be prepared in either English or Japanese. Those who are native speakers of Japanese shall prepare and submit Forms 1a and 1b of Appendix C-2, which are cover sheets of the proposal, in both English and Japanese.

8.3 Volume

The research proposal must be compiled in the most simplified way, focusing on the minimally necessary contents. The total volume of the proposal, excluding appendices, must be 20 pages or less. See Appendix C-2 for further specific rules.

8.4 Contents to be Included in Research Proposals and the Preparation Procedure

See Appendix C-2

8.5 Notes for Preparation and Submission of Joint Research Application Form

The Joint Research Application Form (Appendix C-1) must be duly signed by the representative of the RO after agreeing on the Terms and Conditions (Appendix B), and the original must be submitted

to GOSAT RA Secretariat by post. If the original of the Joint Research Application Form does not reach GOSAT RA Secretariat by the application deadline for procedural reasons, contact GOSAT RA Secretariat. Note that receipt of the duly signed original is a prerequisite for issuing the written notice from NIES, which notice confirms the joint research agreement with the Three Parties.

8.6 Submission address of Research Proposal and Joint Research Application Form

Satellite Observation Center
National Institute for Environmental Studies (NIES)
16-2 Onogawa, Tsukuba, Ibaraki
305-8506 Japan

Phone: 81-29-850-2966 (Japanese) / 81-29-850-2035 (English)
FAX: 81-29-850-2219
E-mail: gosat-prj1[at]nies.go.jp

9. Selection of Research Proposals

9.1 Evaluation and Selection Procedure

The research proposals submitted in response to the RA will be evaluated by the Committee. The Three Parties will make a final decision on the selection of research proposals, based on the evaluation results of the Committee. The applicants may be requested to modify or rectify the contents of the proposed research plan, in the course of the evaluation by the Committee, with a view to enriching the expected scientific results from the proposed research. In addition, the Committee may solicit advice of the GOSAT or GOSAT-2 Science Teams in the process of evaluation. All applicants will be notified of the selection results by the scheduled date announced.

9.2 Evaluation Criteria

The submitted research proposals will be examined and selected based on the following evaluation criteria.

1) The contents of the proposed research conform to the purpose of the RA.
2) The methods and approaches adopted in the proposed research are appropriate and the underlying concept is original and/or innovative.
3) The RA Investigators are qualified in terms of research capability, experience, facility/equipment, and skills necessary for accomplishing the purpose of the proposed research.
4) The proposed research is consistent and relevant with the purpose of the GOSAT and GOSAT-2 Projects.
5) The purpose of the proposed research can be accomplished within the research period.

9.3 Post-selection Procedure

The RO shall agree on the General Terms and Conditions for the Joint Research Agreement in accordance with the Research Announcement on Greenhouse Gases Observing SATellite, attached as Appendix B hereto (the Terms and Conditions), and submit the Joint Research Application Form

(Appendix C-1). The joint research agreement between the Three Parties and the RO under the RA shall be entered into force with the issuance of the written notice from NIES in response to the RO's application, which notice shall confirm the approval of the Three Parties. The agreement may be made between PI and the Three Parties only in the case the PI does not belong to any organization. The RO and the PI shall observe all the clauses, in connection with the performance of the research, as stipulated in the Terms and Conditions. GOSAT RA Secretariat shall carry out the administrative work necessary for concluding such an agreement, in line with the intentions of the Three Parties.

10. Cancellation and Postponement of RA

The Three Parties reserve the right to cancel the RA and joint research projects based on the RA by notifying in writing and shall not be liable for any delay in the RA schedule or cancellation of the RA program itself or to those who did not receive any notice regarding such delay or cancellation.

11. Expected Research Topics

The Three Parties have been and will be continually promoting the GOSAT and GOSAT-2 Projects by playing the respective roles in the research and development deemed as necessary for achieving their purpose with the advice and help from the GOSAT Science Team and GOSAT-2 Science Team. The specific research and development activities within the Projects include: the calibration of the GOSAT and GOSAT-2 mission instruments, validation of higher-level products (observation and analysis for validation), development and improvement of the data processing algorithms, development of atmospheric transport models and land ecosystem models, generation of source inventories, and development of carbon flux estimation models. Also, the analysis methods for such basic phenomena that have influence on evaluation of the characteristics and quality of data such as temporal and spatial variation of concentrations and carbon balance distributions are studied. Furthermore, the Projects conduct research on advanced application of the GOSAT and GOSAT-2 data, for example, detection of CH_4 leakage from natural gas pipelines and detection of the emission from large point sources such as mega-cities and local forest fires. More details are provided in the succeeding section.

Through the implementation of this RA, the Projects expect to benefit from the RA research outcomes for developing higher quality data products. At the same time, the Projects want to see the research field of data application be further facilitated, and the data acquired by the GOSAT and GOSAT-2 contribute to resolve the climate change issues through their effective utilization. Therefore, the GOSAT and GOSAT-2 Projects are willing to accept new research proposals from all parts of the world.

In this Chapter hereunder is provided a summary of research topics to be or to have been carried out

in the Projects. It is anticipated that a large number of research themes, that will supplement the research topics of the Projects, that will utilize the applicant's own validation data, or that are based on very original and unprecedented perspectives, will be proposed.

11.1 Research Topics Conducted or Targeted by the GOSAT and GOSAT-2 Projects

1) Calibration

The calibration-related research topics conducted or targeted by the GOSAT and GOSAT-2 Projects (the Projects) include: calibration (including spectral calibration) when interferogram is Projects (the Projects) include: calibration (including spectral calibration) when interferogram is transformed into spectra, calibration in relation to correction of the variation of the observation sensors' field of view, instrument function calibration, radiance calibration, and vicarious calibration for FTS and FTS-2; radiometric calibration, geometric correction, and stray light correction for CAI and CAI-2.

2) Data processing algorithms

The processing algorithm-related research topics conducted or targeted by the Projects include development of fast data processing algorithms, sunglint observation data processing methods, processing algorithms using polarized data, and algorithms to extract parameters from thermal-infrared data, evaluation of spectral parameters of gaseous molecules and sunlight spectra, combined use of short wavelength infrared and thermal infrared data.

3) Carbon flux estimation, atmospheric transport models

The model-development-related research topics conducted or targeted by the Projects include development and refining of source inventory databases, refining of atmospheric transport and land ecosystem models, development of model to assimilate carbon dioxide and/or methane, and development of carbon flux estimation models with high temporal/spatial resolution.

4) Validation

* Before the launch

The research topics targeted by the Projects include calibration of the ground-based high-resolution Fourier Transform Spectrometer (FTS) and small ground-based FTS by airplane and in situ observations, evaluation of the sun glint data processing algorithm by airborne and ground based FTSs, and development of the validation method using data derived from the equipment for validation of aerosols, such as Lidar and Sky-radiometer.

* After the launch

The research topics conducted or targeted by the Projects include acquisition and analytical validation of data taken at validation sites on land and on ocean (including island and cape), analytical validation of data taken by instruments on board private aircraft, and comparison with data taken by other satellites or computed by models for the purpose of validating the quality of data on the CO_2 and CH_4 column abundances, as well as validating the quality of data on vertical distributions of CO_2 and CH_4 concentrations to be derived from the thermal-infrared data. Validation of CAI products is also included.

5) Data application

FTS and FTS-2:

The research topics conducted or targeted by the Projects include analysis of basic phenomena that have influence on evaluation of the characteristics and quality of data such as temporal/spatial variation of concentration distributions and carbon balance distributions; estimation of sources of CO_2 and/or CH_4 using the carbon monoxide (CO) observation data; possible advanced applications, such as detection of CH_4 leak from natural gas pipelines, detection of the emission from large point sources (e.g. mega-cities and local forest fires); and estimation of natural CO_2 flux using the fluorescence from vegetation, possibility of observing atmospheric trace components, such as dinitrogen monoxide (N_2O) and chlorofluorocarbon (CFC).

CAI and CAI-2:

Making and utilizing maps of urban air pollution including PM2.5 and black carbon

11.2 Expected Research Topics to be Proposed in the RA

1) Calibration (limited to CAI-2)
2) Data processing algorithm
3) Carbon balance estimation, atmospheric transport models
4) Validation
5) Data application

12. Schedules of research announcements

1) The First Research Announcement

Release of RA	September 21, 2018
Deadline for proposal submission	November 21, 2018
Notification of the selection results	from January 31, 2019

2) The Second Research Announcement

Release of RA	October 21, 2019
Deadline for proposal submission	January 3, 2020
Notification of the selection results	from March 6, 2020

3) The Third Research Announcement

Release of RA	November 13, 2020
Deadline for proposal submission	January 15, 2021
Notification of the selection results	from April 30, 2021

13. Contact Information

GOSAT RA Secretariat
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National Institute for Environmental Studies (NIES)
16-2 Onogawa, Tsukuba, Ibaraki
305-8506 Japan

Phone: 81-29-850-2966 (Japanese) ／ 81-29-850-2035 (English)
FAX: 81-29-850-2219
E-mail: gosat-prj1[at]nies.go.jp