A Hybrid Approach to Develop Time-Space Resolved Estimates of Air Quality

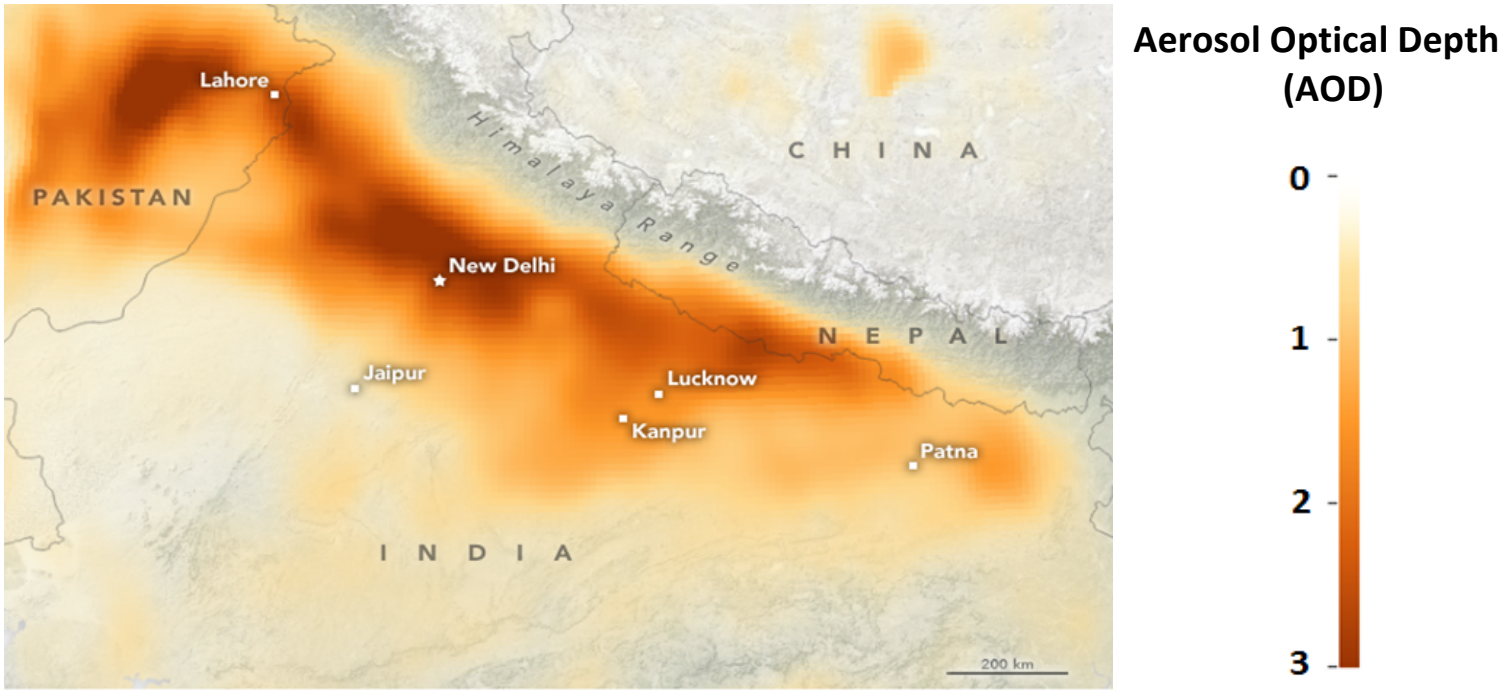
GLOBAL INITIATIVE OF ACADEMIC NETWORK (GIAN)-2018

18-22 June 2018

School of Environmental Sciences
Jawaharlal Nehru University
New Delhi

Overview

Air quality in developed countries has improved dramatically during the past several decades e.g. US witnessed a 41% decline in levels of fine particles ≤ 2.5 μm in aerodynamic diameter ($PM_{2.5}$) since the enforcement of the Clean Air Act. However, air quality in developing countries, especially in their megacities, has deteriorated to the levels of public health hazards. For example, Delhi, the capital of India, was found the most polluted city in the world in terms of levels of $PM_{2.5}$. The annual average concentration of $PM_{2.5}$ in Delhi in 2014 was 153 $\mu g/m^3$, six times higher than the WHO standards. Deteriorating air quality in Delhi has been such a public health concern that it has drawn the attention of media and required international cooperation. In a joint statement on January 15, 2015 Prime Minister Modi and President Obama agreed to develop cooperative efforts to study the impacts of environmental pollutants on human health and well-being; on January 25, 2015, the US Government committed to implement EPA's AIRNow-International program and megacities partnerships, focusing on the dissemination information to help urban residents reduce their exposure to harmful levels of air pollution, and enable urban policy planners to implement corrective strategies for improving ambient air quality in cities. While EPA's AIRNow-International Program is operational in the American Embassy in several cities in India, air pollution monitoring in India is very sparse, constraining the ability of decision-makers and researchers either to quantify the burden of disease/disability associated with air pollution or to undertake corrective measures, targeting areas with elevated levels of air pollution. Goal of this course to train graduate students, researchers and professionals in the state of the art hybrid approach to develop time-space resolved estimates of air pollution for the Indian sub-continent. This course will be offered by Dr. Naresh Kumar who has developed this hybrid approach and location- and time-specific estimates of air pollution for the National Capital Region (see ***precise.ccs.miami.edu/delhi***). Dr. Kumar has been working on air pollution, especially air pollution in/around Delhi, for the past two decades, and developed several novel approaches to quantify location- and time-specific estimates of air pollution, and associated health risk in real-time.



Objectives

Capitalizing on the principles of atmospheric remote sensing, in-situ (or ground) measurements and optimal interpolation techniques, this course will provide conceptual and theoretical understanding and practical skills in use and applications of state-of the-art hybrid approach to develop time-space resolved estimates of air pollution anywhere in the world. Course will include the following topics:

i. An introduction to the trends of air pollution and associated health and environmental impacts in developed and developing countries.
ii. Direct and indirect approaches to quantify air pollution.
iii. An introduction to atmospheric remote sensing to quantify 3D distribution of aerosols at local, regional and global scales.
iv. Use of satellite data to develop daily estimates of aerosol optical depth (AOD) at different spatial resolutions: 1 km, 2.5km, 5km and 10km.
v. Empirical methods to derive fine particulate matter ≤ 2.5 μm in aerodynamic diameter (PM2.5) using satellite data and meteorological conditions.
vi. Local time-space Kriging to quantify location-time specific estimates of exposure.
vii. A critical review of the hybrid approach and future directions for air pollution science.

Who can attend?

Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.

Students at all levels (BS/BTech/MSc/M.Phil/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.

Lecture Schedule

Everyday there will be two lectures (one hour each) and 1 tutorial (2 hours) as per the format. 60% of lectures and tutorial will be delivered by the guest faculty whilst 40% by the host. Some laboratory and field sessions will also be conducted

DATE	LECTURE (18-22 June 2018)
Day 1 **18 June 2018**	Introduction to air pollution, sources, types and composition, trends of air pollution and its associated health and environmental impacts
Day 2 **19 June 2018**	Develop an understanding of and skills in acquiring, processing and analysing data from different sources, including satellites
Day 3 **20 June 2018**	Develop an understanding and skills in estimating location and time-space estimates of air pollution
Day 4 **21 June 2018**	Understand the limitations of current approaches to assess air pollution estimates and need for research and development in air pollution science.
Day 5 **22 June 2018**	Air pollution surveillance and health effects of air pollution, especially in Delhi and other cities where air pollution has become a health hazard

Date of Examination: Will be followed after the completion of the course

GUEST FACULTY

Naresh Kumar, Ph.D.
Associate Professor of Environmental Health, Department of Public Health Sciences, University of Miami, Miami (USA).
He specializes in spatiotemporal modelling and prediction of air pollution, health effects of air pollution and real-time health risk surveillance.

HOST FACULTY

Arun Srivastava, Ph.D.
Assistant Professor of Air Pollution,
School of Environmental Sciences,
Jawaharlal Nehru University, New Delhi
He specializes in physical and chemical characteriztion of aerosols in space and time, source identification and health effects.

PREREGISTRATION AND FEES

Prior registration is mandatory for all students as per the procedure provided on GIAN web portal

JNU M. A. / M. Sc. Students	: Free
JNU M.Phil/Ph.D students	: ₹ 1000
JNU Faculty	: ₹ 2000
Students of other recognised institutions	: ₹ 2000
Faculty of other recognised institutions	: ₹ 4000
Industry, private institutes	: ₹ 10000
Participants from outside India	: ₹ 10000

Accommodation is the sole responsibility of the participant. A small number of rooms may be available on request.

Register at: http://www.gian.iitkgp.ac.in/GREGN/index (One time compulsory registration)
JNU-GIAN Website: http://www.jnu.ac.in/GIAN/ (to register for this course)

Venue: ADB Seminar Hall, SES, JNU, New Delhi (New campus)