

Memorandum of Understanding (MoU)

for

"Regional Characterization of Atmospheric Aerosols at Patiala (North Western Region of India) Region"

sub project of the
Aerosol Radiative Forcing over India (ARFI) Project
under
ISRO Geosphere Biosphere Program (IGBP)

Between

Atmospheric Research Laboratory
Department of Physics
Punjabi University, Patiala-147 002, Punjab (India)


and

Space Physics Laboratory (SPL)
Vikram Sarabhai Space Centre (VSSC)
Indian Space Research Organization (ISRO), Dept. of Space (DOS), Govt. of India
Thiruvananthapuram - 695022, India

Signed on this day _____ of _____ 2022

Dr. Varinder Kumar Kaushik
Registrar
Punjabi University
Patiala 147002
Punjab, India

Dr. K Rajeev
Director, Space Physics Laboratory (SPL)
Vikram Sarabhai Space Centre
Indian Space Research Organization (ISRO)
Thiruvananthapuram - 695022, India


Principal Investigator,
ISRO-GBP PROJECT
Physics Department,
Punjabi University, Patiala.

1. PREAMBLE

Noting that the Space Physics Laboratory (SPL) and Atmospheric Research Laboratory, Department of Physics, Punjabi University, Patiala, Punjab, India [hereafter Collaborating Agency (CA)] have an abiding interest in the regional characterization of atmospheric aerosols over the Indian region through the application of ground-based measurements of aerosols and the scientific understanding of the various source and transport processes to understand the radiative and climate impacts. SPL and CA have planned a collaborative scientific research program on the characterization of atmospheric aerosol properties. SPL and CA have agreed to collaborate and carry out specific activities listed below, as a continuation of the previous MoU, under the ISRO Geosphere-Biosphere Program (IGBP) Phase - II.

2. PARTIES

2.1 Executing party:

Space Physics Laboratory (SPL), Vikram Sarabhai Space Centre (VSSC), Indian Space Research Organization (ISRO), Dept. of Space (DOS), Govt. of India, Thiruvananthapuram

2.2 Indenting party:

Atmospheric Research Laboratory, Department of Physics, Punjabi University, Patiala-147 002, Punjab, India will be referred as Collaborating Agency (CA)

3. AUTHORIZED SIGNATORIES

Authorized signatory for SPL is the Director, SPL and for the CA it shall be an officer not below the grade of Professor/ Head of Department

4. FUNCTIONARIES AND CONTACT ADDRESS, PHONE, EMAIL ETC.

4.1 SPL

Sl. No	Name	Contact Address	Phone& email
4.1.1	Dr. K Rajeev	Director, Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram, 695022	0471-2563663 k_rajeev@vssc.gov.in
4.1.2	Dr. S Suresh Babu	Head, Aerosols Trace gases and Radiative Forcing Branch, SPL, VSSC, Thiruvananthapuram, 695 022	0471-2562404 s_sureshbabu@vssc.gov.in


Principal Investigator,
ISRO-GBP PROJECT
Physics Department,
Punjabi University, Patiala.

4.2 CA

Sl. No	Name	Contact Address	Phone &Email
4.2.1	Dr. Varinder Kumar Kaushik Registrar	Punjabi University, Patiala-147 002, Punjab, India	Phone: 0175 5136030 e-mail: registrar@pbi.ac.in
4.2.2	Dr. Karamjit Singh PI	Department of Physics Punjabi University, Patiala-147 002, Punjab, India	Mob. +91 94640 77434 e-mail: dhaliwalkaramjit@gmail.com

All correspondence on day-to-day matters during the course of the project shall be between respective focal points/ project investigator identified in the above table.

5. EFFECTIVE DATE

5.1 Commencement

The effective date for the commencement of this MoU will be the date of signing the MoU by SPL and CA.

5.2 Duration

This MoU is valid from the date of signing the MoU to 31st March 2024.

6. SCOPE OF WORK

CA will be responsible for all the ground data collection in the respective study area in accordance with the project guidelines of the "Aerosol Radiative Forcing over India (ARFI) Project" in the following sites.

Details of observational sites and districts

Sl. No	Station name(Latitude, Longitude, Altitude)	Number of observational site
(a)	Patiala (Latitude : 30°20' N, Longitude: 76°24' E, Altitude : 251 m)	Year I: 1 Year II: 1 Year III: 1

The scope of the work to be carried out for the project includes:

- 6.1 Undertake regular aerosol data collection by operating the ground-based instruments as per the requirements of the ARFI project
- 6.2 Quality check and process raw data (L-0) for ensuring the accuracy of data collection
- 6.3 Send raw and processed data to nodal center (SPL) on a daily/ fortnightly basis
- 6.4 Create a database of all the processed data as per the format provided by ARFI Project and submit the softcopy of the database to SPL.
- 6.5 CA can retain a copy of the data for carrying out scientific research for academic purposes and publications in peer-reviewed international journals.
- 6.6 Sharing of data with other parties outside the CA should be with the consent of SPL
- 6.7 Participate in the joint scientific data analysis to realize the ARFI project objectives
- 6.8 Extend help in conducting site-specific field experiments
- 6.9 Intimate progress report and the progress of the observatory, database creation and/or analysis to SPL in accordance with the project requirements
- 6.10 The collected data, results, and findings would be shared with the scientific community by SPL as per the directive from ISRO HQ.

7. METHODOLOGY

The data analysis will be done following standard methods. Methods will be updated based on the discussion during the scientific progress review meeting conducted at SPL.

8. DELIVERABLES AND GUIDELINES ON DATA SECURITY

8.1 Deliverables:

Generation of primary aerosol database over the region by operating an aerosol observatory as part of the ARFI network for the development of aerosol database over the Indian subcontinent.

8.2 Data Security

1. All collected data from the individual station shall be kept safe and secure by the concerned CA.
2. Sharing of data with the other agencies should be after the quality check and with the consent of SPL through the common web portal of ARFI project.

3. The data policy of ISRO will be applicable to the database generated through the network observation.

9. SCIENTIFIC DATA TO BE COLLECTED BY CA

The aerosol data to be collected from the station includes

1. Spectral Aerosol Optical Depth
2. Aerosol Black Carbon Mass concentration
3. Spectral Single Scattering Albedo
4. Meteorological parameters from the region

10. APPLICABLE DOCUMENTS

Detailed project proposal to be submitted by CA to SPL. In addition, CA should send quarterly progress report to SPL including the details of data collected and the scientific results emerged from the study.

11. RESPONSIBILITIES OF EACH PARTY

11.1 Responsibilities of SPL

1. The specification of the instruments for ground-based observations to meet the project objectives will be decided jointly by SPL and CA.
2. Funds to carry out the aerosol observations and other related activities will be provided by the ARFI project of ISRO-GBP as per the budgetary provision and fund availability to realize the project objectives.
3. Technical and scientific guidance to support the CA to meet the ARFI objectives

11.2 Responsibilities of CA

1. An officer/scientist should be identified in the Centre to undertake data collection systematically from the identified study area and process the first level data.
2. Principal Investigator is solemnly responsible for sending the data to the nodal station daily or fortnightly
3. To involve in revision and updating of analysis as and when required
4. It is envisaged to encourage the researchers to use the data; however, the CA should not share the data with anybody else without prior permission from SPL. In all research communications/ publications emanating out of this study in the project due credit and acknowledgment need to be given to the ARFI Project

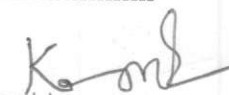
5. The PI/ Research Scholar/ Project Fellow involved would, however, with prior approval of SPL can utilize the data for the doctoral, other research work, and publications with due acknowledgment to ARFI project
6. The CA would be advised to organize either a Research Fellow/Research Associate or Project Fellow to assist in executing the project work. Selection of Project staff will be as per the rules prevailing in the University/Institute. The fellowships/salary towards this should be as per the Govt. of India rules. Additional funds towards HRA as per entitlement and existing Govt. of India rules will also be provided. TA and DA during fieldwork/ duty are to be governed by Department of Space (DOS), Govt. of India rules. Funds to carry out the fieldwork will be provided.
7. The utilization of the funds will be as per the existing rules and norms of Govt. of India. Head of the institution/ university is authorized to operate the funds to achieve the project objectives in time.
8. The funds will be made available in one or two instalments. CA must submit Utilization Certificate (UC) and Statements of Expenditure (SE) duly signed by the Head of Finance Department, Principal Investigator, and Competent authority (Head of the institute) with the departmental stamp.

12. PROJECT SCHEDULE

From the date of signing the MoU to 31st March 2024

13. BUDGETARY PROVISION FOR THREE YEARS *(Subject to budget availability)*

Sl. No	Item	Year-I (2021 – 22)	Year-II (2022 – 2023)	Year-III (2023 – 2024)	Total
1	Manpower	4.90	5.00	5.00	14.90
2	Scientific Equipment, Contingency, Spares and consumables	30.00	1.10	1.50	42.10
3	TA/ DA for Field work & for project meeting (PI & Researcher)	0.50	0.50	0.50	1.50
4	Institute overhead	0.00	0.50	0.50	1.50
	Total	35.40	7.10	7.50	50.00


Principal Investigator,
ISRO-GBP PROJECT
Physics Department,
Punjabi University, Patiala.

14. CONSIDERATION

The CA shall deliver the data/ outputs to SPL for the consideration as given in clause 11 of this MoU

15. FUNDING AND TERMS AND CONDITIONS OF PAYMENT

ARFI Project of ISRO GBP would provide 1st year advance funding to the CA after the signing of MoU. At the end of the year, the 2nd year advance will be paid to CA after receiving the UC and SE as per the format provided by SPL and same will follow for the third year. The CA will furnish the UC and SE at the end of 3rd year and return the unspent money (if any).

16. TRAINING

Necessary training for operating the ground based instruments will be provided at SPL

17. WARRANTY

CA shall complete the scientific analysis of the data collected within 3 months of the data collection and submit the processed data with the quarterly report to SPL.

18. PROJECT MONITORING

1. The project will be monitored by SPL through existing internal project review mechanisms
2. If there is any delay at any stage of the project, the same will be communicated by CA to SPL stating clearly the reasons for delay.

19. CONFIDENTIALITY

The confidentiality of data shall be maintained as per the existing ISRO data policy guidelines

20. INTELLECTUAL PROPERTY RIGHTS

- 20.1 The CA can use the project data collected by the CA project team for Ph.D./ report/ publication in consultation with SPL


Principal Investigator,
ISRO-GBP PROJECT
Physics Department,
Punjab University, Patiala

20.2 The originals of any reports and documents or materials prepared other than those stated in 20.1 or inventions or information produced as a result of the services and all intellectual property rights therein, unless otherwise specifically stated in the MoU, shall be and shall remain property of SPL.

21. CHANGE IN SCOPE OF WORK

Any change in scope of work would be with the mutual consent of both parties. A separate amendment to MoU to such an extent has to be signed.

22. MODIFICATIONS

Any further modifications to this MoU, if required, would be through amendments with mutual consent.

23. FORCE MAJEURE

Neither SPL nor CA shall be considered in default in performance of the obligations under this MoU if such performance is prevented or delayed by events such as, but not limited to, war, hostilities, revolution, riots, civil commotion, strikes, lock-outs, conflagrations, epidemics, accident, wind, flood, drought, earthquake or ordinance of any Government or of any subdivision thereof, or because of any act of God, or for any other cause beyond the reasonable control of the party affected.

Then the party so affected shall promptly notify the other party in writing specifying the nature of the force majeure and of the anticipated delay in the performance of MoU and as from the date of that notification, SPL and CA may at its discretion either terminate the MoU forthwith or suspend the performance of the contract for a period of not exceeding 6 months. If at the expiry of such period of suspension any of the reasons still remain, SPL and CA may either agree a further period of suspension or treat the MoU as terminated.

In the event of the contract being terminated by any reason of force majeure, the SPL shall take such steps as are necessary to bring the services to an end, in a cost-effective, timely, and orderly manner.

SPL shall submit an account in writing which shall state the amount claimed taking into account all fees and costs properly incurred or committed by the SPL in relation

to the contract of its terminations which cannot be recovered. Provided that payments are within the financial limit and not subject to dispute, CA shall always:

23.1 pay all fees, expenses and other sums due and outstanding under the terms of this contract up to and including the date of termination ("the relevant date")

23.2 reimburse all reasonable expenses necessarily incurred by SPL after the relevant date in winding up the contract

24. INDEMNIFICATION

Either party shall not be liable for in respect of any demand or in consequence of any accident or injury to any work men or other person employed by the other party related to the project or its sub- contractor or violation of any statutory provision under the scope of this MoU.

25. INDEMNITY BOND

CA shall exercise reasonable skill, care, and diligence in the performance of the MoU and indemnify and keep indemnified SPL in respect of any loss, damage or claim howsoever arising out of or related to breach of MoU, statutory duty or negligence by CA or its employees agents or sub-contractors in relation to the performance or otherwise of the services to be provided under this MoU.

26. ARBITRATION

In event of any dispute or difference of opinion between the Parties hereto, such disputes and differences shall be resolved amicably by mutual consultation. Failing which the party with the written consent of the other party may take recourse of any alternative dispute settlement mechanism recognized by the Central Government or under any law including arbitration to settle under provisions of the Arbitration and Conciliation Act, 1996. The place of arbitration and jurisdiction for the other proceedings shall be preferred in Courts/Tribunal at Thiruvananthapuram.

27. JURISDICTION

Place where any dispute arising out any MoU or its terms shall be subject to Thiruvananthapuram only.

28. TERMINATION

This MoU may be terminated by either party giving three months written notice to the other but however, such termination shall not affect the projects/ assignments agreed to be undertaken by both the parties before such termination and both the parties should complete such projects/ assignments as if this MoU is in operation.

IN WITNESS WHEREOF, the parties hitherto have caused this MoU to be signed in their respective names of the day, the month and the year herein before mentioned.

Dr. Varinder Kumar Kaushik

Registrar

Punjabi University, Patiala-147 002

Punjab, India

Signature:

Place:

Date:

Office Seal:

[Handwritten Signature]
24/02/2022
Registrar,
Punjabi University,
Patiala

Witness: Principal Investigator, ARFI Project, Punjabi University, Patiala

Dr. Karamjit Singh

Assistant Professor, Department of Physics

Punjabi University, Patiala-147002

Punjab, India

Signature:

Place:

Date:

[Handwritten Signature]

Dr. K Rajeev

Director, Space Physics Laboratory

Vikram Sarabhai Space Centre, ISRO

Thiruvananthapuram 695 022

Signature:

Place:

Date:

Office Seal:

Witness: Principal Investigator, ARFI Project, SPL/VSSC

Dr. S. Suresh Babu

Head

Aerosols Trace Gases and Radiative Forcing

Branch, Space Physics Laboratory,

VSSC, Thiruvananthapuram 695 022

Signature:

Place:

Date:

[Handwritten Signature]