International Conference on

Aerosol Climate Change Connection (AC3)

(Centenary Celebration of Bose Institute)

25-27 April, 2017

Conference Proceedings

BOSE INSTITUTE, DARJEELING
INDIA

International Conference on
Aerosol Climate Change Connection

National Advisory and Technical Programme Committee

Prof Sibaji Raha	*Bose Institute, India (**Chairman**)*
Prof A. Jayaraman	*NARL, Gadanki, India*
Prof P. C. S. Devara	*Amity University, Haryana, India*
Prof Chandra Venkataraman	*IIT, Bombay, India*
Prof S. N. Tripathi	*IIT, Kanpur, India*
Prof M. M. Sarin	*PRL, Ahmedabad, India*
Dr Gufran Beig	*IITM, Pune, India*
Dr G Pandithurai	*IITM, Pune, India*
Prof Sanjay K Ghosh	*Bose Institute, Kolkata, India*
Dr Amitabha Mitra	*Bose Institute, Kolkata, India*
Dr Abhijit Chatterjee	*Bose Institute, Kolkata, India*
Dr Sanat Kumar Das	*Bose Institute, Kolkata, India*

Local Organizing Committee

Prof Sibaji Raha, *Bose Institute, India (**Chairman**)*

Prof Sanjay K Ghosh	*Bose Institute, India*	**Mr** Vivek Gurung	*Bose Institute, India*
Dr Amitabha Mitra	*Bose Institute, India*	**Dr** Debajyoti Ray	*Bose Institute, India*
Dr Ajay K Singh	*Bose Institute, India*	**Dr** Chirantan Sarkar	*Bose Institute, India*
Dr Abhijit Chatterjee	*Bose Institute, India*	**Mr** Arindam Roy	*Bose Institute, India*
Dr Sanat Kumar Das	*Bose Institute, India*	**Mr** Abhinandan Ghosh	*Bose Institute, India*
Mr Soumendra Singh	*Bose Institute, India*	**Miss** Tanusree Mukherjee	*Bose Institute, India*
Dr Anandamay Adak	*Bose Institute, India*	**Mr** Arun K. Dasgupta	*Bose Institute, India*
Mrs Yashodhara Yadav	*Bose Institute, India*	**Mr** Deo Kumar Roy	*Bose Institute, India*
Mr Sabyasachi Majee	*Bose Institute, India*	**Mr** Kanak Baran Hazra	*Bose Institute, India*

Convener

Dr Abhijit Chatterjee, *Bose Institute, India*

Joint Convener

Dr Sanat Kumar Das, *Bose Institute, India*

Chairman, Centenary Celebration Committee

Prof Dipankar Home, *Bose Institute, India*

Treasurer

Accounts Officer, Bose Institute

About the Conference....

On behalf of the organizing team, it is our great pleasure to extend a warm welcome to all the distinguished participants especially to young scientists, faculties, research students/scholars attending the **International Conference on Aerosol Climate Change Connection (AC3)** at the Darjeeling campus of the prestigious and one of the oldest premiere scientist research organizations in the world, Bose Institute, founded by Acharya Sir J. C. Bose in the year 1917.

Bose Institute is celebrating its centenary year through various year-long programmes covering all the disciplines the institute is engaged on. As a part of this centenary celebration and to commemorate its 100th birth day, we are holding this International Conference during 25-27 April, 2017.

Out of the various programs in the institute, a new facility came up at Darjeeling at eastern part of Himalaya in India, at an altitude of 2200 meter (amsl) in the year of 2005 focusing on the research in Astroparticle Physics and Space Science over eastern Himalaya in India. The major area of research under this program has been the long-term ground based measurements of various atmospheric physical and chemical parameters. Over the years, Bose Institute has been able to make this facility a prime research centre on atmospheric and space science as a long-term monitoring station to monitor various atmospheric and weather parameters. The facility at Darjeeling campus has been working day and night to understand the "airspace environment and climate change" which remained unexplored over this part of Himalaya.

Climate change is no longer a distant threat now but a reality and we are indeed experiencing the impact of human-induced global warming on the geological, biological and ecological systems. We are experiencing the increase in extreme weather events and poor air quality. Thus climate change is not just an environmental issue but has much wider implications and the impact is much stronger over the Himalayas. Standing at such a position, holding an international conference on Aerosol Climate Change Connection is of great importance and relevance.

This international conference will be focused on the discussions on the emerging trends in recent aerosol science researches and the new insights on the role of aerosols on climate change by bringing aerosol science community from across the country as well as the Globe together at this part of majestic environment of Himalaya. In this three-day conference six major topics will be discussed; optical and radiative properties of aerosols, remote sensing of aerosols, formation, transport and deposition of carbonaceous aerosols, role of aerosols on clouds and precipitation, chemical characterization of aerosols and aerosols and Himalayan climate.

We have received a good number of abstracts from India and abroad which made us proud and thankful for the wide recognition of the conference. We expect that exciting current results and novel developments will be presented by the keynote/invited speakers as well as other participants. This assembly of renowned and pioneering scientists from India and abroad will certainly be an exciting, stimulating and encouraging event for young scientists, research scholars and students.

We express our deepest gratitude to all of them who made this conference exciting and successful. We deeply thank Prof. Siddhartha Roy, Director of Bose Institute, for his kind support. Our heartfelt thanks to Prof Sibaji Raha, the former Director of Bose Institute and The Chairman of the AC3 conference for his encouragement and continuous support. We would also like to thank Prof Dipankar Home, Chairman of Centenary Celebration Committee, Bose Institute for his support. We are thankful to Department of Science and Technology, Government of India to provide major funding for the conference to organize this conference as a part of the centenary celebration of Bose Institute. Thanks to our corporate national and multinational sectors for their generous support. We would like to thank the keynote and invited speakers who have accepted our invitation to deliver the lectures. We thank all the other participants who have showed their interests and shared their current research results. We deeply thank all the scientific, technical and other academic and non-academic members of Environmental Sciences Section and Center for Astroparticle Physics and Space Sciences of Bose Institute for their continuous effort to make this event a grand success.

We welcome you all to Darjeeling, the Queen of Hills and wish a pleasant and enjoyable period with Khangchendzonga, the majestic Himalayan peak over the three-day conference.

Thank you all.....

Organizing Team
AC3 Conference
Bose Institute
Darjeeling
India

CONTENTS

INVITED TALKS

CP-17

LONG TERM SATELLITE BASED STUDY ON AEROSOL AND TRACE GASES OVER CAPITAL CITY OF ASSAM, GUWAHATI

Jhuma Biswas

Department of Physics, Birjhora Mahavidyalaya, Bongaigaon, Assam, India

Keywords: AOD, MODIS, TRACE GASES, GIOVANNI.

INTRODUCTION

Atmospheric aerosol particles are suspensions of solid, liquid otherwise mixed particles with large inhomogenity in their size distribution and chemical composition. To understand the climatic effects of aerosols, it is necessary to understand their chemical composition and physical as well as optical properties over a key location of interest. The entire attenuation of direct solar radiation in a vertical column of air due to scattering and absorption properties of aerosol particles is describe by the term called Aerosol Optical Depth (AOD). Proper evaluations of aerosols in addition to trace gases are necessary for the in progress global climate simulations because they play as vital components for Earth's climate change process. Global monitoring of aerosols from space by using satellites provides a unique chance to study the effects of pollutants in different areas over the Earth's surface. The main goal of the present study is to assess the spatio-temporal distributions of AOD and trace gases and their inter relation over capital city of Assam, India for the period, October, 2004 to December, 2016.

METHODS

MODIS sensor on board the NASA Earth Observing System (EOS) Terra and Aqua satellite based AOD data and OMI on board NASA EOS Aura satellite based trace gases data are used for the period of October, 2004-March, 2016 over Guwahati. Meteorological data has been obtained from TRMM and ARIS. All the necessary data sets are obtained from the Giovanni web service (http://disc.sci.gsfc.nasa.gov/giovanni), which provides a vary simple way to visualize, examine as well as access enormous amounts of Earth science remote sensing data. For this study, the monthly mean level-3 collection-6 MODIS AOD data on a 1°×1° latitude-longitude grid along with daily mean OMI level-3 NO_2 tropospheric column and SO_2 column amount (Planetary Boundary Layer) data at a spatial resolution of 0.25° has been used.

RESULTS

The monthly variation of AOD at 550 nm and rainfall (April-September) over Guwahati for the period October 2004 to December 2016 is shown in Figure:1. The seasonal variation of AOD shows highest value during the pre-monsoon (Mar-May) season due to the intense biomass burning activities and lowest in post-monsoon (Oct-Nov) season over the study location mainly due to wash out of aerosols by rain in the preceding months without sufficient replacement. From the Figure:1 it is clearly seen that there is a slidly increasing trend of AOD whereas the monthly rainfall from the pre-monsoon to monsoon