



ज्ञान - विज्ञानं विमुक्तये

Project completion report

(UGC Major Research Project)

Project title: "Spatial and temporal variation of AOD in Mid Brahmaputra valley"

UGC Reference F.No.42-441/2013(SR) dated 12/03/13

PI: Dr. Raza R Hoque
Department of Environmental Science
Tezpur University
Tezpur 784028

Executive Summary

Project title: "Spatial and temporal variation of AOD in Mid Brahmaputra valley"

UGC Reference F.No.42-441/2013(SR) dated 12/03/13

AOD was monitored at Tezpur a site of mid-Brahmaputra region to investigate the regional aerosol characteristics. In the present study AOD values were retrieved daily on hourly basis from April 2014 to April 2016 at five different 440nm, 500nm, 675nm, 870nm and 1020nm using Microtop-II Sunphotometer. Cloud covers days were avoided. To study the nature of aerosol loading at mid Brahmaputra region with respect to other region of the Brahmaputra valley, seven locations are selected from lower Brahmaputra to upper Brahmaputra region, out of these selected sites two sites are selected at high altitude, one from north bank and other from south bank of the river. MODIS aqua and terra AOD at 550nm was retrieved for the study period for all the locations. Spectral variation of AOD was used to calculate Angstrom exponent(α) which gives the understanding about the type of the aerosol loading at the region. Back trajectory analyzes using hysplit model were used to trace the pathway of the atmospheric particle during windy and dusty event.

Mean AOD at 500 nm 0.34 ± 0.15 was observed for data set with lowest 0.31 ± 0.17 during post-monsoon and highest 0.62 ± 0.09 during pre-monsoon. The mean seasonal variation of $\alpha_{440-1020}$ values from minimum 0.61 ± 0.51 during monsoon to maximum 1.23 ± 0.19 during winter with high standard deviation shows the presence of multimode atmospheric aerosol of different origin and composition. Background aerosol (5.80% to 17.08%) due to anthropogenic activity was observed throughout the study period, followed by biomass burning which is maximum ($\cong 24\%$) during winter and pre-monsoon. During to the favorable atmospheric wind condition the regional aerosol dust shows its maximum ($\cong 58\%$) contribution during pre-monsoon. However, local dust aerosol originating from natural and local human anthropogenic activities show maximum ($\cong 60\%$) contribution during monsoon and post-monsoon. Spatial variation of aerosol optical depth of entire Brahmaputra valley shows a decreasing trend with the increase in elevation of particular location above the sea level. Within the seasons the aerosol loading was more or less the same for entire Brahmaputra valley. Trajectory analyzes during windy and dusty event in the mid-Brahmaputra region show that aerosol particles in the form of dust may take a long pathway to reaches the region as during these events the concentration of dust aerosol was relatively high. The aerosol originating from the India-Gangtic-Plain (IGP) and even from the Grate Indian desert with favorable wind condition is capable to reach the region. Size distribution pattern of aerosol in columnar atmosphere is relatively different from the near surface aerosol size distribution. Near surface aerosol size distributions are bi-model type throughout the season while more concentration of fine mode aerosol was observed in columnar distribution, which depicts the abundant of fine fraction of aerosol in the upper atmosphere. These fine mode aerosols is capable of travel a long distant with favorable wind and remain in atmosphere for long period.

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002.

Annual/Final Report of the work done on the Major Research Project.
(Report to be submitted within 6 weeks after completion of each year)

1. Project report No. **Final**
2. UGC Reference F.No.42-441/2013(SR) dated 12/03/13
3. Period of report: from 01/04/2013 to 31/03/17
4. Title of research project “Spatial and temporal variation of AOD in Mid Brahmaputra valley”
5. (a) Name of the Principal Investigator: Dr. Raza Rafiqul Hoque
(b) Department.: Department of Environmental Science
(c) University/College where work has progressed: Tezpur University
6. Effective date of starting of the project: 01/04/2013
7. Grant approved and expenditure incurred during the period of the report:
 - a. Total amount approved Rs. 9,90,000/-
 - b. Total expenditure Rs. 9,84,322/-
8. Report of the work done: (Please attach a separate sheet)
 - i. Brief objective of the project
 - 1) The spatial and temporal variation in the AOD in mid-Brahmaputra valley
 - 2) The relationship of AOD with the size distribution of aerosol.
 - ii. Work done so far and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication)

Two conference paper presented:

1) Bora, J. and Hoque, R. R. Variation of aerosol optical depth and classification of aerosol type at Tezpur, Assam: A semi urban cite of north bank mid Brahmaputra climatic zone of North-East India., Climate Chance Society, CCSO13, 2017.

2) Bora, J. and Hoque, R. R. Temporal variability of atmospheric visibility retrieved from multi-wavelength sunphotometer at Tezpur, Assam., PES5, 2017.

One M.Sc. Dissertation completed:

Name: Ms Priyanka Saikia

Title: “Short term study of AOD Characteristics over Tezpur: Variation with different local metrological conditions.”

One PhD Thesis due submission:

Name: Mr. Jayanta Bora

Title: “Study of variabilities of aerosol characteristics and AOD over mid-Brahmaputra region - Impact meteorology and implications”

Submission due date: 30 June 2018

iii. Has the progress been according to original plan of work and towards achieving the objective. if not, state reasons **Yes**

iv. Please indicate the difficulties, if any, experienced in implementing the project:

For the AOD measurement, difficulty was encountered due to overcast condition throughout the year. There happened to be greater number of days with cloudy sky in the region.

v. If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the Commission on a separate sheet:: The project has been completed.

vi. If the project has been completed, please enclose a summary of the findings of the study. One bound copy of the final report of work done may also be sent to University Grants Commission. One bound copy of the final report of work done is enclosed

vii. Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as

(a) Manpower trained: Two number (One Post graduate student and one PhD student)

(b) Ph. D. awarded: One Ph D ongoing (Due submission by 30 June 2018)

(c) Publication of results: Research Papers are under preparation.

(d) Other impact, if any: Resource created under the project was utilized in teaching the following courses of MSc programme of the department:

1. Atmospheric Chemistry (2 credits)

2. Environmental Pollution and Management (3 credits)

SIGNATURE OF THE PRINCIPAL INVESTIGATOR

Dr. Parin P. Hogue
Assoc. Professor
Tezpur University
PI, AOD Project (UGC)
(F.No. 42-441/2013)

REGISTRAR/PRINCIPAL
(Seal)

कुलसचिव
तेजपुर विश्वविद्यालय
Registrar
Tezpur University

**UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002**

STATEMENT OF EXPENDITURE IN RESPECT OF MAJOR RESEARCH PROJECT

1. Name of Principal Investigator: Dr. Raza Rafiqul Hoque

2. Deptt. of PI : Department of Environmental science

Name of University: Tezpur University

3. UGC approval Letter No. and Date: F.No.42-441/2013(SR) dated 12/03/13

4. Title of the Research Project: "Spatial and temporal variation of AOD in Mid Brahmaputra valley"

5. Effective date of starting the project: 01/04/2013

6. a. Period of Expenditure: From 01/04/2013 to 31/03/17

b. Details of Expenditure

Head	Fund received (Rs.)			Expenditure(Rs.)					Balance (Rs.)	
	1st Instalment	2nd Instalment	Total(Rs): A	I (2013-14)	II (2014-15)	III (2015-16)	IV (2016-17)	Total: I+II+III+IV =B	A-B	
Books & Journals	nil	nil	0					0	0	
Equipment	800000	nil	800000		794371			794371	5629	
Contingency including special needs	25000	20000	45000	21987	2760		23632	48379	-3379	
Field Work/Travel	50000	40000	90000	43410	23882		26018	93310	-3310	
Hiring Services	nil	nil	0					0	0	
Chemicals & Glassware	25000	20000	45000		22472		15790	38262	6738	
Overhead	10000	nil	10000	10000				10000	0	
Total:	910000	80000	990000	75397	843485	0	65440	984322	5678	
Interest earned(Rs.)	(For the period 2013-2017)		812							
Total balance(Rs.)	[Balance (A-B) Rs.5678 + Interest earned Rs.812]= Rs.6490/-									

7. If as a result of check or audit objection some irregularity is noticed at later date, action will be taken to refund, adjust or regularize the objected amounts.

8. It is certified that the grant of Rs. 9,90,000/- (Rupees Nine lakhs ninety thousands only) received from the University Grants Commission under the scheme of support for Major Research Project entitled "Special and temporal variation of AOD in Mid Brahmaputra valley" vide UGC letter No. F. F.No.42-441/2013(SR) dated 12/03/13 and an amount of Rs.812 (Rupees eight hundreds towels only) has been earned as interest during the period. An amount of Rs.9,84,322/- (Rupees Nine lakhs Eighty-four thousands three hundreds twenty-two only) has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. The unspent balance Rs 6,490 (Rupees six thousands four hundred ninety only) is refunded by RTGS no.: SBIN517188786388 dated: 07/07/17

Signature of Principal Investigator

Dr. Raza Rafiqul Hoque
Asst. Professor
Tezpur University
PI, AOD Project (UGC)
(F.No. 42-441/2013)

Finance Officer

CA. SURAJIT CHAKRABORTY & CO.
CHARTERED ACCOUNTANTS

CA. SURAJIT CHAKRABORTY
(Proprietor)

Registrar
(Seal)

Registrar
Tezpur University

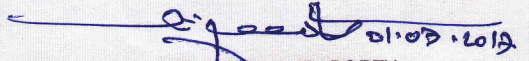
Annexure - V

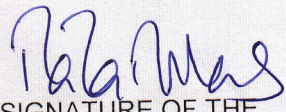
UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110 002

Utilization certificate

It is certified that the grant of Rs. 9,90,000/- (Rupees Nine lakhs ninety thousands only) received from the University Grants Commission under the scheme of support for Major Research Project entitled "Spatial and temporal variation of AOD in Mid Brahmaputra valley" vide UGC letter No. F. F.No.42-441/2013(SR) dated 12/03/13 and an amount of Rs.812 (Rupees eight hundreds towels only) has been earned as interest during the period. An amount of Rs.9,84,322/- (Rupees Nine lakhs Eighty-four thousands three hundreds twenty-two only) has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission. The unspent balance Rs 6,490 (Rupees six thousands four hundred ninety only) is refunded by RTGS no. SBINS17188786385..dated:..07/07/17

For SURAJIT CHAKRABORTY & CO.
CHARTERED ACCOUNTANTS


CA. SURAJIT CHAKRABORTY
(Proprietor)
Membership No.- 305054
STAUTORY AUDITOR


SIGNATURE OF THE
PRINCIPAL INVESTIGATOR
Dr. Raza R. Hoque
Tezpur University
PI, AOD Project (UGC)
(F.No. 42-441/2013)


REGISTRAR/PRINCIPAL

SIGNATURE OF THE COINVESTIGATOR