9th INDIAN INTERNATIONAL CONFERENCE ON AIR QUALITY MANAGEMENT

MEASUREMENT, MODELLING, HEALTH RISK AND PUBLIC POLICY

16th – 20th December 2024

VENUE: T.T.J AUDITORIUM, IC & SR, IIT MADRAS

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About IICAQM

The Indian International Conference on Air Quality Management (IICAQM) serves as an important forum that offers opportunities to scientists, engineers, educators, and practitioners to share information on recent progress in theory, technology, modelling, and policy in the area of air quality management and health.

Air pollution is a cross-sectoral issue with emissions originating from diverse sources. Despite technological advances and continuous efforts from the research and scientific community and the government, air pollution remains one of India's most significant environmental threats. Particulate matter poses the biggest challenge, with emission levels continuously exceeding standards, particularly in urban areas. Also, ambient and household air pollution contributed significantly to millions of premature deaths in the country. Air pollutants, released into the atmosphere, undergo multiple atmospheric transformation processes as they are transported over long distances from their sources. They are responsible for adverse effects on human health, visibility, building materials, and ecosystems over spatial scales ranging from local to global. The impact of air pollutants on human health is governed by the toxicity of pollutants, exposure time, and exposure pathway. Therefore, there is an increasing need to manage air quality to minimize our exposure to toxic air pollutants.

The 1st (IICAQM 2016) and 3rd (IICAQM 2018) conferences were held at IIT Madras, the 2nd (IICAQM 2017) was held at IIT Delhi, the 4th (IICAQM 2019) at IIT Bombay, the 5th (IICAQM 2020) was hosted online by IIT Madras, and the 6th (IICAQM 2021) was hosted online by IIT Guwahati. We are delighted that the 7th IICAQM (2022) is hosted by IIT Madras in a hybrid mode. The 8th (IICAQM 2023) was held at IISc Bangalore. 9th IICAQM 2024 aims to bring together leading academicians, scientists, engineers, and research scholars to exchange and share their experiences and research results related to all aspects of air pollution health and exposure assessment and its management.

20 rigorously peer reviewed papers have been accepted for presentation. The conference includes 10 keynote addresses, 18 invited talks, in addition to paper, poster, and industry presentations. The conference proceedings will be published as a dedicated book chapter in Springer Nature India Private Limited.

The IICAQM 2024 would like to thank all the collaborating institutions, generous sponsors, colleagues, friends, staff, and students. Also the speakers, experts, delegates, and authors for their valuable contributions. We acknowledge the help of the eminent members of our scientific advisory board, the IICAQM 2024 organizing committee, and all the reviewers who supported the peer-review process. We hope that all the fellow participants will have fruitful and productive interactions during and after the conference.

The Editors,

Prof. Shiva Nagendra S.M., Indian Institute of Technology Madras (India)
Prof. Prashant Kumar, University of Surrey (United Kingdom)
Dr. Richard Ball, University of Bath (United Kingdom)
Prof. Sotiris Vardoulakis, University of Canberra (Australia)
Prof. Uwe Schlink, Helmholtz Centre for Environmental Research – UFZ (Germany)
Dr. Kraichat Tantrakarnapa, Mahidol University (Thailand)
Prof. Nguyen Thi Kim Oahn, Asian Institute of Technology (Thailand)

9th INDIAN INTERNATIONAL CONFERENCE AIR QUALITY MANAGEMENT IICAQM 2024

18th - 20th December 2024

Measurement, Modelling, Health Risk and Public Policy

Indian Institute of Technology (IITM)

University of Surrey (UoS), United Kingdom

University of Bath, United Kingdom

University of Canbera Australia

UFZ Helmholtz Centre for Environmental Research, Germany

Mahidol University, Thailand

Asian Institute of Technology, Thailand

CONFERENCE VENUE:

The conference will be held at the **Indian Institute of Technology (IIT) Madras**, Chennai, India. The campus is conveniently located at about 14 km from Chennai International Airport and 12 km from Chennai Central Railway Station.

CONFERENCE WEBSITE

https://iicaqm.in/
Email: iicaqmiitm@gmail.com
Alternate email:
iicaqm@wmail.iitm.ac.in

CONFERENCE COORDINATORS:

Prof. S.M. Shiva Nagendra, IIT Madras (India) Prof. Prashant Kumar, University of Surrey (UK) Dr. Richard Ball, University of Bath (UK) Prof. Sotiris Vardoulakis, University of Canberra (Australia) Prof. Uwe Schlink, UFZ Helmholtz Centre for Environmental Research (Germany) Dr. Kraichat Tantrakarnapa, Mahidol University (Thailand) Prof. Nguyen Thi Kim Oanh, Asian Institute of Technology (Thailand)

Contact Person

Prof. S.M. Shiva Nagendra, (Chairman IICAQM 2024) Department of Civil Engineering, Indian Institute of Technology Madras, Chennai -600 036

+91-44-22574290

snagendra@iitm.ac.in/iicaqmiitm@gmail.com

ABOUT ORGANIZING INSTITUTES

The Helmholtz Centre for Environmental Research (UFZ), founded in December 1991, is the only Helmholtz Association institute solely focused on environmental research. It operates in Leipzig, Halle, and Magdeburg.

The University of Canberra (UC), founded in 1967, is known for its practical, industry-focused education and research. Located in Australia's capital, it offers a wide range of programs in health, education, design, business, and IT, with strong ties to industry and government.

The University of Surrey's Global Centre for Clean Air Research (GCARE) conducts cutting-edge air quality research and fosters collaboration with national and international partners. It operates within the Department of Civil & Environmental Engineering

The University of Bath, established in 1966, is a top 10 UK university known for its research and teaching excellence. In the 2021 Research Excellence Framework, it ranked 25th for research quality and 28th for Research Power.

The Asian Institute of Technology (AIT) Founded in 1959, near Bangkok specializes in engineering, technology, and sustainable development. AIT ranked 2nd in Thailand for Engineering and Technology in the QS 2020 rankings

Mahidol University (MU), founded in 1888, is Thailand's leading research institution, offering 629 programs across multiple faculties and campuses. It was ranked the country's top university in the 2011 QS Asian University Rankings.

BACKGROUND

Rapid urbanization, industrial growth, and vehicle emissions have caused severe air quality issues. The WHO estimates over 2 million annual deaths from urban air pollution, especially in developing countries, with respiratory illnesses on the rise. Road transport is a major contributor, alongside domestic and industrial activities. Air pollution can spread from local to global scales, affecting human health, visibility, building materials, and ecosystems. Health impacts depend on pollutant toxicity, exposure time, and pathway, emphasizing the need for scientific assessment of toxic air pollutants.

INDIAN INTERNATIONAL CONFERENCE ON AIR QUALITY MANAGEMENT (IICAQM)

IICAQM serves as a very important forum and opportunity for scientists, engineers, educators, and practitioners to exchange the latest advancements in theories, technologies, and applications in the area of air quality management and health impacts. The 1st (IICAQM 2016), 3rd (IICAQM 2018) and 7th (IICAQM 2022) conferences were held at IIT Madras, the 2nd (IICAQM 2017) at IIT Delhi, the 4th (IICAQM 2019) at IIT Bombay, the 5th (IICAQM 2020) was hosted online by IIT Madras, the 6th (IICAQM 2021) was hosted in hybrid mode by IIT Guwahati and IIT Madras. The 8th (IICAQM 2023) was held at IISc Bangalore. 9th IICAQM 2024 aims to bring together leading academicians, scientists, engineers, and research scholars to exchange and share their experiences and research results related to all aspects of air pollution health and exposure assessment and its management.

BENEFITS OF ATTENDING IICAQM

The conference offers an excellent opportunity to exchange information amongst researchers working in academic institutions / R&D organizations, to present and publish research findings, and to interact with experts and partners from administration and industry.

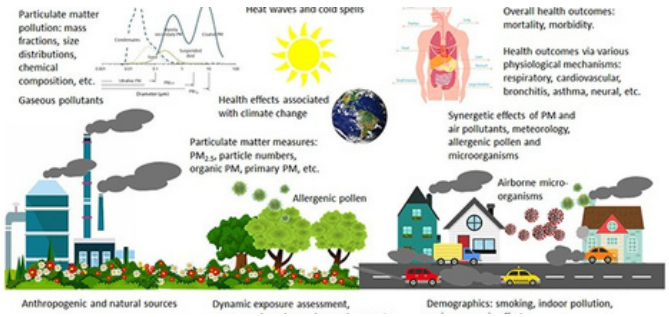
CALL FOR PAPERS

We welcome paper submissions that present new ideas, techniques, new management systems, and innovative applications that reflect the current breakthroughs in air quality management.

CONFERENCE TOPICS

The areas of interest to the conference are listed below. Full papers must be submitted by 30th September 2024 through the IICAQM website

- Air Quality Monitoring and Measuring Techniques
- Air Quality Modelling
- Emission Inventory
- Source Apportionment
- Source-receptor modeling
- Particulate matter, ultrafine particles, and black carbon in transport microenvironments
- Exposure Monitoring and Health Risk Assessment
- Indoor Air Quality
- Air Quality Management Policies and Legislation
- Air Quality Data Analytics
- Case Studies



REGISTRATION FEE*

Participation Type	ConferenceRate		
	Delegates	Authors	Students
SAARC Countries	INR 15,000	INR 7,500	**INR 5000 ***INR 7,500
Other Countries	EURO 175	EURO 175	EURO 175

*Registration fee includes an electronic copy of the IICAQM 2024 proceedings, conference kit, and refreshments. Students must provide a bonafide certificate. Your registration will not be processed without payment.

**INR 5000 for the students who are attending only conference and not presenting paper.

***INR 7500 for the students attending both conference and winter school.

Note: Accommodation only for students

IMPORTANT DATES

Submission of full-length paper:	30th September 2024
Submission of poster:	5th October 2024
Paper/poster acceptance/revision notification to authors:	30th October 2024
Submission of revised paper/poster along with registration fee:	15th November 2024
Conference dates:	18th - 20th December 2024

Registration link:

https://code.iitm.ac.in/code-programs/IICAQM2024/

INDIAN INTERNATIONAL CONFERENCE ON AIR QUALITY MANAGEMENT

9TH IICAQM WINTER SCHOOL

on "Receptor modelling and sensor applications in air quality management"

2024

Venue: Indian Institute of Technology, Madras

In the face of rapid urbanization and industrial growth, maintaining air quality has emerged as a crucial challenge. "Air Quality Modelling and Management" is a field dedicated to understanding, predicting, and mitigating air pollution's impacts on public health and the environment. By leveraging advanced computational models, scientists can simulate the dispersion of pollutants and forecast air quality under various scenarios. This enables policymakers and urban planners to implement effective strategies to reduce emissions and improve air quality. Join us at our conference to explore the latest innovations, methodologies, and policies in air quality management, and collaborate with experts dedicated to creating healthier, sustainable urban environments.

16 - 20 Dec

Online Registration:
https://code.iitm.ac.in/code-programs/IICAQM2024/

Register Now!

ELIGIBILITY:

Ph.D./M. Tech./M. Sc or Final year B.E./B. Tech. students from IITs/NITs/AICTE/UGC recognized colleges; Professionals working in Air Quality Management

(a) Students from IITs/IISc/NITs/AICTE/UGC recognized colleges: Registration fee is Rs. 7500/-.

(b) Participants from other organizations: Few seats are also available for participants from Industry, Government Departments, and Research Organizations. They have to pay Rs. 15,000/- per candidate as registration fee. This amount is to be sent along with the application form. All payments should be made online.

Registration fee includes an electronic copy of the lecture handouts, IICAQM 2024 proceedings, and conference kit. Students must provide a bonafide certificate. Your registration will not be processed without payment.

Module 1: Introduction to air quality modelling and management

1. Introduction to the principles and applications of air quality modelling, including the tools and methodologies.

2. Exploration of various air quality models, including urban, industrial, and rural settings.

3. Discussion on the essential Data Requirements and Input Parameters

4. Examination of Air Quality Management Strategies and policies.

Module 2: Air quality exposure assessment using wearable technology

1. Introduction to Wearable Technology for Air Quality Monitoring.

2. Types of Sensors and Their Applications in Air Quality Assessment.

3. Data Collection and Analysis Techniques Using Wearable Devices.

4. Challenges and Opportunities in Using Wearable Technology for Air Quality Monitoring.

Module 3: Receptor modelling for personal exposure

1. Introduction to Receptor Modelling

2. Types of Receptor Models

3. Application of Receptor Models in Air Pollution Studies

4. Limitations and Challenges in Receptor Modelling

Group Discussion: Evaluation of the effectiveness of receptor models in assessing personal exposure to air pollutants.

Module 4: Demonstration of Air, Noise & Water pollution monitoring

1. Introduction to air, noise, and water pollution monitoring techniques.

2. Air Pollution Monitoring Equipment.

3. Noise Pollution Monitoring Tools.

4. Water Pollution Monitoring Methods.

Module 5: Pre-conference workshop

1. Overview of workshop objectives and expected outcomes.

2. Hands-on sessions on data collection, analysis, and interpretation related to pollution studies.

3. Interactive discussions on current challenges and innovative solutions in environmental pollution management.

4. Preparation and guidance for presenting research findings at the upcoming conference.

Jointly Organized by:

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

UNIVERSITY OF SURREY

UNIVERSITY OF BATH

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH - UFZ

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ASIAN INSTITUTE OF TECHNOLOGY 1959

CONTACT PERSON:

Prof. S.M. Shiva Nagendra,
(Chairman IICAQM 2024)
Department of Civil Engineering,
Indian Institute of
Technology Madras, Chennai -600 036
P: +91-44-22574290
E: snagendra@iitm.ac.in/iicaqmiitm@gmail.com

WINTER SCHOOL
ON
RECEPTOR MODELLING AND SENSOR APPLICATIONS IN AIR QUALITY MANAGEMENT
16th – 17th December 2024

Day 1 of 2		
Monday, 16th December 2024		
Venue: Vishweshwaraya Seminar Hall (BSB 368), Department of Civil Engineering, Indian Institute of Technology Madras		
08:30 - 9:00	Registration & Orientation	
09:00-09:30	**Inaugural address** **Welcome address:** Dr. Tanushree Parsai, IIT Madras **Course overveiw:** Prof. Shiva Nagendra S M, IIT Madras & Prof. Uwe Schlink, Helmholtz Centre for Environmental Research - UFZ, Germany **Inaugural address:** Prof. Benny Raphael, Head, Department of Civil Engineering, IIT Madras	
09:30-09:45	Introduction of the Participants	
Module 1: Introduction to air quality monitoring and modelling		
09:45-10:30	Basics of air pollution, current challenges and opportunities (Online)	Prof. Shiva Nagendra S M, IIT Madras
10:30-11:15	Measurement of gaseous pollutants and particulate matter in ambient air	Prof. R Ravi Krishna, IIT Madras
11:15-11:30	Break	
11:30-12:15	India's policy landscape for combating air pollution (Online)	Prof. Mukesh Khare, IIT Delhi
12:15-13:00	Regional climate modelling and air quality	Dr. Chandan Sarangi, IIT Madras
13:00-14:00	Lunch Break	
Module 2: Air quality exposure assessment using wearable technology		
14:00-14:45	Introduction to wearable technology for air quality monitoring	Prof. Uwe Schlink, Helmholtz Centre for Environmental Research - UFZ, Germany
14:45-15:30	Data collection and analysis techniques using wearable devices	Prof. Uwe Schlink, Helmholtz Centre for Environmental Research - UFZ, Germany
15:30-15:45	Break	
15:45-16:30	Leveraging R for air quality management and analysis	Dr. Aswin Giri, IIT Madras
16:30-17:15	Introduction to noise pollution and its monitoring techniques	Ms. Lakshmi Pradeep, IIT Madras
17:15-18:00	Networking & research opportunities at IIT Madras	

Day 2 of 2		
Tuesday, 17th December 2024		
Venue: Vishweshwaraya Seminar Hall (BSB 368), Department of Civil Engineering, Indian Institute of Technology Madras		
Module 3: Receptor modelling for personal exposure and health risk assessment		
09:00-09:45	Introduction to receptor modelling	Prof. Shiva Nagendra S M, IIT Madras
09:45-10:30	Types of receptor models & its application in air pollution studies	Prof. Uwe Schlink, Helmholtz Centre for Environmental Research - UFZ, Germany
10:30-11:15	Air pollution: From sampling to analysis	Dr. Arul Veerappan, NYU Langone Health
11:15-11:30	Break	
11:30-12:15	Forest fires and public health: Understanding the risks and consequences	Dr. Tanushree Parsai, IIT Madras
12:15-13:00	**Group Discussion** Air pollution monitoring, source identification, exposure and health risk assessment	
13:00-14:00	Lunch Break	
Module 4: Demonstration of Air & Noise pollution monitoring		
14:00-15:30	Demonstration of air and noise monitoring instruments	Dr. Senthilkumar, TNPCB Ms. Chaithra S, Mr. Vijayakumar, Dr. Ezhilkumar, Mr. Debabrat Biswal, Ms. Lakshmi Pradeep, Dr. Aswin Giri IIT Madras
15:30-15:45	Break	
Module 5: Pre-conference workshop		
15:45-17:30	Pre-Conference workshop on 'Scientific writing: Hints and tips'	Ms. Neha Sharma, Springer
17:30-18:00	Networking & research opportunities at Organising Institutes	

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IICAQM-2022
MEASUREMENT, MODELLING, HEALTH RISK AND PUBLIC POLICY
18th – 20th December 2024

Day 1 of 3		
Wednesday, 18th December 2024		
Venue T.T.J Auditorium, IC&SR, Indian Institute of Technology Madras		
08:30 - 9:30	Registration & Orientation	
09:30-10:00	**Inaugural address** **Welcome address:** Prof. Shiva Nagendra S M, IIT Madras **About conference:** Prof. Uwe Schlink, Helmholtz Centre for Environmental Research - UFZ, Germany **Inaugural address:** Dr. Jayanthi M I.F.S., Chairperson, TNPCB **Address by Guest of Honour:** Dr. E Theranirajan, Dean, Madras Medical College **Presidential address:** Prof. V Kamakoti, Director, IIT Madras **Closing remarks:** Prof. Sotiris Vardoulakis, University of Canberra, Australia	
10:00-10:30	**Felicitation "Air Quality Management Lifetime Achievement Award"** **About the award:** Prof. Gufran Beig, NIAS, Bengaluru **Introduction of awardee:** Prof. Prashant Kumar, University of Surrey, UK **Awardee acceptance speech:** AQMLTA awardee 2023 - Shri. S K Gupta, Envirotech Instruments Pvt. Ltd. AQMLTA awardee 2024 - Prof. Virendra Sethi, IIT Bombay **Moderator:** Prof. Shiva Nagendra, IIT Madras	
10:30-11:00	**Keynote Address 1:** Challenges in protection and improvement of air quality management in India	Shri. S K Gupta, Envirotech Instruments Pvt. Ltd.
11:00-11:30	**Keynote Address 2:** Role of academia and research in Environmental Protection – Some thoughts	Prof. Virendra Sethi, IIT Bombay
11:30-11:45	Break	
	INVITED TALKS Chair: Prof. Sotiris Vardoulakis (University of Canberra, Australia) Rapporteur: Dr. Aswin Giri (IIT Madras)	
11:45-12:05	**Invited Talk 1:** Health effects of air pollution: Going beyond particle mass concentrations	Prof. Harish Phuleria, IIT Bombay
12:05-12:25	**Invited Talk 2:** Monitoring temperature and humidity in UK theatres (Online)	Dr. Richard J Ball, University of Bath, UK
	TECHNICAL SESSION I: Air quality measurement and monitoring Chair: Prof. Uwe Schlink (Helmholtz Centre for Environmental Research - UFZ, Germany) Rapporteur: Ms. Lakshmi Pradeep (IIT Madras)	
12:25-12:40	**Paper 1:** Development of air quality monitoring web application using Google Earth engine	Abhimanyu Kumar Gond, IIT (BHU) Varanasi
12:40-12:55	**Paper 2:** Mitigating humidity interference in PM2.5 measurement using heated inlet with laser scattering technology	Kruti Davda, Oizom Instruments Pvt. Ltd.
12:55-13:10	**Paper 3:** A remote sensing approach to analyze impact of crop residue burning on urban air quality using fire characteristics and PM2.5 to CO ratio	Sayeed Anwar, IIT Roorkee

13:10-13:25	**Paper 4:** Bench-scale study for control of dust resuspension from playgrounds and material stockpiles using dust suppressants	Umangi Mehta, IIT Bombay
13:25-14:30	Lunch Break	
	INVITED TALKS Chair: Prof. Virendra Sethi (IIT Bombay) Rapporteur: Dr. M R EzhilKumar (IIT Madras)	
14:30-15:00	**Keynote Address 3:** We All Breathe the Same Air	Prof. Prashant Kumar, University of Surrey, UK
15:00-15:30	**Keynote Address 4:** Recognizing environmental stressors with the help of wearables	Prof. Uwe Schlink, Helmholtz Centre for Environmental Research - UFZ, Germany
15:30-15:50	**Invited Talk 3:** Dispersion Modeling Analyses of Air Emissions from Accidental Release of Hazardous Chemicals in Southern Louisiana	Prof. Kuruvilla John, University of North Texas, USA
15:50-16:10	**Invited Talk 4:** Urban air pollution monitoring using drone mounted low-cost particulate matter sensor	Dr. Ajit Ahlawat, Delft University of Technology, Netherlands
16:10-16:30	Break	
	TECHNICAL SESSION I conti.: Air quality measurement and monitoring Chair: Prof. Gufran Beig (National Institute of Advanced Studies, Bengaluru) Rapporteur: Mr. Shoumick Mitra (IIT Madras)	
16:30-16:45	**Paper 5:** Temperature and relative humidity driving ozone levels at Kharagpur, India	Samrat Santra, IIT Roorkee
16:45-17:00	**Paper 6:** Annual variations of air quality parameters at the Kalpakkam nuclear power plant site (East coast of India)	M. Sowmya, Indira Gandhi Centre for Atomic Research
17:00-17:15	**Paper 7:** Seasonal and diurnal variations of PM2.5 and ozone in Bangalore: Impact of meteorological factors on air quality	H N Sowmya, Dayananda Sagar College of Engineering
17:15-17:30	**Paper 8:** Real-Time Dust Monitoring for Metro Construction with Low-Cost Sensors	Sailee Redekar, Sinhgad College of Engineering
17:30-19:00	**Poster Presentation Session: Elevator Pitch** Exhibition Hall, ICSR **Chairs:** Dr. Kraichat Tantrakarnapa (Mahidol University, Thailand), Prof. Sotiris Vardoulakis (University of Canberra, Australia), Prof. Uwe Schlink (Helmholtz Centre for Environmental Research - UFZ, Germany), Prof. Prashant Kumar (University of Surrey, UK) & Prof. Harish Phuleria (IIT Bombay)	
19:30-21:00	Conference Dinner Venue: AC Dining Hall, ICSR	
	Day 2 of 3	
	Thursday, 19th December 2024	
	Venue T.T.J Auditorium, IC&SR, Indian Institute of Technology Madras	
	INVITED TALKS Chair: Prof. Prashant Kumar (University of Surrey, UK) Rapporteur: Mr. Saket Ranjan (IIT Madras)	

09:00-09:30	**Keynote Address 5:** Quantitative assessment of emission source contributions to ambient air pollution (Online)	Prof. Nguyen Thi Kim Oanh, Asian Institute of Technology, Thailand
09:30-10:00	**Keynote Address 6:** Estimating particulate emissions from roads (Online)	Prof. Akula Venkatram, University of California, Riverside, USA
10:00-10:20	**Invited Talk 5:** Micro(nano)plastics particles in the air and its implications to human health	Prof. Thava Palanisami, The University of Newcastle, Australia
10:20-10:40	**Invited Talk 6:** Air pollution and trace elements	Dr. Arul Veerappan, NYU Langone Health, New York
10:40-11:00	**Invited Talk 7:** Sensor network optimization, source mapping with inverse modelling and real-time air quality forecasting using advanced CFD based tools	Mr. Sreejith K V, Fluidyn Consultancy Pvt. Ltd.
11:00-11:15	Break	
	TECHNICAL SESSION II: Air quality modelling and machine learning approaches Chair: Dr. Kraichat Tantrakarnapa (Mahidol University) Rapporteur: Mr. Sarup Das (IIT Madras)	
11:15-11:30	**Paper 9:** Chemical characterization and source apportionment of PM10: A case study of Silchar, Assam	Himanshu Gupta , IIT Guwahati
11:30-11:45	**Paper 10:** Forecasting PM2.5 levels using ARIMA: Insights from temporal data analysis	Aishi Nath, NIT Meghalaya
11:45-12:00	**Paper 11:** Influence of building configurations on airflow, dispersion and ventilation of traffic emissions in urban street canyons-A CFD approach	Namrata Mishra, IIT Kharagpur
12:00-12:15	**Paper 12:** Deep learning based brick kiln detection using SENTINEL-2 imagery.	Avinash Mehta, IIT Roorkee
12:15-12:30	**Paper 13:** Particulate Matter (PM2.5), Temperature, and Humidity Interactions: Comparing Multiple Linear Regression and Machine Learning Models in Urban Areas	Rochitra Keisham, Manipur University
12:30-12:45	**Paper 14:** Machine learning imputation techniques for optimum air quality index predictions	Salvator Lawrence, VIT
12:45-13:00	**Paper 15:** A comparative source apportionment studies at five cities of India and air pollution control technologies	Nidhi Verma, IIT Madras
13:00-14:00	Lunch Break	
	INVITED TALKS Chair: Prof. Priya Rajagopalan (RMIT University, Australia) Rapporteur: Mr. Manjunath S P (IIT Madras)	
14:00-14:30	**Keynote Address 7:** Gaps and limitation in air quality management in India - Suggestive steps to be taken to improve air quality	Dr. B Sengupta, Ex-Member Secretary, CPCB
14:30-15:00	**Keynote Address 8:** Air quality resource framework of India	Prof. Gufran Beig, NIAS, Bengaluru
15:00-15:20	**Invited Talk 8:** International environmental governance and its influence on Air Quality Management in India	Dr. Ajay Deshpande, IIT Bombay
15:20-15:40	**Invited Talk 9:** Aerosol bioparticles exposure and health risk assessment at landfill site in Nagpur	Dr. Krishnamurthi Kannan, CSIR-NEERI
15:40-16:00	Break	

	Stakeholder Engagement Workshop Chairs: Dr. B. Sengupta (CPCB), Prof. Sotiris Vardoulakis (University of Canberra, Australia), Prof. Prashant Kumar (University of Surrey, UK), & Prof. Uwe Schlink (Helmholtz Centre for Environmental Research - UFZ, Germany) Moderators: Prof. Shiva Nagendra (IIT Madras) & Sree Kumar Kumaraswamy (WRI)	
16:00-16:20	**Invited Talk 10:** Air quality management perspectives from ACAAS program: Context setting presentation	Dr. Prakash Doraiswamy, World Resources Institute (WRI), India
16:20-16:40	**Invited Talk 11:** Role of IIT Madras as Institute of Repute in National Clean Air Programme	Prof. Shiva Nagendra, IIT Madras
16:40-17:00	**Invited Talk 12: Experience and challenges in managing air quality in selected million plus cities**	City representatives
17:00-18:00	**Panel discussion** on '**Informing Policies with Science: How can Cities Prepare for NCAP 2.0?**'	

Day 3 of 3

Friday, 20th December 2024		
Venue T.T.J Auditorium, IC&SR, Indian Institute of Technology Madras		
	Workshop on 'Indoor Air Quality' Chair: Prof. Shiva Nagendra (IIT Madras) Rapporteur: Ms. Chaithra S (IIT Madras)	
09:00-09:30	**Keynote Address 9:** Clean Energy for Healthy Environments and Lives: Climate, air quality and health co-benefits	Prof. Sotiris Vardoulakis, University of Canberra, Australia
09:30-10:00	**Keynote Address 10:** Integrative approaches to combat air pollution and health impacts through One Health	Dr. Kraichat Tantrakarnapa, Mahidol University, Thailand
10:00-10:20	**Invited Talk 13:** Ventilation retrofitting for improving indoor air quality	Prof. Priya Rajagopalan, RMIT University, Australia
10:20-10:40	**Invited Talk 14:** Adverse health effects of air pollution	Dr. Anant Mohan, AIIMS
10:40-11:00	**Invited Talk 15:** Impact of daily Air Quality Index information and monitoring on air pollution awareness and respiratory health: A randomized pilot study	Dr. A Chitra, Madras Medical College
11:00-11:15	**Invited Talk 16:** Characteristics of particulate matter resuspension due to human activities in indoor environments	Dr. Chithra V S, Centre for Water Resources Development and Management
11:15-11:30	**Invited Talk 17:** Particulate Matter (PM10) bound Microplastics in urban area and its associated health risks	Dr. Lekshmi V Mohan, NIT Trichy
11:30-11:45	Break	
	TECHNICAL SESSION III: Air quality health impacts and policy interventions Chair: Dr. Anant Mohan (AIIMS) Rapporteur: Debabrat Biswal (IIT Madras)	
11:45-12:00	**Paper 16:** Association of urinary metabolites of carcinogenic pollutants with cognitive function among adult population of West Bengal, India: A cross-sectional study	Anupa Yadav , ICMR - Centre for Ageing and Mental Health
12:00-12:15	**Paper 17:** Solar Microgrids to Combat Household Air Pollution in Rural India: A Case Study	Gopika Indu, University of Canberra

12:15-12:30	**Paper 18:** Health impact assessment of road traffic noise in two Indian cities	Lakshmi Pradeep, IIT Madras
12:30-12:45	**Paper 19:** Factors affecting road dust and control measures: A review	Sourav Mishra, IIT (Indian School of Mines), Dhanbad
12:45-13:00	**Paper 20:** Indoor air quality assesment and monitoring of newly constructed classrooms in VVCE campus using IoT	Shilpa B S, Vidyavardhaka College of Engineering
13:00-14:00	Lunch Break	
14:00-15:00	**Air Quality Management Lecture Series**	Dr. K V George, NEERI
15:00-16:00	**Panel Discussion** on '**Urban air quality management: Can artifical intelligence replace human intelligence?** ' Prof. Sotiris Vardoulakis (University of Canberra, Australia), Prof. Prashant Kumar (University of Surrey, UK), Dr. Kraichat Tantrakarnapa (Mahidol University, Thailand), Prof. Uwe Schlink (Helmholtz Centre for Environmental Research - UFZ, Germany), Dr. B. Sengupta (CPCB), Dr. Arul Veerappan (NYU Langone Health, New York), Prof. Priya Rajagopalan (RMIT University, Australia) & Dr. Anant Mohan, AIIMS Moderator: Prof. Shiva Nagendra	
	Closing ceremony	
16:00-17:00	Valedictory function & Prize distribution	
17:00-18:00	High Tea	

CONTENTS

17.	Dr. Krishnamurthi Kannan, CSIR-NEERI	*Aerosol bioparticles exposure and health risk assessment at landfill site in Nagpur*
18.	Dr. Prakash Doraiswamy, World Resources Institute (WRI), India	*Air quality management perspectives from ACAAS program: Context setting presentation*
19.	Prof. Shiva Nagendra, IIT Madras	*Role of IIT Madras as Institute of Repute in National Clean Air Programme*
20.	Prof. Sotiris Vardoulakis, University of Canberra	*Clean Energy for Healthy Environments and Lives: Climate, air quality and health co-benefits*
21.	Dr. Kraichat Tantrakarnapa, Mahidol University	*Integrative approaches to combat air pollution and health impacts through One Health*
22.	Prof. Priya Rajagopalan, RMIT University, Australia	*Ventilation retrofitting for improving indoor air quality*
23.	Dr. Anant Mohan, AIIMS	*Adverse health effects of air pollution*
24.	Dr. A Chitra, Madras Medical College	*Impact of daily Air Quality Index information and monitoring on air pollution awareness and respiratory health: A randomized pilot study*
25.	Dr. Chithra V S, Centre for Water Resources Development and Management	*Characteristics of particulate matter resuspension due to human activities in indoor environments*
26.	Dr. Lekshmi V Mohan NIT Trichy	*Particulate Matter (PM10) bound Microplastics in urban area and its associated health risks*
Technical presentations		
Technical Session I: Air quality measurement and monitoring		
27.	Abhimanyu Kumar Gond	*Development of air quality monitoring web application using Google Earth engine*
28.	Kruti Davda	*Mitigating humidity interference in $PM_{2.5}$ measurement using heated inlet with laser scattering technology*
29.	Sayeed Anwar	*A remote sensing approach to analyze impact of crop residue burning on urban air quality using fire characteristics and PM2.5 to CO ratio*
30.	Umangi Mehta	*Bench-scale study for control of dust resuspension from playgrounds and material stockpiles using dust suppressants*
31.	Samrat Santra	*Temperature and relative humidity driving ozone levels at Kharagpur, India*
32.	Sowmya M	*Annual variations of air quality parameters at the Kalpakkam nuclear power plant site (East coast of India)*

33.	Sowmya H N	*Seasonal and diurnal variations of PM2.5 and ozone in Bangalore: Impact of meteorological factors on air quality*
34.	Sailee Redekar	*Real-Time Dust Monitoring for Metro Construction with Low-Cost Sensors*
Technical Session II: Air quality modelling and machine learning approaches		
35.	Himanshu Gupta	*Chemical characterization and source apportionment of PM10: A case study of Silchar, Assam*
36.	Aishi Nath	*Forecasting PM2.5 levels using ARIMA: Insights from temporal data analysis*
37.	Namrata Mishra	*Influence of building configurations on airflow, dispersion and ventilation of traffic emissions in urban street canyons-A CFD approach*
38.	Avinash Mehta	*Deep learning based brick kiln detection using SENTINEL-2 imagery*
39.	Rochitra Keisham	*Particulate Matter (PM2.5), Temperature, and Humidity Interactions: Comparing Multiple Linear Regression and Machine Learning Models in Urban Areas*
40.	Salvator Lawrence	*Machine learning imputation techniques for optimum air quality index predictions*
41.	Nidhi Verma	*A comparative source apportionment studies at five cities and air pollution control technologies*
Technical Session III: Air quality health impacts and policy interventions		
42.	Anupa Yadav	*Association of urinary metabolites of carcinogenic pollutants with cognitive function among adult population of West Bengal, India: A cross-sectional study*
43.	Gopika Indu	*Solar Microgrids to Combat Household Air Pollution in Rural India: A Case Study*
44.	Lakshmi Pradeep	*Health impact assessment of road traffic noise in two Indian cities*
45.	Sourav Mishra	*Factors affecting road dust and control measures: A review*
46.	Shilpa B S	*Indoor air quality assessment and monitoring of newly constructed classrooms in VVCE campus using IoT*

WINTER SCHOOL

ON

RECEPTOR MODELLING AND SENSOR APPLICATIONS IN AIR QUALITY MANAGEMENT

Invited Talks

Basics of air pollution, current challenges and opportunities

Prof. Shiva Nagendra S M
IIT Madras

Speakers Profile:

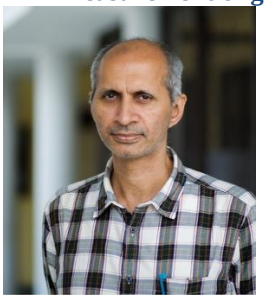
Dr. Shiva Nagendra SM is presently working as Professor in Department of Civil Engineering, Indian Institute of Technology Madras (IITM), Chennai, India. He is Chairman GATE, JAM 2025, IIT Madras. He has more than 24 years' experience in research, teaching, consultancy and community development. He has published more than 100 research publications in international and national refereed journals, two reference book, more than 100 papers in conferences and three patents. He is author of books titled 'Urban Air Quality Monitoring, Modelling and Human Exposure Assessment' (ISBN:978-981-15-5511-4) and 'Artificial Neural Networks in Vehicular Pollution Modelling' (SCI-41, ISBN-10: 3-540-37417-5) published by Springer. He is associate editor of the journal Frontiers in Sustainable Cities, Frontiers and Journal of the Institute of Engineers (India): Series A, Springer. He also edited seven conference proceedings. He is Director of Clean Environment for Planetary Health in Asia (CEPHA) Network supported by UKRI. He is founder chairman of Indian International Conference on Air Quality Management (IICAQM) series and founder President of Air Quality Management Association (AQMA). He has been part of numerous grants involving multiple national and international partners. Much of his research interests focus on air quality management which includes monitoring, source apportionment, modelling, design and development of emission control system, development of air quality management system, personal exposure monitoring, environmental impact assessment, outdoor-indoor air pollution relationships and indoor air quality management. He is WHO subject matter expert in a global technical consultation on the transmission of respiratory pathogens through the air. He also is a professional member of several technical institutions and organizations of India.

Abstract of the talk:

Air pollution is a serious social and environmental problem around the world. Urban air pollution is one of the major issues in India. Air quality in the urban area is deteriorating due to complex interactions between source emissions, poor dispersion conditions, and increased urban warming. In cities, wide variety of sources contribute to air pollutants. Among these, the single major source of air pollutants in cities is vehicular exhaust emissions. The poor air quality in urban areas impacts the health of the people. During peak traffic hours and poor meteorological conditions, increase in ambient pollutant concentrations results into episodic conditions at urban areas. This presentation will first introduce the basics of air pollution, air quality characteristics in urban areas followed by key components of urban air quality management plan.

Invited Talks

Measurement of gaseous pollutants and particulate matter in ambient air



Prof. R Ravi Krishna
IIT Madras

Speakers Profile:

R Ravi Krishna is currently a professor in the department of Chemical Engineering at the Indian Institute of Technology Madras, Chennai. His primary research interests are in the assessment of the fate and transport of constituents in the environment. Specifically, the interest is in the measurement and modeling of mass fluxes across environmental interfaces. Problems of current interest include the release of bioaerosols from solid waste; propagation of antimicrobial resistance in the environment; dynamics of aerosols in dense urban traffic; and the design of hybrid unit operations for waste treatment.

Abstract of the talk:

The talk will primarily focus on the various analytical methods available for the assessment of gaseous pollutants and particulate matter in ambient air. Brief details of the physical basis of the methods and the interpretation of the data for different objectives will be discussed in brief. We will also look at both the physical and chemical analysis of the gaseous components and particulate matter and the appropriate sampling methods corresponding to the end use.

Invited Talks

India's policy landscape for combating air pollution

Prof. Mukesh Khare
IIT Delhi

Speakers Profile:

Dr. Mukesh Khare is a Professor Emeritus of Environmental Engineering in the Department of Civil Engineering at IIT Delhi. He is the Fellow of Institution of Engineers India and Fellow of Wessex Institute of Great Britain. He is a Chartered Engineer. He obtained his Ph.D. degree in the Faculty of Engineering from Newcastle University, UK and has managed a range of Environmental projects throughout his professional career. With a specialization in air quality modelling, Prof. Khare's experience has covered research and development studies, teaching, consulting, modelling, and editorial activities. In addition, Prof. Khare has authored more than 200 research publications, primarily for peer-reviewed journals and conference proceedings. Besides this, Prof. Khare has authored more than 5 books and contributed several chapters for various publishing houses in urban air quality monitoring, modelling and management. Recently in 2024, Prof. Khare with his co-authors has written a textbook on 'Air Pollution: Science, Engineering and Management fundamentals' published by CRC Press, Taylor and Francis. Prof. Khare has been serving as a member in High Level Task Force (HLTF) at Prime Minister Office. Prof. Khare has also been working as Member, Environmental Appraisal Committees (Infrastructure-I and Non-Coal Mining), Ministry of Environment and Forests and Climate Change, Government of India. Prof. Khare has also been in various Public Sector Undertakings as Director in their respective Boards of Director.

Abstract of the talk:

This presentation highlights India's multifaceted strategies to combat air pollution, emphasizing critical policies and initiatives. Key milestones include the Supreme Court's 1998 mandate for all public transport in Delhi to switch to Compressed Natural Gas (CNG) by April 2001, which significantly reduced vehicular emissions. Legislative frameworks like the Air (Prevention and Control of Pollution) Act and National Ambient Air Quality Standards (NAAQS) empower regulatory enforcement of pollution control measures across sectors. Prominent initiatives include the Graded Response Action Plan (GRAP) for managing air quality emergencies and the National Clean Air Programme (NCAP), a comprehensive, long-term strategy to enhance air quality nationally. Additionally, the National Air Quality Monitoring Programme (NAMP) provides real-time air quality data to inform public awareness and policymaking. Despite these efforts, gaps remain, particularly in data quality control and assurance (DQC/DQA). This presentation further evaluates the efficacy of current measures, identifies limitations, and suggests solutions to address these challenges, underscoring India's commitment to tackling air pollution and its associated health impacts.

Invited Talks

Regional climate modelling

Dr. Chandan Sarangi
IIT Madras

Speakers Profile:

Chandan Sarangi is an Assistant Professor at the Department of Civil Engineering, IIT Madras, Chennai, Tamil Nadu, India. He completed his Post Doctorate Research from the Pacific Northwest National Laboratory (PNNL), Richland, WA, USA, and Integrated Ph.D. from IIT Kanpur, India. He has extensive experience in Aerosol-cloud-climate interactions; Impact of climate change on Cloud systems and rainfall; Impact of aerosols on Evapotranspiration and land-atmosphere interactions; Effect of dust deposition on snow darkening and Himalayan glaciers; Urban heat island effect and air quality over megacities; Extreme rainfall and coupling with aerosols and urbanization, and Cloud seeding research. He has been part of many cutting-edge research teams and have published first author papers in many reputed and high impact journals like Nature Communications, Nature Climate Change, NPJ Climatic and Atmospheric Sciences, Geophysical Research Letters, Atmospheric Chemistry and Physics etc. More details about him and his research work can be found at https://civil.iitm.ac.in/faculty/chandansarangi/.

Abstract of the talk:

In this lecture, we will discuss about the fundamentals of regional coupled models where chemistry is simulated online with meteorology. We will emphasize on the inherent processes and feedback between atmospheric pollution and changing weather patterns using wildfires as example. Anthropogenic contribution to the overall fine particulate matter ($PM_{2.5}$) concentrations has been declining sharply in North America. In contrast, a steep rise in

wildfire-induced air pollution events with recent warming is evident in the region. Here, based on coupled fire–climate–ecosystem model simulations, summertime wildfire-induced $PM_{2.5}$ concentrations are projected to nearly double in North America by the mid-21st century compared to the present. More strikingly, the projected enhancement in fire-induced $PM_{2.5}$ ($\sim$ 1–2 $\mu g\, m^{-3}$) and its contribution ($\sim$ 15 %–20 %) to the total $PM_{2.5}$ are distinctively significant in the eastern US. This can be attributed to downwind transport of smoke from future enhancement of wildfires in North America to the eastern US and associated positive climatic feedback on $PM_{2.5}$, i.e., perturbations in circulation, atmospheric stability, and precipitation. Therefore, the anticipated reductions in $PM_{2.5}$ from regulatory controls on anthropogenic emissions could be significantly compromised in the future in the densely populated eastern US.

Invited Talks

Introduction to wearable technology for air quality monitoring

Prof. Uwe Schlink
Helmholtz Centre for Environmental Research - UFZ, Germany

Speakers Profile:

Dr. Uwe Schlink is a Senior Researcher at the Helmholtz Centre for Environmental Research (UFZ) in Leipzig, Germany, and Professor at University of Leipzig, Institute of Meteorology. He is heading the Research Group on "Urban climate and personal exposure" in the Department of Urban and Environmental Sociology at UFZ. His research areas include urban climate research, adaptation strategies, urban air quality, personal exposure, environmental health effects, and vulnerability with extreme environmental situations in urban areas, statistical modelling and Bayesian inference. He has published more than 60 articles in peer-reviewed international journals. He is an adjunct faculty at the Dept. of Civil Engineering of the IITM in Chennai and a fellow of the Institute of Advanced Studies at Durham University, UK.

Abstract of the talk:

This lecture will introduce small smart sensors – we call them wearables – that are worn by people moving around in urban areas. These sensors continuously record the level of air pollution and in this way assess the individual's personal exposure. The sensors are combined with GPS, which registers the geo-position and thus enables spatiotemporal monitoring of air quality. Many types of wearables are currently being developed and used by the public, such as health trackers (which measure heart rate and other physiological parameters for physical training purposes) or GPS trackers for hiking. The wearables we are interested in here are applied for environmental measurements, and this involves air quality as well as noise and

climate parameters. In this presentation we give an overview of the literature, provide technical information on the pollution sensors, discuss issues of their accuracy, and presents some results of recent application studies in Chennai (India) as well as Leipzig and Berlin (Germany).

Invited Talks

Data collection and analysis techniques using wearable devices

Prof. Uwe Schlink
Helmholtz Centre for Environmental Research - UFZ, Germany

Speakers Profile:

Dr. Uwe Schlink is a Senior Researcher at the Helmholtz Centre for Environmental Research (UFZ) in Leipzig, Germany, and Professor at University of Leipzig, Institute of Meteorology. He is heading the Research Group on "Urban climate and personal exposure" in the Department of Urban and Environmental Sociology at UFZ. His research areas include urban climate research, adaptation strategies, urban air quality, personal exposure, environmental health effects, and vulnerability with extreme environmental situations in urban areas, statistical modelling and Bayesian inference. He has published more than 60 articles in peer-reviewed international journals. He is an adjunct faculty at the Dept. of Civil Engineering of the IITM in Chennai and a fellow of the Institute of Advanced Studies at Durham University, UK.

Abstract of the talk:

This lecture will explain approaches of data acquisition using wearable sensor sets. Starting from example measurements made in Landon, UK, we discuss important issues of the sensors' sampling rate, ventilation and time constants. The concept of spheres-of-influence is explained. This concept was originally developed for the specification of the location of a weather station. Here we transfer it to the specification of the sampling rate of a wearable sensor. We argue that a standard operation procedure (SOP) is a valuable prerequisite supporting the implementation of wearable sensor measurements. The measurements taken by wearable sensors can be enhanced by various additional techniques. In this lecture we

explicate the assimilation of sensor records with simulated urban data, resulting in interpolated data for an entire urban region. Walking interviews conducted simultaneously with the walking measurements can register the perceptions of the walking person and thus provide additional dimensions of personal exposure. Exposure feedback and visualization are useful techniques to communicate the results.

Invited Talks

Leveraging R for air quality management and analysis

Dr. Aswin Giri
IIT Madras

Speakers Profile:

Aswin Giri is working as a Post-Doctoral Equivalent Fellow at the Indian Institute of Technology Madras, India, in the field of Air Quality Management with Prof. Shiva Nagendra. His PhD research at IIT Madras, titled "Air pollution hotspot management using image processing and machine learning techniques", was in the nexus of air quality perception, computer vision and low-cost sensors, with an overarching theme of localized and efficient urban air quality management. His research interests include air quality monitoring, modelling, machine learning for air quality management, air quality perception and exposure assessment.

In addition to academics, he co-founded SENSurAir Private Limited, with Prof. Shiva Nagendra, Prof. Devendra Jalihal, PhD scholars & engineers from civil & electrical departments of IIT Madras. The startup aims to help people manage air pollution by providing economical solutions for monitoring air quality in urban, rural and industrial areas, and disseminating data to the community.

Abstract of the talk:

The use of low-cost sensors for air quality monitoring is producing huge amounts of data. This talk will introduce R, a free open-source software for statistical computing and graphics. This will help young researchers to get some fundamental understanding of the software and its applications in air quality management. The participants will be exposed to different packages available for air quality management and its use cases. The session will explore

techniques for data preprocessing, visualization, and statistical analysis, specifically tailored to air quality datasets. Attendees will learn how to handle and analyze data from low-cost sensors, providing insights into pollutant trends and spatial distributions. Key R packages such as openair, ggplot2, and tidy verse will be discussed, demonstrating their application in real-world scenarios. The talk will also touch upon integrating machine learning techniques in R for predictive air quality modeling. By the end of the session, participants will have a clearer understanding of how R can be effectively leveraged to address air quality challenges and contribute to data-driven environmental decision-making.

Invited Talks

Introduction to noise pollution and its monitoring techniques

Ms. Lakshmi Pradeep
IIT Madras

Speakers Profile:

Lakshmi Pradeep is a final year research scholar in the Department of Environmental Engineering, Indian Institute of Technology Madras, India. She completed her B. Tech in Civil Engineering from NSS College of Engineering, Kerala and M. Tech in Geoinformatics from IIT Kanpur. She is currently working on characterization, modelling and mapping of noise pollution in urban areas. Her research interest includes environmental noise pollution monitoring and characterization, health risk assessment, and personal exposure measurement of vulnerable groups and modelling and mapping of environmental noise.

Abstract of the talk:

As urban populations expand due to migration for better employment opportunities and living standards, environmental pollution problems, including noise pollution, have become more pronounced in several Indian cities. This talk will provide a comprehensive introduction to noise pollution, focusing on major sources of noise, and the associated health effects, including both auditory and non-auditory impacts. Participants will gain insights into the principles and methods of noise measurement, along with an overview of the various instruments used for this purpose. The session will explore legal laws and regulations enacted in the country to control noise pollution, highlighting their role in promoting public health and well-being. Key noise pollution parameters and indices will be discussed, offering a detailed perspective on how noise is quantified and analyzed. Attendees will also be introduced to noise abatement and control technologies, including barriers, and urban

planning strategies. The talk aims to empower young researchers and practitioners with the knowledge and tools to tackle noise pollution challenges and contribute to creating quieter and healthier environments. This session promises to enhance understanding of the multidimensional impacts of noise pollution and equip attendees with actionable strategies for its control and management.

Invited Talks

Introduction to receptor modelling

Prof. Shiva Nagendra S M
IIT Madras

Speakers Profile:

Dr. Shiva Nagendra SM is presently working as Professor in Department of Civil Engineering, Indian Institute of Technology Madras (IITM), Chennai, India. He is Chairman GATE, JAM 2025, IIT Madras. He has more than 24 years' experience in research, teaching, consultancy and community development. He has published more than 100 research publications in international and national refereed journals, two reference book, more than 100 papers in conferences and three patents. He is author of books titled 'Urban Air Quality Monitoring, Modelling and Human Exposure Assessment' (ISBN:978-981-15-5511-4) and 'Artificial Neural Networks in Vehicular Pollution Modelling' (SCI-41, ISBN-10: 3-540-37417-5) published by Springer. He is associate editor of the journal Frontiers in Sustainable Cities, Frontiers and Journal of the Institute of Engineers (India): Series A, Springer. He also edited seven conference proceedings. He is Director of Clean Environment for Planetary Health in Asia (CEPHA) Network supported by UKRI. He is founder chairman of Indian International Conference on Air Quality Management (IICAQM) series and founder President of Air Quality Management Association (AQMA). He has been part of numerous grants involving multiple national and international partners. Much of his research interests focus on air quality management which includes monitoring, source apportionment, modelling, design and development of emission control system, development of air quality management system, personal exposure monitoring, environmental impact assessment, outdoor-indoor air pollution relationships and indoor air quality management. He is WHO subject matter expert in a global technical consultation on the transmission of respiratory pathogens through the air. He also is a professional member of several technical institutions and organizations of India.

Abstract of the talk:

Receptor modeling is a critical tool in air quality management, enabling the identification and quantification of pollution sources using ambient air quality data. This talk will provide an introductory overview of receptor modeling techniques, offering participants a foundational understanding of their principles and applications. The session will cover key concepts such as source apportionment, the use of chemical composition data, and the mathematical frameworks that underpin receptor models. Popular approaches, including Positive Matrix Factorization (PMF) and Chemical Mass Balance (CMB), will be introduced, along with case studies of their implementation. By the end of the talk, participants will gain insights into how receptor modeling can inform targeted air quality interventions and policy decisions, laying the groundwork for further exploration and application in this essential field.

Invited Talks

Types of receptor models & its application in air pollution studies

Prof. Uwe Schlink
Helmholtz Centre for Environmental Research - UFZ, Germany

Speakers Profile:

Dr. Uwe Schlink is a Senior Researcher at the Helmholtz Centre for Environmental Research (UFZ) in Leipzig, Germany, and Professor at University of Leipzig, Institute of Meteorology. He is heading the Research Group on "Urban climate and personal exposure" in the Department of Urban and Environmental Sociology at UFZ. His research areas include urban climate research, adaptation strategies, urban air quality, personal exposure, environmental health effects, and vulnerability with extreme environmental situations in urban areas, statistical modelling and Bayesian inference. He has published more than 60 articles in peer-reviewed international journals. He is an adjunct faculty at the Dept. of Civil Engineering of the IITM in Chennai and a fellow of the Institute of Advanced Studies at Durham University, UK.

Abstract of the talk:

Poor air quality is the result of emissions that are released into a stable atmosphere in which they very poorly disperse so that they can accumulate in the lower air layers. In the real environment, there are a large number of emission sources. All emitted pollutants mix with each other and we observe and measure a superposition of pollutants that originate from very different sources. An important task for air quality management is the identification of local and remote emission sources. Important tools for this purpose are the receptor models that attempt to disentangle the contributions of different emission sources, especially in complex situations: multiple sources emitting at different locations, at different distances and in different combinations of pollutants at different times of the day. The lecture introduces the

receptor concept and explains three commonly used types of receptor models. The presentation ends with a demonstration of such modelling techniques.

Invited Talks

Air pollution: From sampling to analysis

Dr. Arul Veerappan
NYU Langone Health

Speakers Profile:

Dr. Arul Veerappan holds PhD degree in Pharmacology and Environmental Toxicology from Dr. ALM Postgraduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai, Tamil Nadu, India in 2000. He then received a Japan Science and Technology Agency STA fellowship and continued his research on PM2.5 and health effects at the National Institute for Environmental Studies, Tsukuba, Japan. Further, Dr. Arul moved to Cornell University, an Ivy League Institution in USA for his postdoctoral fellowship and continued as an instructor. He also served as overseas visiting professor in the department of Chemical Engineering at Anna University, Chennai. Currently, Dr. Arul works as an Assistant Professor in the Division of Environmental Medicine, Department of Medicine at New York University Grossman School of Medicine. His major areas of research are environmental toxicants such as heavy metals and air pollution including World Trade Center Particulate Matter and cardiopulmonary health effects and carcinogenesis. He also teaches heavy metals in air pollution, industrial hygiene and occupational health courses for the Environmental Health Sciences Graduate Program at New York University. Dr. Arul has published his research work in high impact top tier journals such as PNAS, Nature Medicine, Translational Science etc. He has also presented his work in various national and international conferences.

Abstract of the talk:

This “Air pollution: From Sampling to Analysis" lecture will reveal the process of taking air samples to then analyze them in a laboratory to determine the levels of pollutants present in

the air, thereby assessing air quality. It also deals with air monitoring techniques to provide real-time readings of contaminants in the air. Air monitoring and air sampling are two different methods of looking at air quality. The air monitoring uses electronic devices to provide real-time readings of contaminants in the air. The air sampling involves trapping air over a period of time in a container that is then sent to a laboratory for analysis to identify and quantify specific compounds. Different techniques are used to collect air samples depending on the pollutant being measured, including filters for particulate matter, absorbent tubes for gases, and specialized samplers for specific compounds. Air sampling devices draw a known volume of air through the collection media. The collected samples are then transported to the analytical/toxicological laboratory to analyze using various techniques like chromatography, spectroscopy, or gravimetric analysis to identify and quantify the pollutants. So, this lecture will be useful to gain the knowledge of air monitoring, air sampling, chemical and/or toxicological analyses.

Invited Talks

Forest fires and public health: Understanding the risks and consequences

Dr. Tanushree Parsai
IIT Madras

Speakers Profile:

Dr. Tanushree Parsai is an Assistant Professor in the Environmental Engineering division of the Civil Engineering department at IIT Madras. She did her bachelor's in civil engineering and then did her master's in environmental engineering. She is a recipient of gold medals for obtaining the highest CGPA in her Bachelors' and Masters' programs. Motivated to work in field of Environmental Engineering she joined Indian Institute of Technology Delhi for her PhD in the year 2016. Her doctoral research focused on stability of mixture of nanoparticles in water medium and associated health risk. She was awarded best Thesis Dissertation award in the year 2022 for her research work at IIT Delhi. Prior to joining IIT Madras, she was working as an Assistant Professor in Indian Institute of Technology Mandi, Himachal Pradesh. She is working on different aspects of the interaction of emerging contaminants in environmental medium, removal of a mixture of contaminants, nanoparticles, microplastics, Polycyclic aromatic hydrocarbons, and associated health risk assessment. She has published more than 15 papers, book chapters and conference publications in the field of emerging contaminants fate and risk assessment.

Abstract of the talk:

Wildfires are extreme natural or artificial events that release organic carcinogenic health hazards like polycyclic aromatic hydrocarbons (PAHs). Most of the released PAHs are trapped in burnt ash, a part of which was transported and settled on different mediums like soil and water. After strong rainfall events, PAHs enter into surface water bodies through

surface runoff, thereby deteriorating water quality. This study aimed to explain the human health risks associated with exposure to water contaminated with PAHs due to wildfires. Due to their high concentration, increased exposure, toxicity, and recalcitrant nature, 16 PAHs are classified as priority pollutants by the United States Environmental Protection Agency (USEPA), of which Benzo(a)pyrene (BaP) is highly toxic to humans. Interaction human health risk assessment was conducted using the modified weight of evidence method, USEPA. Exposure to individual BaP poses a risk to children (HQ = 1.59) and adults (HQ = 6.83) due to its high toxicity. Exposure to water contaminated by PAHs resulted in higher health risks for both BaP equivalent and a mixture of PAHs. Cancer and non-cancer risk due to dermal exposure was more elevated than oral exposure due to higher lipophilicity of PAHs. PAHs pose a higher dermal risk (HQ int =330 and cancer risk=3.06×10 -1) than oral exposure (HQ int =6.83 and cancer risk=6.25×10 -4). Thus, effective PAH monitoring is required in different environmental mediums for their effective removal.

Invited Talks

Pre-Conference workshop on Scientific writing: Hints and tips'

Ms. Neha Sharma
Springer

Speakers Profile:

The face of scientific publishing is changing at a very fast pace. Neha Sharma, Editor - Applied Science and Engineering Springer, will speak briefly about the transitions and the needs of the publishing world and how researchers need to prepare for it. This author workshop has been devised specifically as a resource for researchers, particularly young scientists how to achieve publication success.

Some of the key topics covered during this presentation are:

1. Writing for International Publications: Structure, Style and Accuracy
2. Selecting a journal for your manuscript
3. Peer review.

Abstract of the talk:

Neha Sharma is presently working as Editor at Springer Nature. She is a part of the Global Acquisition Team at Springer, an imprint of Springer Nature. She is responsible for acquisition and publishing of books in Engineering and Applied Sciences portfolio. She has worked in various areas of academic publishing, with over 10 years of publishing experience. She is responsible for acquiring books in Mechanical Engineering and Material Science for India and surrounding regions. Her publication portfolio includes conference proceedings, monographs, edited volumes, major reference works and textbooks.

Invited Talks

Challenges in protection and improvement of air quality management in India

Shri. S K Gupta
Envirotech Instruments Pvt. Ltd.

Speaker's profile

Shri S. K. Gupta is an entrepreneur and recognised as a pioneer in developing indigenous capabilities and technologies to produce India's own air pollution monitoring instruments in early 80's.He initiated air pollution monitoring activities on a large scale. He has also made an important contribution in developing competent skilled workforce by organizing several hands- on training programmes across the country. He also established and operated nearly 100 real time monitoring stations nationwide. He has actively collaborated with IIT Delhi, IIT Madras, IIT Jodhpur, IIT Kanpur and CSIR-NEERI, CSIR-NPL labs to develop indigenous sensors and devices. He is a member of the commission for Air Quality Management for Delhi and adjoining areas of NCR constituted by Govt of India and the founding Secretary of the Delhi Chapter of the Indian Association for Air Pollution Control. Shri. SK Gupta is a civil engineer from IIT Kanpur, an avid reader, traveller, designer with a knack for exquisites. He has deep interest in protecting culture, traditions and environment. He has devoted more than 40 years to advancing air quality management and environmental sustainability in India. His remarkable efforts have significantly strengthened India's capabilities in environmental monitoring, innovation, and capacity building.

Abstract of the talk

Importance of good air quality is now well recognised. Several measures have been initiated by government to control pollution from sources, emission limits and air quality standards have been laid. The Central and State pollution control boards have greatly strengthened their surveillance. Several new technologies and better fuels have been adopted to reduce emissions. National clean air programme has been launched. Several source apportionment studies have been conducted to tag pollution sources. Many air-quality models are being used to predict ground level concentrations to help in management of air quality. Yet the Air Quality has deteriorated and has become a cause of great worry. Infact several pockets have become highly critical. Thus, a serious introspection is needed to identify gaps and challenges and reasons for this situation. One of the known reason is rapid increase in industrialisation, urbanisation and vehicle movement and another one which is beyond our control is impact of local meteorology which affects dispersion and dilution of air pollutants. Besides these two, there are some other reasons or issues which are not deliberately talked and are avoided. Some of these would be presented in my talk today.

Invited Talks

Role of academia and research in Environmental Protection – Some thoughts

Prof. Virendra Sethi
IIT Bombay

Speaker's profile

Dr. Virendra Sethi is a Professor in Environmental Science and Engineering Department (previously CESE) at IIT Bombay. He completed his B.Tech. in Chemical Engineering from IIT Bombay, and then MS and PhD in Environmental Engineering from University of Cincinnati, USA. He has worked with ONGC and USEPA, and has been at IIT Bombay since 2000. His areas of interests are air quality, remote sensing, and aerosol dynamics and measurements

Abstract of the talk

India is facing growing environmental concerns, and we in the academic and research community have a significant role to play. A PAN-India voice needs to emerge for enabling the already known solutions to be co-ordinated nationally, and implemented locally. Some recent efforts by MoEFCC and Office of the Principal Scientific Adviser, GoI, need to be highlighted and pursued collectively.

Invited Talks

Health effects of air pollution: Going beyond particle mass concentrations

Prof. Harish Phuleria
Associate Professor,
Environmental Science & Engineering Department,
Indian Institute of Technology Bombay

Speaker's profile

Dr. Harish C. Phuleria is an associate professor in Environmental Science and Engineering Department at IIT Bombay having about 20 years of experience on environmental monitoring, aerosols chemistry, exposure assessment and environmental health. His primary area of research is quantifying and characterizing the short- and long-term exposures to different environmental stressors such as air pollution and road traffic noise. Dr. Phuleria's research group focuses on understanding the emissions from vehicular and biomass emissions sources, monitoring and modelling the long-term air pollution exposures in various microenvironments, quantifying toxic chemicals in human tissues and examining the effect of air pollution on children and adults' health. He holds a bachelor's and master's degree in Chemistry from Delhi University and IIT Delhi, additional master's degree in Environmental Science and Engineering from IIT Bombay and a PhD degree in Environmental Engineering from University of Southern California, Los Angeles, USA.

Abstract of the talk

There is substantial evidence of adverse health effects of exposure to air pollution on human health from studies conducted primarily in Western Europe and North America. However, these relate the health effects mostly to particle mass concentration and are at levels way lower than observed in urban areas of low- and middle-income countries such as India. There is growing concern that particle mass concentration may not be the best exposure metric and rather particle toxicity and composition may drive such effects. Thus, we have examined the chemical composition of PM 2.5 and its oxidative potential for various source and atmospheric aerosols across India. Multiple oxidative potential assays together with standard bulk particle composition analyses allow us to examine the spatial and temporal variability of fine aerosols and their potential for causing adverse health effects. In this talk, our recent work in examining toxicity of fine particles and its potential drivers, from diverse real-world vehicular traffic fleet including roadway tunnels, biomass burning, urban residential outdoor locations and regional background sites will be presented. The implication of these findings on air quality regulation, policies, and society, at large will be further discussed.

Invited Talks

Monitoring temperature and humidity in UK theatres

Dr. Richard J Ball
University of Bath, UK

Speaker's profile

Dr Richard Ball is a Reader in the Department of Architecture and Civil Engineering at the University of Bath. He graduated from the University of Bath with a BEng in Materials Science and Engineering and later completed a PhD in Materials Science also at Bath. He has published over 100 papers in refereed international journals covering batteries, fuel cells, solar cells, ceramics, composites, NDT, sensors, sustainable construction materials and air quality. Recent research has focused on the development of novel coatings for buildings to help improve air quality, air quality in refugee camps around the world, and the degradation of fibrous plaster ceilings in the UK. He is a chartered engineer, chartered scientist and a fellow of the Institute of Materials, Minerals and Mining.

Abstract of the talk

From the late 19th century, many high-status buildings in the UK, such as theatres, banks, clubs and hotels were decorated using fibrous plaster, a composite consisting of hessian (Jute) fibers embedded within a gypsum plaster matrix. The fast-setting time of gypsum enabled the material to be manufactured in sections off site and then quickly installed providing a much cheaper alternative to lime-based plasters. Many of these ceilings still exist today, particularly in historic theatres. Research at Bath has shown that much existing historic material has degraded especially due to weakening of the hessian fibers, attributed to moisture and biological attack from fungi. A key factor in the degradation process is the environmental conditions to which the fibrous plaster is exposed. Following a background of historic fibrous plaster, this talk will introduce some of the factors which influence the temperature and humidity in UK theatres. Some initial results from monitoring will be presented demonstrating the typical ranges of temperature and humidity measured, and how these vary a different location within a theatre and throughout the year.

Invited Talks

We All Breathe the Same Air

Prof. Prashant Kumar
University of Surrey, UK

Speaker's profile

Prashant Kumar is Chair in Air Quality and Health, the founding Director of the Global Centre for Clean Air Research (GCARE), the founding Co-Director of the Institute for Sustainability, and the founder of Guilford Living Lab, and the Trustee of Zero Carbon Guildford. He obtained his PhD (Engineering) from the University of Cambridge (UK) after winning a Cambridge-Nehru Scholarship and Overseas Research Scholarship award. He earned his Master's Degree in Environmental Engineering & Management from the Indian Institute of Technology, Delhi, where he won the 'Outstanding Postgraduate Student Award' for his exemplary performance. Winner of the 2023 "Haagen-Smit Clean Air Award," often regarded as the "Nobel Prize of Clean Air," he was recognised as a top 1% Highly Cited Researcher by Clarivate in both 2022 and 2023. He received the University of Surrey's Vice-Chancellor Award for Researcher of the Year in 2017, and his recent paper on green infrastructure won the "2023 Haagen-Smit Prize for Best Paper" from Elsevier. With ~400 journal articles published in prestigious journals like Science, Nature Cities, and Chemical Society Reviews, he has garnered ~26,000 citations (h-index=78, i10-index=334). He has successfully secured over £15M in individual research funding from UKRI, including roles as Principal Investigator on the £1.2M RECLAIM Network Plus and £2M GP4Streets projects, as well as support from industry and international organizations. His research frequently appears in prominent media outlets, including the BBC and The Times. Further information can be found at www.surrey.ac.uk/gcare.

Abstract of the talk

Following the Cuban Missile Crisis, President John F. Kennedy famously remarked in his "A Strategy for Peace" speech, "We all breathe the same air. We all cherish our children's future. And we are all mortal." But is this true? My life's work questions this very premise, and I fear the answer is "no." Many vulnerable individuals breathe air that is far more hazardous than others. This disparity is often underestimated, as discussions about air pollution tend to focus on ambient (outdoor) conditions. This talk will delve into this issue, presenting key findings from several GCARE projects over the past two decades – such as RECLAIM Network Plus, GP4Streets, GreenCities, INHALE, Healthy Sailing, iSCAPE, CO-TRACE, and SAMHE – focused on indoor/outdoor environments and both active and passive solutions. This talk will also showcase the extensive work of the GCARE team, including the Guildford Living Lab, which has developed guidance, tools,

policy briefs, and co-designed nature-based solutions for mitigating air pollution and climate change. This talk will explore how various communities, particularly vulnerable groups like the elderly and children, are exposed to air pollution in different environments. Additionally, I will discuss how passive solutions can serve as effective exposure control strategies, alongside policy changes aimed at promoting behavioral shifts.

Invited Talks

Recognizing environmental stressors with the help of wearables

Prof. Uwe Schlink
Helmholtz Centre for Environmental Research - UFZ, Germany

Speaker's profile

Dr. Uwe Schlink is a Senior Researcher at the Helmholtz Centre for Environmental Research (UFZ) in Leipzig, Germany, and Professor at University of Leipzig, Institute of Meteorology. He is heading the Research Group on "Urban climate and personal exposure" in the Department of Urban and Environmental Sociology at UFZ. His research areas include urban climate research, adaptation strategies, urban air quality, personal exposure, environmental health effects, and vulnerability with extreme environmental situations in urban areas, statistical modelling and Bayesian inference. He has published more than 60 articles in peer-reviewed international journals. He is an adjunct faculty at the Dept. of Civil Engineering of the IITM in Chennai and a fellow of the Institute of Advanced Studies at Durham University, UK.

Abstract of the talk

Urban areas are hotspots of environmental stressors such as noise, air pollution and heat to which city dwellers, pedestrians and cyclists are exposed. We demonstrate the potential of mobile sensor (wearable) recordings to identify pollution hotspots and respond with adaptation measures. To this end, we discuss the results of previous research projects on the development and application of wearable sensors. Possible adaptation measures include changes in personal mobility behavior and the official introduction of traffic restrictions in residential areas of cities. This presentation will discuss practical approaches in selected cities. One of these activities is the choice of movement routes of commuters in Chennai and the combination of wearable exposure measurements with walking interviews. Another example is closely related to the Superblocks initiative, which aims to implement traffic calming in a heavily polluted residential quarter in Leipzig.

Invited Talks

Dispersion modeling analyses of air emissions from accidental release of hazardous chemicals in southern Louisiana

Prof. Kuruvilla John
University of North Texas, USA

Speaker's profile

Kuruvilla John is a professor in the Department of Mechanical Engineering at the University of North Texas (UNT), Denton, Texas. Kuruvilla received his B. Tech degree in chemical engineering in 1986 from Anna University in India. He then worked briefly for Asian Paints in Madras before moving to the United States for higher education. He earned his M.S. and Ph.D. degrees in chemical engineering from the University of Iowa, Iowa City, Iowa in 1989 and 1996, respectively. Prof. John's research interests are in the area of environmental sustainability with a focus on air quality monitoring, modelling and assessment. He has an active research portfolio and was instrumental in securing 43 research contracts, grants and projects worth over $15 million from various industries and funding agencies including National Science Foundation, Department of Energy, and Texas Commission on Environmental Quality among others. He has served as principal investigator and project director of a National Science Foundation (NSF) funded centre for research excellence in science and technology. As a mentor, Prof. John has supervised 57 M.S. students, 4 Ph.D., and 13 post-doctoral researchers and scientists since 1995. Many of his former students and research scientists are currently pursuing successful careers globally in the environmental arena. With his students, Prof. John has authored over 85 peer-reviewed journal papers, reports, book chapters and conference papers.

Abstract of the talk

The MRCC (Mississippi River Chemical Corridor) is a complex region where industrial, residential, commercial, and recreational areas intersect, along with transportation networks and river-based industries. However, its industrial density contributes to significant air quality issues, putting nearby communities at serious health risks. To better understand the environmental and health risks in this region, five detailed case studies of unintended or accidental release of hazardous chemicals in the MRCC were conducted using AERMOD. This model allowed to simulate the movement of various toxic chemicals released during industrial incidents, including SO2, VOCs, vinyl chloride, ethylene oxide, ethylene, and propylene. The focus was on emissions originating from chemical facilities near areas that contain significant EJ communities identified by the EPA's toxic air release indicators. The findings confirmed that toxic chemical concentrations were significantly higher in EJ communities close to industrial facilities,

reinforcing concerns about the disproportionate health risks faced by vulnerable populations in the MRCC.

Invited Talks

Urban air pollution monitoring using drone mounted low-cost particulate matter sensor

Dr. Ajit Ahlawat,
Delft University of Technology, Netherlands

Speaker's profile

In 2019, I was awarded a Doctor of Philosophy (Ph.D.) degree in atmospheric aerosol instrumentation from the CSIR-National Physical Laboratory in Delhi, India. I then undertook postdoctoral research for approximately six years at the Leibniz Institute for Tropospheric Research (TROPOS) in Leipzig, Germany. During this period, I made a significant contribution to the advancement of air pollution monitoring through both ground-based and airborne observational campaigns. I am currently employed as an Assistant Professor in the Department of Geoscience and Remote Sensing at Delft University of Technology (TU Delft), Delft, Netherlands. My research is focused on the utilization of advanced innovative methodologies for the measurement of urban air pollution. I employ state-of-the-art technologies, including drones, low-cost sensor networks, artificial intelligence, machine learning algorithms, and miniaturized instrumentation, to enhance the scientific understanding of urban atmospheric processes and environmental challenges. My research emphasizes the investigation of air pollution dynamics in urban settings, particularly the mechanisms behind the formation of atmospheric phenomena such as haze and fog.

Abstract of the talk

Delhi is considered as one of the most polluted cities around the world. Previous studies have reported use of ground-based low-cost sensor (LCS) network over Delhi. However, there is still a significant knowledge gap regarding vertical information of air pollutants over Delhi. Therefore, an airborne campaign using LCS on-board drone was conducted at Delhi to provide vertical distribution of particulate matter (PM) during post-winter season from March 12-23, 2021. The drone carried a payload comprising of PM-LCS along with meteorological sensors for PM mass concentrations, temperature and humidity measurements. A custom designed inlet set-up and a dehumidification unit was used in order to minimize the effect of rotor downwash and humidity on particle mass concentration respectively. The LCS performance comparison revealed higher correlation when compared against the reference instrument at ground. Multiple sensitivity tests were performed to evaluate the LCS performance while the drone was airborne. The results indicate that incorporating LCS into innovative platforms is feasible, potentially offering detailed data in vertical dimension. The LCS set-up also revealed a low-level haze in the

early morning, which the WRF-Chem model was unable to predict due to several inherent limitations.

Invited Talks

Quantitative assessment of emission source contributions to ambient air pollution

Prof. Nguyen Thi Kim Oanh
Asian Institute of Technology, Thailand

Speaker's profile

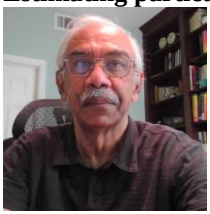
Prof. Nguyen Thi Kim Oanh, a distinguished professor and the founding director of the Center for Nexus of Air Quality, Health, Ecosystem and Climate, at the Asian Institute of Technology (AIT). She has over 35 years of working experience in research, education, consultancy, and capacity building. Prof. Kim Oanh is internationally recognized for her work on air pollution and climate in Asia, and has been recognized in the top 2% globally most cited scientists in the field of "Meteorology and Atmospheric Sciences" in 2021. Her current research covers a wide range of environmental quality management topics, including air quality management and air quality data system; meteorology and climate modeling; air quality and climate co-benefits; monitoring and control of organic pollutants of dioxins, pesticides, and polycyclic aromatic hydrocarbons; and industrial environmental management. She has worked closely with government agencies and international organizations to provide science-based recommendations to improve environmental quality. Her research has a significant impact on environmental policy and public health in the region and has been credited with international awards and recognition.

Abstract of the talk

A key question to ask in developing a clean air action plan for a geographical domain is where the pollution comes from. Is it mainly from local, regional or trans-boundary emission sources and how much is from atmospheric transformation processes? This science-based information is useful in prioritizing emission control efforts to improve air quality. Integrated approach relying on the technical tools can be used to answer the questions. Emission inventory is used to quantify the atmospheric pollution loads from the sources located within the domain. Dispersion modeling can be used to analyzed the contributions from different source categories and/or source regions, both inside and outside the domain. As for particulate matter and volatile organic compounds, when a suitable composition monitoring dataset is available, source apportionment by receptor modeling can be applied to quantify sources' contributions to the pollution at receptor sites. Case studies from Southeast Asia are provided to illustrate such integrated approach when the technical tools are used in combination to better reveal the source-receptor relationship.

Invited Talks

Estimating particulate emissions from roads



Prof. Akula Venkatram
University of California, Riverside, USA

Speaker's profile

Dr. Akula Venkatram is a Distinguished Professor of Mechanical Engineering at the University of California, Riverside, California, USA. His research is focused on the development and the application of models for the transport and dispersion of air pollutants over urban and regional scales. Dr. Venkatram co-edited and contributed to the "Lectures on Air Pollution Modeling" published by the American Meteorological Society. He was member of the team that developed AERMOD, and was a principal contributor to RLINE, the USEPA model for line sources. He is the recipient of the inaugural award from the AMS Committee on Meteorological Aspects of Air Pollution for "contributions to the field of air pollution meteorology through the development of simple models in acid deposition, ozone photochemistry and urban dispersion". His research on modeling the air quality impact of transport related emissions was recognized in 2010 by the United States Environmental Protection Agency, through a Scientific and Technological Achievement Award for "expanding and improving the scientific and regulatory communities' ability to assess the impacts of mobile source emissions". His research on this topic is summarized in the monograph "Urban Transportation and Air Pollution".

Abstract of the talk

Resuspended dust, particularly PM2.5 and PM10 from roadways, is a major contributor to particulate emissions in many regions of India. Accurate estimates of dust emissions are crucial for effective air quality management, yet these estimates often rely on the AP-42 model from the U.S. Environmental Protection Agency (EPA). This model, however, has notable limitations, primarily its dependence on silt loading—a metric that is challenging to measure on busy roads. Furthermore, the model's empirical nature can introduce uncertainties in estimating PM2.5 emissions. This talk describes a study aimed at addressing these limitations of the AP-42 model. The first step involved developing a mobile platform capable of measuring PM emission rates on roadways without disrupting traffic. Data collected from several major highways enabled the creation of a new model that enhances the AP-42 framework in two significant ways: 1) it employs a mechanistic approach that extends its applicability, and 2) it removes the need for silt loading as an input variable.

Invited Talks

Micro(nano)plastics particles in the air and its implications to human health

Prof. Thava Palanisami
The University of Newcastle, Australia

Speaker's profile

Dr. Thava Palanisami obtained his PhD in risk assessment and remediation of mixed contaminants from the University of South Australia. Currently, he is the Director of the Environmental Plastics and Innovation Cluster (EPIC), at the University of Newcastle, Australia. His team EPIC aims to develop systemic solutions to improve food, soil, and water security while minimizing pollutant exposure and associated health risks. About a decade ago, Dr. Thava's team began investigating plastics as a major contaminant, focusing on understanding the aging and weathering processes of microplastics in the environment which intended to enhance the precision of ecological and human health risk assessments and to create effective remediation strategies. Currently, his team is working on over 15 different research projects to fill knowledge gaps, and the remediation technologies they have developed in collaboration with industry partners are ready for implementation. Dr. Thava has also led the Australian Microplastic Assessment Project, and his team has developed the first treatment technology capable of completely removing microplastics and their associated chemicals from the entire water cycle. Additionally, Dr. Thava Palanisami has been recognized by the UNEP as a global leader in microplastics research and has made significant contributions to the development of preventive policies worldwide.

Abstract of the talk

It is increasingly recognized that the ubiquity of convenient single-use plastic has resulted in a global plastic pollution crisis, with substantial global environmental and health consequences. Plastics degrade slowly, breaking down into microplastics and nanoplastics (MNPs) that persist in ecosystems and can enter the human body through ingestion, inhalation, and skin contact. Further, considerable number of research studies showed that PM10 (particulate matter ≤10μm in aerodynamic diameter) can be inhaled by the human and can get deposited in the respiratory tract, alveoli, and other parts, resulting in diseases. Therefore, concerns have arisen about inhaled plastic particles, which can penetrate the respiratory system and potentially cause inflammation and chronic conditions like asthma and COPD. Our team is studying airborne plastic debris, focusing on factors such as concentration, size, and polymer types to understand the health risks of inhaled and ingested particles. Preliminary data (under review) shows presence of multiple types of MNPs are common in academic environments. We identified polypropylene (PP), polyethylene (PE), polyethylene terephthalate (PET), and polyurethane (PU) as the most

frequently encountered MNPs. Further, our findings suggest that PET-derived monomers may interact with inflammatory receptors, raising concerns about their health effects. This research highlights the need for increased awareness and protective measures regarding indoor air quality.

Invited Talks

Air pollution and trace elements

Dr. Arul Veerappan
NYU Langone Health, New York

Speaker's profile

Dr. Arul Veerappan holds PhD degree in Pharmacology and Environmental Toxicology from Dr. ALM Postgraduate Institute of Basic Medical Sciences, University of Madras, Taramani, Chennai, Tamil Nadu, India in 2000. He then received a Japan Science and Technology Agency STA fellowship and continued his research on PM2.5 and health effects at the National Institute for Environmental Studies, Tsukuba, Japan. Further, Dr. Arul moved to Cornell University, an Ivy League Institution in USA for his postdoctoral fellowship and continued as an instructor. He also served as overseas visiting professor in the department of Chemical Engineering at Anna University, Chennai. Currently, Dr. Arul works as an Assistant Professor in the Division of Environmental Medicine, Department of Medicine at New York University Grossman School of Medicine. His major areas of research are environmental toxicants such as heavy metals and air pollution including World Trade Center Particulate Matter and cardiopulmonary health effects and carcinogenesis. Dr. Arul has published his research work in high impact top tier journals such as PNAS, Nature Medicine, Translational Science etc. He has also presented his work in various national and international conferences.

Abstract of the talk

Air pollutants pose major risks to public health. Especially, urban residents are often affected by either natural or manmade pollution cascades. Particulate matter (PM) is one of the examples and PM is of great concern to the public and to government agencies because of the adverse health effects. These effects can be both acute and chronic. PM has the strong potential for adsorbing toxic trace elements, which may then enter the human body through inhalation and have adverse physiological effects. The most toxic trace elements include arsenic, chromium, cadmium, mercury, and lead, which are known to damage multiple organs even at low exposure levels. These trace elements, common air pollutants, are emitted mainly because of various industrial activities and contribute to the deposition and build-up in soils. Trace elements are persistent in the environment and are subject to bioaccumulation in food-chains. Cadmium exposures are associated with kidney and bone damage. Cadmium has also been identified as a potential human carcinogen, causing lung cancer. Lead exposures have developmental and neurobehavioral effects on fetuses, infants, and children, and elevates blood pressure in adults. Mercury is also toxic in the elemental and inorganic forms, but the main concern is associated with the organic compounds, especially methylmercury that accumulates in

the food-chain, the main route of human exposure. Health effect studies for inhalation of toxic substances are essential because the rapid rise in urbanization and industrialization causes a steady increase in emissions, and human health depends primarily on the quality of the air we breathe. Further, continuous monitoring PM levels and targeting trace element analysis in air pollution are vital for mitigation for environmental health.

Invited Talks

Sensor network optimization, source mapping with inverse modelling and real-time air quality forecasting using advanced CFD based tools

Mr. Sreejith K V
Fluidyn Consultancy Pvt. Ltd.

Speaker's profile

Serves as Senior Manager in Fluidyn, a global leader in air quality and dispersion modelling using advanced numerical tools. Post-graduation from NITC with specialization in energy and environmental management. 10+ years of academic, research and corporate experience. Hold 4 patents and several publications. Currently focusing on integrating simulation, data analytics, and machine learning tools to develop sustainable, practical solutions for air quality management and broader environmental challenges.

Abstract of the talk

Effective air quality management largely depends on representative monitoring, accurate source detection, and robust forecasting. An integrated approach using Fluidyn tools to optimize sensor placement, identify/quantify emission sources, and enable real-time air quality forecasting is presented here. Sensor Location Optimization: CFD models are capable of accurately capturing the influence of local micro scale terrain conditions, weather, and pollution patterns in determining optimal sensor locations, ensuring no sources go un-attended. Source Detection: Using inverse modelling technique to track, identify and quantify the emission sources from sensor feedback – for reliable and effective pollution management. Real-Time Forecasting: A predictive framework integrating live data and advanced modelling methods to forecasts pollutant levels and potential hotspots, in days advance, under dynamic conditions. Case studies validated such framework's effectiveness in industrial and urban settings, demonstrating improved monitoring, source attribution, and forecasting. This highlights the role of advanced computational techniques in modelling air quality and effectively mitigating pollutant level.

Invited Talks

Gaps and limitation in air quality management in India - Way forward to bridge the gaps to improve air quality

Dr. B Sengupta,
CPCB

Speaker's profile

Dr. B. Sengupta worked in Central Pollution Control Board (CPCB), Ministry of Environment and Forests, Govt. of India for more than 30 years in different capacity. He was Member Secretary of CPCB for more than 10 years (1998-2008). He also worked in University of Florida, Gainesville, USA on air quality management and control and GHG emission reduction at university of OSLO Norway. He has vast experience in the field of Air and Water Quality Management, Industrial Pollution Control, Standard Development (Ambient and Source specific), Environmental Impact Assessment Studies, Fuel Quality improvements, Clean Technology, Waste Minimization, Pollution Prevention issues, Pollution Control in SSI units, Climate Change, Hazardous and Solid Waste Management. He represented India in many International Meetings / Seminars / Workshops organized by UNEP/USEPA/WHO/World Bank/UNIDO etc. Dr. Sengupta has published more than 250 technical reports while working in CPCB and also presented/publish more than 50 papers in National and International peer reviewed Journals. He also guided several M.Tech and Ph.D. students of IIT-Delhi, JNU, Delhi University etc.

Abstract of the talk

In India many initiatives have been taken to improve air quality such as the notification of Ambient Air Quality Standards (AAQS), the development of the Air Quality Index (AQI) based on CAAQMS data, the transition to cleaner transportation fuels (BS-II to BS-VI), and the implementation of vehicular exhaust standards. The establishment of manual and continuous air quality monitoring stations, the National Clean Air Action Plan (NCAP), and the identification of 132 non-attainment cities highlight efforts to address pollution challenges. However, critical gaps remain in achieving effective air quality management. Recommendations to bridge these gaps include the measurement of the Ventilation Coefficient (VC) in cities, and correlating AQI with VC for accurate public information. Calibration and periodic audits of CAAQMS by independent agencies and the alignment of monitoring station locations with CPCB guidelines are essential. Further, the promotion of clean fuels and the adoption of electric vehicles in non-attainment cities are crucial. Upgrading solvent recovery plants, reducing non-point pollution sources such as fugitive dust, and addressing VOC emissions from chemical industries are vital steps. Stricter regulation of SO_2 and NO_x emissions from power plants and methane emissions from MSW dumpsites, along with improved Inspection and Maintenance (I/M) systems,

will also enhance air quality. Training and capacity building for SPCB/PCC staff and innovative measures like waste co-processing in cement plants are imperative.

Invited Talks

Air quality resource framework of India

Prof. Gufran Beig
IISc Bengaluru

Speaker's profile

Prof. Beig is currently serving as "Chair Professor" at NIAS in Indian Institute of Science campus, Bangalore. He is a well-known expert of Air Quality and Climate Change. A subject gaining importance under NET-ZERO commitment given by Govt. of India to United Nations. His current interest lies in air quality management with scientific approach and understanding the extreme events and their linkages with climate change. He as the Founder Director of India's first air quality forecasting framework, popularly known as "SAFAR" developed under the Ministry of Earth Sciences, Govt. of India. He is the recipient of coveted Shanti Swarup Bhatnagar Award, India's highest honor in Scientific discipline. He is the first Indian recipient to confer with World Meteorological Organization award of United nations. Besides other numerous awards, he is the fellow of Indian academy of sciences and Indian Meteorological Society (IMS). Prof. Beig has published 249 peer-reviewed international research papers so far, with around 10800 citations. He has also edited 8 scientific books, released 31 technical monographs and delivered more than 410 invited talks.

Abstract of the talk

The problem of air pollution is traditionally considered as source emissions centric and hence India's NCAP programme was formulated to tackle air pollution by cities /states and was highly local emission centric. The air pollution is not restricted to geopolitical boundaries and can travel long distances. In an era of rapidly changing climate, we need to shift from a location-specific and emission-centric approach to one that considers larger meteorological and climatological processes, overriding air shed mapping, along with larger scale finer emissions inventory. Addressing this common challenge requires a carefully considered, multi-sectoral science-based integrated solution from fundamental to applied science and management to policy interventions. It is, therefore, envisaged by the office of the scientific advisor to the Govt. of India, on setting up NARFI framework with an objective to develop science-based information mechanism and knowledge resource to help decision-makers. Talk will briefly touch upon concept of NARFI.

Invited Talks

International governance and its influence on Air Quality Management in India

Dr. Ajay Deshpande
IIT Bombay

Speaker's profile

Dr. Ajay Deshpande is an Environmental professional with more than 27 years hand-on experience in Environmental Pollution Control and Governance, Environmental Policy and Planning, Urban and Industrial Environment Management, Environmental Safeguards and Sustainable Development. He has 360-degree experience of working in various capacities in the field of environment including consulting organisation, environment regulator, development organisation and environmental review/justice. Dr. Deshpande worked with Asian Development Bank as part time Member of its Compliance Review Panel (www.compliance.adb.org) and responsible to ensure that the ADB financed projects are strictly following environment related ADB norms and procedures. He has also worked on assignments from APCTT-UN ESCAP, EBRD and AIIB on environmental safeguards. Dr. Deshpande, previously, worked for more than 4 years as Expert Member with National Green Tribunal (NGT), India (www.greentribunal.gov.in) (2013-17) which is only third dedicated environmental justice delivery system and has original, special and appellate jurisdictions in the matters related to environment. He has worked with environmental regulator, Maharashtra Pollution Control Board (MPCB) (www.mpcb.gov.in). He is also Adjunct Professor at IIT- Mumbai and is involved in academic activities at several institutes. He is also working on several committees of State and Central government on environmental governance and research.

Abstract of the talk

India is facing significant challenges of air pollution and more than 132 cities are now covered under the ambitious NCAP. The regulatory response of the authorities and also, of the judiciary has been conventional command and control with some innovation in mitigation strategies and associated finance to the urban local bodies. Most of these cities have already conducted emission inventory and source apportionment studies and have evolved city specific action plan. Still however, the desired results are far at distance, though the air action planning has been practised since 2005. The industries are one of the major contributors to the city specific air pollution. International environmental governance now is rapidly evolving and new focus is on decarbonisation through various initiatives. Europe is fast moving for Cross Border Adjustment Mechanism (CBAM), Corporate Sustainability Due Diligence Directive (CSDDD) and Corporate Sustainability Reporting Directive (CSRD). The industries need to comply these initiatives in order to be relevant in market and to secure their business. This will surely have co-benefit in terms

of more efficient and clean operations of the industry which ultimately will lead to reduced pollution including the air emissions. The presentation will address these aspects and will try to present the current status of Indian industries and how these international governance initiatives will help industries not only to be competitive but also lead to reduced air pollution and lesser carbon footprint.

Invited Talks

Aerosol bioparticles exposure and health risk assessment at landfill site in Nagpur

Dr. Krishnamurthi Kannan
CSIR-NEERI

Speaker's profile

Dr. Kannan Krishnamurthi obtained Master's degree in Environmental Toxicology and Doctorate in Biochemistry from Nagpur University in 1990 and 2001 respectively. He also qualified the Post Doctoral study on HER-2 mechanism using in vitro cell culture system. He joined CSIR-NEERI in September 1995 and is Chief Scientist & Sub Vertical In-charge WCTA and co-chair in Waste Management Vertical at CSIR-NEERI. In view of his contribution and experience Dr. K. Krishnamurthi has been nominated in various International and National committees. Dr. Krishnamurthi is a recipient of STOX-2012 (Fellowship) for the year 2012 by Executive Council of Society of Toxicology (STOX) at Lucknow (UP). He has been awarded by fellowship by many academies. He delivers keynote addresses and lectures in a number of National Conferences and seminars and serves in a number of Committees and Task Forces in various capacities. He has near about 50 publications in various National & International, holds 3 patents and guides Ph.D students.

Abstract of the talk

Waste management facilities maintained and managed by the cities contribute to public health and cause environmental concerns due to the generation and release of particulate matter, bioparticles and aerosols (organic and inorganics). Pathogenic microorganisms laden Bioparticles (bioaerosols) can pose risks to nearby communities apart from the workers involved in management of the waste. This study intended to identify and quantify inhalable concentrations of bioaerosols (bacteria and fungi) at a municipal landfill site (solid waste) in comparison to the surrounding residential sites at downwind and upwind directions in Nagpur, India. The findings of the study showed that the land fill site had a high concentration of bioparticles, with an average total of 11056 CFU/m3 in winter and 2244 CFU/m3 in monsoon. The fungal count was statistically lower than bacterial count in both the seasons. The study also observed antibiotic resistance of certain bacterial isolates, including Bacillus, Staphylococcus gallinarum, and Streptomyces speibonae, to antibiotics such as chloramphenicol, netillin, nitrofurantoin, and streptomycin. The hazard quotient (HQ) >1 arrived in this study conducted on adults employed at the landfill site confirmed having significant risk to bacterial bioparticles. In summary, waste management sites serve as a significant source of bioaerosols due to the decomposition of organic matter in the deposited waste. The public health and the

surrounding environment can substantially affected due to the generation and emission of bioaersols. Proper management of landfill operations, such as implementing effective waste segregation and processing methods, is crucial in mitigation and the release of bioaerosols and in protection of the local communities.

Invited Talks

Air quality management perspectives from ACAAS program: Context setting presentation

Dr. Prakash Doraiswamy
World Resources Institute (WRI), India

Speaker's profile

Dr. Prakash Doraiswamy is the Director of Air Quality at WRI India. Prior to joining WRI India, he worked at RTI International, University of Albany, Desert Research Institute and The University of Tennessee at Knoxville in the US. He has about 22 years of unique experience bringing together air quality measurements and air quality modelling for assessing and managing air quality. His research experience covers a broad range of areas, including particle and gaseous measurements, mobile source emission inventory development, regional emissions and air quality modeling, source apportionment, quality assurance, and diagnostic data analysis. Dr. Doraiswamy is specifically interested in building capacity in the Global South. Over the years, he has successfully procured multiple grants from organizations such as the Health Effects Institute, National Aeronautics and Space Administration (NASA), U.S. Environmental Protection Agency (EPA) and U.S. Department of State focused on citizen science, low-cost sensors and satellite data, air quality modeling, capacity building, and quality assurance oversight. In his current role at WRI, he directs the technical aspects of our support for the cities in their effort to manage air quality. In addition, he serves as the science lead for the Clean Air Catalyst Indore Pilot and is directing efforts from emission inventory to solutions design and development. He is a member and immediate past Chair of the Editorial Review Board of the Journal of Air & Waste Management Association (A&WMA), the Chair of A&WMA Publications Committee, and a member of the Editorial Advisory Committee of EM: A&WMA's Magazine for Environmental Managers.

Abstract of the talk

As part of the Accelerator for Clean Air Actions (ACAAS) program, WRI India is supporting 10 Indian cities with technical support and capacity building initiatives to plan and implement solutions towards improving air quality. The objectives include providing technical support, identify mitigation measures, perform on-ground pilot testing and help develop plans to scale up solutions. The program works across multiple sectors including transport, road dust, waste burning, construction, bakeries, and industries. This presentation will provide an overview of the ongoing efforts across the 10 cities, its successes and challenges, and our future outlook. This talk will also share our experiences working across the 10 cities and the limitations they face and aims to set the context for the stakeholder workshop and the panel discussion. Through our ACAAS experience, we

will identify specific topics for further discussion on how cities can prepare for the next phase of the National Clean Air Programme.

Invited Talks

Role of IIT Madras as Institute of Repute in National Clean Air Programme

Prof. Shiva Nagendra S M
Indian Institute of Technology Madras

Speaker's profile

Dr. Shiva Nagendra SM is presently working as Professor in Department of Civil Engineering, Indian Institute of Technology Madras (IITM), Chennai, India. He is Chairman GATE, JAM 2025, IIT Madras. He has more than 24 years' experience in research, teaching, consultancy and community development. He has published more than 100 research publications in international and national refereed journals, two reference book, more than 100 papers in conferences and three patents. He is author of books titled 'Urban Air Quality Monitoring, Modelling and Human Exposure Assessment' (ISBN:978-981-15-5511-4) and 'Artificial Neural Networks in Vehicular Pollution Modelling' (SCI-41, ISBN-10: 3-540-37417-5) published by Springer. He is associate editor of the journal Frontiers in Sustainable Cities, Frontiers and Journal of the Institute of Engineers (India): Series A, Springer. He also edited seven conference proceedings. He is Director of Clean Environment for Planetary Health in Asia (CEPHA) Network supported by UKRI. He is founder chairman of Indian International Conference on Air Quality Management (IICAQM) series and founder President of Air Quality Management Association (AQMA). He has been part of numerous grants involving multiple national and international partners. Much of his research interests focus on air quality management which includes monitoring, source apportionment, modelling, design and development of emission control system, development of air quality management system, personal exposure monitoring, environmental impact assessment, outdoor-indoor air pollution relationships and indoor air quality management. He is WHO subject matter expert in a global technical consultation on the transmission of respiratory pathogens through the air. He also is a professional member of several technical institutions and organizations of India.

Abstract of the talk

The National Clean Air Programme (NCAP) aims to mitigate air pollution in India's major cities and states through a comprehensive, time-bound strategy targeting a 20-30% reduction in Particulate Matter (PM10) concentrations by 2024. As part of this initiative, IIT Madras contributed by conducting source apportionment and carrying capacity assessment studies across eight cities: Trichy, Madurai, Chennai, Thoothukudi, Belgaum, Davanagere, Bagalkote, and Nellore. These studies encompassed the development of Emission Inventory (EI), Source Apportionment (SA), and Carrying Capacity (CC) frameworks to identify key pollution sources, quantify their contributions, and evaluate

their spatial spread. The findings provided critical insights into urban air pollution dynamics, helping to inform evidence-based policy and interventions. Challenges encountered during the study, including data acquisition, methodological constraints, and stakeholder engagement, are also discussed to highlight avenues for improving future air quality management strategies.

Invited Talks

Clean Energy for Healthy Environments and Lives: Climate, air quality and health co-benefits

Prof. Sotiris Vardoulakis
University of Canberra

Speaker's profile

Sotiris Vardoulakis is Professor of Environmental Public Health at the University of Canberra, Director of the HEAL (Healthy Environments And Lives) National Research Network, and Adjunct Professor at the Indian Institute of Technology Madras. He is co-Director of the Clean Air and Planetary Health in Asia (CEPHA) Network and the Clean Energy for Healthy Environments And Lives (CE4HEAL) partnership. Previously he was Director of Research and Head of the WHO Collaborating Centre on Occupational Health at the Institute of Occupational Medicine in Edinburgh, and before that Head of the Environmental Change Department at Public Health England. He also held academic positions at the Australian National University, the London School of Hygiene and Tropical Medicine, and the University of Birmingham. Professor Vardoulakis' main research interests include climate change, air pollution and health, sustainable cities, exposure assessment, health impact assessment, environmental epidemiology, and public health communication and policy. He was one of the lead authors of the first UK Climate Change Risk Assessment and contributor to the National Adaptation Programme. He served as a member of the National Institute for Health and Care Excellence (NICE, UK) Public Health Advisory Committee on Air Pollution and of the Royal College of Paediatrics and Child Health Working Group on Indoor Air Quality. He is a currently a Coordinating Lead Author of the UNEP Global Environmental Outlook (GEO-7) Air Chapter.

Abstract of the talk

In a year of climate extremes, there is increasing realisation that widespread reductions in greenhouse gas emissions across all sectors are needed to limit global warming to 1.5oC or 2oC above pre-industrial levels. The decarbonisation of household energy is a key aspect of climate change mitigation efforts in high-income as well as low- and middle-income countries. In Australia, roof-top photovoltaic panels are extensively used mainly in suburban areas. Solar power covers approximately 16% of Australia's electricity generation and is the fastest growing power generation type in the country. However, remote Aboriginal communities in the Northern Territory have benefited less from the penetration of photovoltaics and still significantly rely on diesel generators for their domestic energy needs. In India, many rural communities rely on solid fuels and increasingly on LPG, despite efforts to promote solar microgrids. A range of barries and

enablers for the adoption of solar microgrids in India and Australia have been identified as part of the Clean Energy for Healthy Environments and Lives Australia-India collaborative project. These include financial, technical, administrative, and cultural issues that pause similar challenges in both countries. The potential air quality and health co-benefits from the clean domestic energy transition are explored in this presentation in the context of international research collaboration and knowledge exchange in climate change mitigation.

Invited Talks

Integrative approaches to combat air pollution and health impacts through One Health

Dr. Kraichat Tantrakarnapa
Mahidol University

Speaker's profile

Currently, Kraichat Tantrakarnapa is working at Faculty of Tropical Medicine, MAHIDOL University, Thailand. Kraichat has experienced for 25 years in many natural resources and environmental areas in Thailand and neighboring countries. He has participated as a consulting unit for many organizations, both local and international agencies. The experienced works are Environmental Health, Environmental Impact Assessment., Computer application for Environmental Management, Environmental Health Impact Assessment, Climate change and health impact, Environmental Management System, Occupational Health and Safety Management System and Environmental Planning.

Education

- B.S.(Statistics) Chiangmai University, Thailand
- M.Sc. (Technology of Environmental Management), Mahidol University, Thailand
- Ph.D. (Environmental Engineering), Suranaree University of Technology, Thailand
- Post graduate in Occupational Health and Safety in the Workplaces, ITC-ILO and University of Torino, Italy

Abstract of the talk

The air pollution has been a critical problem worldwide with the consequences of health impacts. The current society is complicated and it is the challenges for solution. There are many factors have induced the environmental changes and people health. One discipline may not be the tool for solving the problem, the understanding of system in terms of human health, animal health and ecosystem might be one approach. In addition, the environmental change in the future has been raised that was negative impacts to our ecosystem including our health such as air pollution and climate change. The integrating approach for air pollution and health impacts through one health might be alternative for our society. The integrating of multidisciplinary and partnership should be taken to solve the problem.

Invited Talks

Ventilation retrofitting for improving indoor air quality

Prof. Priya Rajagopalan
RMIT University, Australia

Speaker's profile

Prof. Priya Rajagopalan is a building scientist and Associate Dean, Research and Innovation at the School of Property, Construction and Project Management, RMIT University. She is also the Director of the Post Carbon Research Centre that tackles complex challenges of decarbonising the built environment and infrastructures to transition to a sustainable, equitable and resilient future. Her research interests span from building energy efficiency, indoor environmental quality, and urban climatology. She has coordinated several projects related to building performance and indoor air quality. She is Past President of the Architectural Science Association and Editorial Board member of Energy and Buildings journal.

Abstract of the talk

Residents in aged care homes constitute a significant proportion of Australia's population. The elderly population is vulnerable to poor indoor air quality. As mobility decline with age, they tend to stay longer indoors compared to normal population. Indoor air quality (IAQ) parameters in selected aged care homes in Melbourne, Australia were monitored for one-year, and the advantages of adding a supplementary fresh filtered air ventilation system in selected spaces were examined. The ventilation system was installed independent of the existing heating, ventilation and air conditioning (HVAC) system in each of the facilities. The monitoring enabled a thorough understanding of the operation and indoor environmental performance of the aged care homes and insights on various factors affecting IAQ. The results showed that air change rates (ACH) were generally sufficient for low or average occupancy, but insufficient when the rooms were fully occupied. Up to 1000ppm reduction in CO2 concentration level was achieved with the addition of the supplementary ventilation system. A systematic approach in monitoring the air quality regularly will improve the health, well-being, and quality of life of aged care residents and decrease hospital visits and associated expenditures. Detailed monitoring of daily activities is very essential to supplement the findings.

Invited Talks

Adverse health effects of air pollution

Dr. Anant Mohan,
AIIMS

Speaker's profile

Dr. Anant Mohan is currently Professor and Head of the Department of Pulmonary, Critical Care and Sleep Medicine at the All India Institute of Medical Sciences, New Delhi, India. He is the recipient of the UK Commonwealth Fellowship in Chest Medicine and Interventional Pulmonology in 2008-2009. He also received the prestigious Visiting professor award by the French Institute in India (IFI) for Louis Pradel Hospital Lyon, France in Dec 2023. In addition, he has been awarded Visiting Professorship in respiratory Medicine at the University College London in 2023. He is Chief Investigator and Co–Investigator of several International collaborative and extramural projects funded by ICMR, DBT, UGC, and European Union and has more than 300 International and National publications in peer-reviewed journals related to various respiratory diseases. His clinical and research interests include Lung Cancer, Interventional Pulmonology, COPD, and Lung transplant. He is the Chief Investigator of the ICMR-Centre for Advanced Research and Excellence (ICMR-CARE) in the field of "Breathomics in Respiratory diseases" that aims to evaluate the role of exhaled breath in common disorders such as TB, Lung cancer, Sarcoidosis, asthma and COPD. He is Fellow of the Royal College of Physicians (London), Fellow of the National Academy of Medical Sciences, and member of major International Respiratory bodies such as the European Respiratory Society and American Thoracic Society. He is also part of several other academic societies.

Abstract of the talk

Air pollution has significant adverse effects on both short-term and long-term health. Exposure to pollutants like particulate matter (PM2.5), nitrogen dioxide (NO2), sulfur dioxide (SO2), and ozone can lead to respiratory issues, including asthma, bronchitis, and chronic obstructive pulmonary disease (COPD). These pollutants irritate the airways, increase inflammation, and reduce lung function, which can exacerbate pre-existing conditions and increase vulnerability to respiratory infections.

Long-term exposure to air pollution is linked to cardiovascular diseases, as it contributes to the buildup of plaque in the arteries, raising the risk of heart attacks and strokes. Studies also show that air pollution may affect brain health, with links to cognitive decline, dementia, and developmental delays in children. Moreover, it is associated with an increased risk of cancer, particularly lung cancer, as well as complications in pregnancy, including low birth weight and preterm birth.

Vulnerable groups, such as children, the elderly, and people with pre-existing health conditions, are especially at risk. Air pollution is responsible for millions of premature deaths worldwide each year, making it one of the leading environmental health threats globally. Reducing air pollution through cleaner energy sources, stricter regulations, and better urban planning is critical to improving public health outcomes.

Invited Talks

Impact of daily Air Quality Index information and monitoring on air pollution awareness and respiratory health: A randomized pilot study

Dr. A Chitra
Madras Medical College

Speaker's profile

Academics: Professor, Institute of Community Medicine, Madras Medical College / MD in Community Medicine: Madras Medical College (2008) / Extensive Roles: Assistant Surgeon, Assistant Professor, Associate Professor, Professor (since 2019)
Research: Nodal Officer for DHR funded Multidisciplinary Research Unit at MMC (since 2017) / Co-Investigator in Health Studies & Extramural studies Funded by ICMR & DHR
DHR funded Costing of health services in India (CHSI) Study
National Hospital based Registry on VenousThromboembolic Disorders (i-RegVeD)
ICMR funded CAR – RAHAT programme
Published more than 20 original research articles in esteemed journal.

Abstract of the talk

Background: Air pollution contributes significantly to respiratory health issues, yet public awareness of pollution levels remains limited. This study evaluated the impact of daily air quality index (AQI) updates and personalized monitoring on awareness and respiratory health in Chennai. Methods: A randomized trial with 100 participants divided into intervention and control groups was conducted over 8 weeks. The intervention group received daily AQI updates via SMS, accompanied by instructions on protective behaviors and access to a portable AQI monitor for home measurements; the control group did not. Pre and post-intervention outcomes included self-reported respiratory symptoms, awareness of air pollution impacts, and AQI-related behavioral changes, assessed through validated questionnaires and interviews. Results: Participants in the intervention group demonstrated significant improvements in AQI awareness (mean score increase: 3.2 ± 1.1, $p < 0.01$) and adoption of protective behaviors. Additionally, intervention participants reported a 15% reduction in respiratory symptoms compared to the control group. Daily AQI monitoring empowered individuals to adapt their routines effectively, particularly during episodes of high pollution. Conclusion: Providing daily AQI updates and access to personalized air quality monitoring tools improves awareness and health outcomes among urban residents. This pilot study underscores the potential of such interventions as scalable strategies to mitigate air pollution's health impacts, particularly in rapidly urbanizing settings like Chennai. Further large-scale trials are recommended to validate these findings. Keywords: Air Quality Index, Respiratory Health, Behavioral Interventions.

Invited Talks

Characteristics of particulate matter resuspension due to human activities in indoor environments

Dr. Chithra V S
Centre for Water Resources Development and Management

Speaker's profile

Dr. Chithra V. S. holds a B.Tech degree from the University of Kerala, a Master's degree from Anna University, Chennai, and a Ph.D. in Environmental Engineering from the Indian Institute of Technology Madras. She is currently serving as a Scientist in the Ecology and Environment Research Group at the Centre for Water Resources Development and Management in Calicut, Kerala. With over 10 years of experience in academia and research, her expertise lies in indoor air quality, air pollution modeling, emission inventory, source apportionment, and the health and environmental impacts of air pollution. Dr. Chithra has received several fellowships and awards, including the Rekha Nandi and Bhupesh Nandi Prize from The Institution of Engineers (India) and the Shree Gayathree Devi Award from IIT Madras. She has published more than 40 research papers in leading international and national journals and conferences. Additionally, she is an active member of professional organizations such as the Institution of Engineers (India) and the Indian Society for Technical Education and serves as a reviewer for several journals.

Abstract of the talk

Particulate matter resuspension from indoor surfaces is a significant contributor to occupant exposure to airborne particles. Numerous field studies have identified it as a primary source of indoor air pollution. The process of PM resuspension is influenced by several factors, which can be broadly categorized into three groups: the characteristics of the particulate matter itself, the indoor environmental conditions, and human-related activities. Human movements, such as walking, and other activities are responsible for disturbing settled particles on surfaces, lifting them back into the air. This resuspension not only contributes to increased exposure to particulate matter but also poses a potential health risk, as it can release pathogens and bioaerosols into the indoor air. Inhalation of these particles could lead to respiratory infections and other health issues. Other factors, such as indoor relative humidity, the type of flooring materials, and specific patterns of human activity, also influence the resuspension of particulate matter. The combined effects of these different factors on indoor air quality need more in-depth research to fully comprehend their impact and the mechanisms driving the resuspension of particulate matter in indoor environments.

Invited Talks

Particulate Matter (PM10) bound Microplastics in urban area and its associated health risks

Dr. Lekshmi V Mohan,
NIT Trichy

Speaker's profile

Dr. Lekshmi Mohan V joined as Assistant Professor in the Department of Civil Engineering at National Institute of Technology Tiruchirappalli in 2024. Prior to her academic career, Dr. Lekshmi served as Senior Program Associate at World Resources Institute (WRI) India, where she worked on policy implementation and management aspects of Air Pollution in collaboration with the Greater Chennai Corporation. She completed Ph.D. in Civil Engineering from Indian Institute of Technology Madras in 2021 and Masters in Environmental Engineering from Sardar Vallabhbhai National Institute of Technology, Surat (2014). Her dedication to advancing knowledge in her field is reflected in her impressive accomplishments, including over six publications, a patent for a multi-stage air purification system, and her role as a reviewer for several reputed journals. Her research interests include Air Quality Management, Urban Air Quality, Air Quality monitoring, Air Quality Modelling, Indoor Air Pollution, Air Purification Technologies, Air Pollution Control, Personal Exposure Assessment, Health Risk Assessment, Sensor-based monitoring networks.

Abstract of the talk

Inhaled microplastics (MPs) may contain chemical additives, such as phthalates and bisphenol A (BPA) that has a potential to trigger immune response. Airborne microplastic in the urban atmosphere of Tiruchirappalli city was studied by collecting PM_{10} samples at various locations during the monsoon season. The mean PM_{10} concentration at Thuvakudi (Industrial area) was higher (43.67±6.3 µg/m³) compared to the NITT Campus (Background site) (28.17±6.4 µg/m³), indicating strong influence of industrial activities, vehicular emission and localized events. Further, the PM_{10} samples were investigated under fluorescence microscope employing Nile Red staining to elucidate the prevalence of MPs. The study revealed MPs concentration in the range of 30.2 ± 13.6 to 32.69 ± 7.27 particles/m^3. Also, the observed MPs were mostly fragments and fibers (length to diameter ratio≥3:1). The size of fragmented MPs ranged between 1.6 µm to 10 µm and in the case of fibers, diameter below 3 µm and length over 10 µm was noticed. This study indicates the need for further studies to understand the spatial and seasonal variation in microplastic concentration in the atmosphere and characterize them to identify the potential sources.

Technical Session I: Air quality measurement and monitoring

Development of air quality monitoring web application using Google Earth engine

*Abhimanyu Kumar Gond, Aarif Jamal, Tarun Verma

Department of Mining Engineering
Indian Institute of Technology (BHU)
Varanasi-221005, India
Email: abhimanyukrgond.rs.min21@itbhu.ac.in

ABSTRACT: This study focuses on developing a web application for air quality monitoring using Google Earth Engine (GEE). Using satellite data from Sentinel-5P provides insights into the spatiotemporal distribution of key pollutants, including SO2, NO2, O3, CO, CH4, aerosols, and HCHO. The research addresses the challenge of air quality monitoring in regions with limited ground-based data by integrating remote sensing, GIS, and cloud computing. Global analysis reveals significant concentrations of pollutants in regions such as eastern China, India, Africa, Europe, and the U.S.A. The application allows users to visualize pollution patterns and generate time series charts at any point in the location. Sustainable practices, such as clean energy promotion and emission control, are recommended to tackle air pollution. This tool aims to assist researchers, policymakers, and educators in making data-driven air quality management decisions, enhancing environmental policy effectiveness.

Technical Session I: Air quality measurement and monitoring

Mitigating humidity interference in PM2.5 measurement using heated inlet with laser scattering technology

Kruti Davda, Nirali Goswami, Vrushank Vyas

Oizom Instruments Private Limited
Ahmedabad, Gujarat – 380015, India
Email: kruti@oizom.com

ABSTRACT: Particulate matter (PM) is a critical air pollutant with significant effects on human health and the environment. Optical Particle Counters (OPCs), commonly used for PM detection due to their affordability and portability, are limited by their sensitivity to high relative humidity (RH), which can cause overestimation of PM levels. This study investigates the effectiveness of integrating a heated inlet with real-time PM2.5 sensors to reduce RH-related measurement inaccuracies. Laboratory experiments demonstrated a 25–32% reduction in RH by dehumidification using the heated inlet, keeping the sensor within its optimal operating range. Field evaluation conducted by collocation with a Beta-Attenuation Monitor (BAM) indicated that the heated inlet significantly improved the accuracy of PM2.5 measurements in higher humidity conditions. Statistical analysis showed a higher correlation (R2 = 0.82) and reduced error (RMSE = 7.58 µg/m3) for sensors with the heated inlet, compared to those without it. These findings suggest that incorporating a heated inlet in PM sensors effectively mitigates RH interference, enhancing measurement reliability in humid environments.

Technical Session I: Air quality measurement and monitoring

A remote sensing approach to analyze impact of crop residue burning on urban air quality using fire characteristics and PM2.5 to CO ratio

Sayeed Anwar[1], Prakhar Misra[2]

[1]Geospatial Engineering Group, Department of Civil Engineering, Indian Institute of Technology, Roorkee, Roorkee – 247 667, India. Tel.: +91 9934523376, E-mail: sayeed_a@ce.iitr.ac.in

[2]Geospatial Engineering Group, Department of Civil Engineering, Indian Institute of Technology, Roorkee, Roorkee – 247 667, India Tel.: +91 13 32285289, E-mail: prakhar.misra@ce.iitr.ac.in

ABSTRACT: Air Pollution is an increasing concern, especially in developing countries. In India, the Indo-Gangetic Plain region experiences significant air pollution during winter. The reason for high pollutant levels is often attributed to post-monsoon crop residue burning in Punjab, Haryana and Uttar Pradesh. Satellite remote sensing can be effectively used to detect crop residue fires for analyzing spatiotemporal characteristics of fires. Fire radiative power and Fire Radiative energy are effective measures to characterize crop residue fires. Crop residue burning emissions include PM2.5, CO and other pollutants. PM2.5/CO ratio is an excellent indicator of smoke due to wildfire emissions which has been proved by Jaffe et al., (2022). In this study, we devise a method to correlate Fire Counts and Fire Radiative Power with PM 2.5 to CO ratio to assess the impact of crop residue burning emissions on urban air quality in cities in the IGP region such as Delhi. Delhi experiences severe pollution during winter as PM2.5 levels exceed the World Health Organization threshold for unhealthy air. We found out that the PM2.5 to CO ratio increases during post-monsoon crop residue burning in the IGP region especially in Punjab and Haryana.

Technical Session I: Air quality measurement and monitoring

Bench-scale study for control of dust resuspension from playgrounds and material stockpiles using dust suppressants

Umangi H. Mehta[1*], V.S. Vamsi Botlaguduru[1], Manaswita Bose[2], Virendra Sethi[1]

[1]Environmental Science and Engineering Department
[2]Department of Energy Science and Engineering
IIT Bombay, Mumbai - 400076, India
*Tel.: +91 7567497905, Email: umangim96@gmail.com

ABSTRACT: Dust resuspension from surfaces such as open grounds and stockpiles is a significant source of air pollution. This study investigates the effectiveness of moisture and dust suppressants in reducing the resuspension of particulate matter (PM) from stockpiles of coal, limestone, iron-ore, and two types of playground soils under varying wind speeds. A bench-scale setup was developed to study dust resuspension for varying conditions of wind speeds and dust suppressant content. Moisture addition was found to be effective at reducing resuspension for coal, but not as well for the cases of limestone and iron-ore. Resuspension of dust from playground soils was found to be influenced by the type of soil and the particle size distributions. The application of 5% and 10% calcium chloride solutions proved effective in enhancing moisture retention, which was further validated using thermogravimetric analysis. The findings are intended for the application of suppression of fugitive dust sources.

Technical Session I: Air quality measurement and monitoring

Temperature and relative humidity driving ozone levels at Kharagpur, India

Samrat Santra[1], Aditya Kumar Patra[12], Vijay Pal[1]

[1]School of Environmental Science and Engineering,
Indian Institute of Technology Kharagpur,
Kharagpur, West Bengal, 721302, India
Tel.: +91 8918246243, E-mail: santra127samrat@kgpian.iitkgp.ac.in
Tel.: +91 9782236817, E-mail: vijaypalmahariya088@gmail.com

[2]Department of Mining Engineering,
Indian Institute of Technology Kharagpur,
Kharagpur, West Bengal, 721302, India
Tel.: +91 9475427366, E-mail: akpatra@iitkgp.ac.in

ABSTRACT: Ground-level ozone, a trace gas at the lower atmosphere, impacts air quality and affects atmospheric oxidation process of many pollutants as well as poses health risks. This study explores the O3 pollution levels at Kharagpur, India, driven by the most important meteorology drivers. On-site measurements were done from a road-side traffic at Kharagpur during 14-24th February, 2023, between 07:00 and 19:00 using a USEPA-approved Serinus 10 ozone analyser and a portable weather station (Kestrel 5500). A strong positive correlation with temperature (r = 0.84) and negative correlation with relative humidity (r = -0.54) were with O3 concentration levels. A Principal Component analysis (PCA) has shown temperature (T) and relative humidity (RH) were the most influencer for O3 levels at road-side area and rural area. Although over an 8-h average, O3 concentration at the road-side is higher than the rural area, but both areas have crossed the prescribed standard limit of O3 exposure set by NAAQS 2009 and WHO 2021. But for a 12-h, there is hardly any difference between the concentration at the two sites. However, the degree of influence that temperature and relative humidity exert on O3 distribution patterns varies significantly between two distinct environments: roadside areas and rural areas. The findings suggest that the necessity of comprehensive assessments of O3 levels influence by T and RH for the formulation of targeted policies to address the increasing level of O3 pollution.

Technical Session I: Air quality measurement and monitoring

Annual variations of air quality parameters at the Kalpakkam nuclear power plant site (East coast of India)

M.Sowmya, U.Preethi, Kothai Parthasarathy, C.V. Srinivas

Safety Quality and Resource Management Group,
Indira Gandhi Centre for Atomic Research,
Kalpakkam - 600 102, India
Tel.: +91 44 22574290, E-mail: sowmyam@igcar.gov.in

ABSTRACT: This first-time study aims to assess the ambient air quality patterns in Kalpakkam. The changes in the levels of particulate matter (PM10, PM2.5) and gaseous pollutants (SO2, NO2, CO) measured at the Indira Gandhi Centre for Atomic Research Facility (IGCAR) are analysed for the period 2019-2021. Post-monsoon elevation in pollutant levels in Kalpakkam is attributed to the lower planetary boundary layer and low wind speed conditions during the winter months of the North East monsoon season. The sea breeze conditions and high wind speed during the summer season cause a low pollution level at our site. Nevertheless, all the air pollutant levels observed at our site were within the criteria as specified by the Central Pollution Control Board (CPCB), India during the study period. The air quality index (AQI) from the observations shows a “good - satisfactory category" as per the CPCB indexing throughout the study period.

Technical Session I: Air quality measurement and monitoring

Seasonal and diurnal variations of PM2.5 and ozone in Bangalore: Impact of meteorological factors on air quality

H N Sowmya[1], Archudha Arjunasamy[2], Reshma E K[3]

[1]Department of Civil Engineering Dayananda Sagar College of Engineering, Bengaluru – 560078, India
Tel, +91 9886889336, E-mail: soumya-cvl@dayanandasagar.edu

[2]Department of Artificial Intelligence and Machine Learning, Dayananda Sagar College of Engineering, Bengaluru - 560078, India
E-mail: archudha.a@gmail.com

[3]Department of Civil Engineering Dayananda Sagar College of Engineering, Bengaluru – 560078, India
E-mail: reshma-cvl@dayanandasagar.edu

ABSTRACT: Bangalore's atmosphere is experiencing high ozone and PM2.5 concentrations due to the release of primary precursors like nitrogen oxides, CO, anthropogenic activities and the influence of meteorological parameters. The data on PM2.5 and ozone were collected from January 2020 to December 2020 at Peenya station, Bangalore, monitored by KSPCB. The high concentration of PM2.5 was observed during monsoon (26.44 ± 39.16 μg/m3), followed by post-monsoon (30.51 ± 56.72 μg/m3), winter (42.54 ± 22.63 μg/m3) and summer (38.43 ± 24.34 μg/m3). The high concentration of PM2.5 during monsoon is contributed by the transportation of particles from distant places in the southwest direction, causing accumulation within the troposphere followed by post-monsoon, winter and summer. However, a similar trend with slight changes was observed in ozone concentration with high concentration during winter (39.40± 32.39 μg/m3) followed by summer (37.07 ± 34.12 μg/m3), post-monsoon (24.33 ± 24.60 μg/m3) and monsoon (22.21 ± 22.73 μg/m3) season. The high concentration during winter and summer was spelt out due to increased Photooxidation of precursor gases, mainly NOX and CO. However, high concentration during post-monsoon is due to the accumulation of pollutants in lower BLH and stagnant wind speed. The study indicates the dominant role of meteorological parameters in the variations of PM2.5 and ozone.

Technical Session I: Air quality measurement and monitoring

Real-Time Dust Monitoring for Metro Construction with Low-Cost Sensors

Sailee Redekar[1], Pralhad Walvekar[2]

[1]Department of Civil Engineering, Sinhgad College of engineering, Pune, Maharashtra, India.
email- saileeredekar99@gmail.com

[2]Department of Civil Engineering, Zeal College of Engineering & Research, Pune, Maharashtra, India.
email- walvekarpralhad@gmail.com

ABSTRACT: For more than 150 years, metro systems have been an essential mode of transportation, and their continual growth and new builds continue to influence metropolitan infrastructure all around the world. Through their effects on urban development, transportation efficiency, and environmental quality, these systems have a major impact on cities. However, there are dangers to public health and air quality associated with metro construction, particularly for those who live close. These risks stem from the dust produced during underground activities. This study highlights the benefits of contemporary monitoring approach and real-time monitoring of Swargate & Shivajinagar metro stations for the exposure of particulate matter. This study fills a significant vacuum in the existing literature by providing a systematic approach for evaluating the effects of dust generated during metro construction. Real-time monitoring during construction is neglected in favor of pre- and post-construction evaluations in traditional environmental impact assessments. In order to monitor particulate matter (PM) during metro construction, this research suggests a modern method that makes use of inexpensive sensors that have improved sensitivity and saturation. Real-time monitoring techniques and inexpensive sensors are examined, and data from two Metro construction sites analyzed. These results will help researchers create a systematic monitoring framework that will suggest PM exposure control strategies. This will provide workable methods to reduce health risks and enhance air quality in rapidly developing urban areas.

Technical Session II: Air quality modelling and machine learning approaches

Chemical characterization and source apportionment of PM10: A case study of Silchar, Assam

Himanshu Gupta, Ankur Gothwal, Sharad Gokhale

Department of Civil Engineering
Indian Institute of Technology
Guwahati, – 781039, India
Tel.: +91 7389002100, E-mail: himanshu.g@iitg.ac.in ;
sharadbg@iitg.ac.in

ABSTRACT: Particulate matter poses a considerable threat to the environment which is a major challenge for the developing countries like India. This study investigates the source apportionment of PM10 in ambient air with three sampling sites in Silchar, Assam during winter. The chemical characterization of PM-bound trace elements (Al, Fe, Cu, Ni, Zn, Mg, Cd, Mn, Pb, Cr, Na, Ca, Mg), ions (K+, NO3-, SO42-, Cl-, NH4+), and carbonaceous aerosols (OC and EC) was analyzed using inductively coupled plasma spectrometry, ion chromatography, and total organic carbon analyzer respectively. Source apportionment studies were carried out to identify the probable sources influencing the region, using the Positive Matrix Factorisation (PMF) model. The PMF model resolved six major sources that contribute to PM10 concentration with the dominance of road dust and construction (27.1%), followed by secondary aerosols (22.4%), vehicular emission (18.1%), industrial emissions (16.1%), biomass burning (12.2%), and marine aerosols (4.1%).

Technical Session II: Air quality modelling and machine learning approaches

Forecasting PM2.5 levels using ARIMA: Insights from temporal data analysis

Aishi Nath, Ganesh Chandra Dhal

Department of Civil Engineering National Institute of Technology Meghalaya Shillong – 793006, India
Tel.: +919438122573, Email: ganeshdhal@nitm.ac.in

ABSTRACT: Particulate matter is a significant atmospheric contaminant that has a detrimental effect on human health. Accurate and reliable forecasting of pollution levels for future intervals facilitates the execution of necessary actions to alleviate possible risks. This study assesses and predicts the PM2.5 concentration in Shillong city, India, over six-month period in 2023 using the Autoregressive Integrated Moving Average model. Thirty-two-month data ranging from 1 January 2020 to 31 August 2022 were used for model training, while the following six month were utilised for evaluating the model's predictions. The findings reveal that the hourly data enables the development of a model that yields reliable predictions over a brief period. The versatility of the prediction model makes it a standard tool for predicting the quality of air. Ultimately, this research underscores the importance of predictive modelling in environmental management, aiding policymakers and stakeholders in implementing timely and effective interventions to improve air quality.

Technical Session II: Air quality modelling and machine learning approaches

Influence of building configurations on airflow, dispersion and ventilation of traffic emissions in urban street canyons-A CFD approach

Namrata Mishra[1], Aditya Kumar Patra[12]

[1]School of Environmental Science and Engineering
Indian Institute of Technology Kharagpur – 721302, India.
Tel: +91-8423426806, E-mail: mishranamrata1196@gmail.com

[2]Department of Mining Engineering
Indian Institute of Technology Kharagpur -721302, India.
Tel: +91-9475427366, E-mail: akpatra@mining.iitkgp.ac.in

ABSTRACT: The degradation of air quality from traffic-induced pollutants in urban street canyons is often overlooked in urban planning. This study investigates airflow and pollutant dispersion within three configurations: symmetric, step-up, and step-down, using computational fluid dynamics (CFD). Each configuration is examined under two scenarios: low-rise (H/W = 1) and high-rise (H/W = 3). Ventilation efficiency is assessed using the dimensionless air exchange rate (ACH*) and net escape velocity (NEV*). Results show complex airflow patterns, particularly in high-rise canyons, with symmetric and step-up configurations exhibiting higher pollutant concentrations on the leeward side due to clockwise recirculation. Step-down canyons displayed the highest pollutant levels, attributed to low wind velocities, while step-up canyons had enhanced wind flow, promoting better dispersion. Ventilation analysis showed that step-up canyons had the highest ACH* and NEV* values, followed by symmetric and step-down configurations.

Technical Session II: Air quality modelling and machine learning approaches

Deep learning based brick kiln detection using SENTINEL-2 imagery

Avinash Mehta[1], Prakhar Misra[2]

[1]Geospatial Engineering Group, Department of Civil Engineering
Indian Institute of Technology, Roorkee – 247 667, India
Tel.: +91 6266398558, E-mail: avinash_m@ce.iitr.ac.in

[2]Geospatial Engineering Group, Department of Civil Engineering
Indian Institute of Technology, Roorkee – 247 667, India
Tel.: +91 13 32285289, E-mail: prakhar.misra@ce.iitr.ac.in

ABSTRACT: Brick kilns significantly contribute to air pollution and environmental degradation in South Asia, while often operating without proper regulation. This paper introduces a scalable deep learning framework for detecting brick kilns using Sentinel-2 satellite imagery. By applying the state-of-the-art YOLO version 9 object detection model, we identified over 1,200 brick kilns across an area of 28,170 km2 in the Delhi-NCR region. In our evaluation, the YOLOv9 model achieved a mean average precision (mAP50) up to 85%. Our approach simplifies the process by eliminating the need for pixel based classification and multi-stage processing, offering a more efficient and solution-based approach for large-scale monitoring. This research presents a cost-effective tool for tracking brick kiln activity and supporting air quality management efforts.

Technical Session II: Air quality modelling and machine learning approaches

Particulate Matter (PM2.5), Temperature, and Humidity Interactions: Comparing Multiple Linear Regression and Machine Learning Models in Urban Areas

Rochitra Keisham[1], Nongthombam Premananda Singh[1]

[1]Department of Civil Engineering, Manipur Institute of Technology
School of Engineering, Manipur University
Imphal West – 795004, India
Tel.: +91 9176207512/ +91 9862977021,
E-mail: keishamrochitra@gmail.com/
premananda.mit.ce@manipuruniv.ac.in

ABSTRACT: This study examines the link between PM2.5 concentrations, temperature, and humidity in urban traffic corridors. PM2.5, a harmful fine particle, is impacted by temperature and humidity, with emissions in traffic-heavy areas intensifying these effects but the relationships may not be linear due to various factors and complex interactions. In order to examine the link, this study compares two PM2.5 prediction methods: Multiple Linear Regression (MLR) and machine learning models (Random Forest and Gradient Boosting). While MLR is simple, it lacks the ability to capture complex interactions. Machine learning models outperform MLR by detecting intricate patterns, improving prediction accuracy. Findings indicate that machine learning models are more effective for PM2.5 predictions in traffic corridors, supporting better air quality management in urban areas facing climate change.

Technical Session II: Air quality modelling and machine learning approaches

Machine learning imputation techniques for optimum air quality index predictions

Salvator Lawrence[1], B. Srimuruganandam2[*]

[1]Department of Environmental
and Water Resource Engineering,
School of Civil Engineering,
Vellore Institute of Technology,
Vellore – 632 014, India.
Tel.: +91 9385624168, Email: bsrimuruganandam@vit.ac.in

[2]Centre for Clean Environment,
Vellore Institute of Technology,
Vellore – 632 014, India
Tel.: +91 9791177668
E-mail: salvator.lawrence2022@vitstudent.ac.in

ABSTRACT: Air pollution poses significant health hazards, exacerbated by rapid urbanization. Predicting air quality has become crucial to mitigate its impact. Traditional methods are inadequate, prompting the use of Artificial Intelligence, specifically Machine Learning (ML). However, dataset quality affects ML performance. This study applies six imputation techniques coupled with four ML models for precise Air Quality Index prediction in Vellore, India. The results demonstrate that the Gradient Boosting Regressor model, integrated with Support Vector Machine imputation achieves superior performance, with a coefficient of determination R 2=0.9802, and root mean squared error RMSE=4.3471. Scatter plot shows the best fit by the model. Comparative analysis highlights the effectiveness of ML models with advanced imputation techniques over conventional methods employed for prediction. The research contributes for an efficient air pollution monitoring and management with informed policy reforms.

Technical Session II: Air quality modelling and machine learning approaches

A comparative source apportionment studies at five cities and air pollution control technologies

Shiva Nagendra SM*[1], Nidhi Verma [1], Jithin Jose [2], Chaithra S[1], Sathya Prabhakaran SP[1], Mahalaksmi M[1]

[1]Department of Civil Engineering
Indian Institute of Technology
Madras Chennai – 600 036, India
E-mail: snagendra@iitm.ac.in

[2]National Institute of Advanced Studies, Bengaluru

ABSTRACT: The study includes city-specific PMF modeling to identify the possible sources of PM10 pollution across five Indian cities (Chennai, Madurai, Nellore, Thoothukudi, Tiruchirappalli). Different hotspots were selected in each city and the major contributors include resuspension, crustal sources, vehicles, and secondary aerosols, with site-specific variations like marine aerosols and oil combustion observed in some locations. To address air pollution challenges, a team from IIT Madras and Envitran Smart Systems Pvt. Ltd. developed two innovative solutions: CycloFine and RDC. CycloFine, a patented four-stage air purification system, achieves up to 90% PM reduction using mesh screening, baffles, cyclones, and HEPA filtration. It operates automatically based on air quality thresholds. RDC, a patented low-cost road dust collector, aids manual sweepers in efficiently collecting road dust, with 90-95% efficiency using cyclone separator technology.

Technical Session III: Air quality health impacts and policy interventions

Association of urinary metabolites of carcinogenic pollutants with cognitive function among adult population of West Bengal, India: A cross-sectional study

Anupa Yadav[1&2], Aniruddha Mukhopadhayay[2], Amit Chakrabarti [1], Asim Saha[1] and Pritha Bhattacharjee[2]

[1]ICMR - Centre for Ageing and Mental Health (I-CAM),
Indian Council of Medical Research (ICMR);
Kolkata – 700091, India
Tel.:+91 33 2364390, E-mail:anupayadav08@gmail.com

[2]Department of Environmental Science,
University of Calcutta,
Kolkata-700019, India
E-mail: pbenvs21@gmail.com

ABSTRACT: In scientific findings it seem that air pollution is not merely an environmental concern but a silent killer, insidiously infiltrating our brain and impacting cognitive health. Therefore, it is imperative to prioritize measures that address air pollution and its insidious connection to cognitive decline. Study aim to find the prevalence of cognitive impairment, endeavoured to identify impact of sociodemographic factors on cognitive function, and association between cognitive decline and urinary metabolites of arsenic (U-iAs), cadmium (U-Cd), lead (U-Pb, δ-ALA) benzene (SPMA), and PAH (1-OHP), if any. Cognitive ability was measured (N=383) by using Mini Mental State Examination (MMSE), questionnaire was used to collect data on demographic and lifestyle factors affecting cognitive ability. U-iAs, U-Cd and U-Pb were measured (N=258) by atomic absorption spectrometer (AAS), δ-ALA by spectrophotometer, SPMA and 1-OHP by high pressure liquid chromatography (HPLC). The prevalence of mild cognitive impairment (MIC) was 14.09% among total study individuals. Among females, MIC prevalence was 3 times higher than males, in rural individuals it was twice than in urban counterparts, and in age group >60 years, it was 3 times higher than those <60 years. Females using biomass fuel showed 2.5 times higher prevalence of MIC than those using clean fuel. Regardless of study site, age, education, family income, and fuel used for cooking, females consistently exhibited significantly higher MIC prevalence than males. In females, increase in urinary metabolites such as δ-ALA, SPMA, and 1-OHP

showed positive correlation with reduction in Mini-Mental State Examination (MMSE) score. While, in males only 1-OHP showed this positive correlation. Exposures to environmental As, Cd, Pb, benzene, and PAH from cooking activities, solid biomass fuel, smoking and travelling could be potential contributors to cognitive decline, reflected in lower cognitive scores in individuals even under 50years age. Our study underscores the importance of pollutants biomonitoring in unexposed adult population.

Technical Session III: Air quality health impacts and policy interventions

Solar Microgrids to Combat Household Air Pollution in Rural India: A Case Study

Gopika Indu [1,2*], Shiva Nagendra S M[2], Sotiris Vardoulakis[1]

[1]HEAL Global Research Centre, Health Research Institute, Faculty of Health, University of Canberra, Bruce ACT 2617, Australia.

[2]Air Quality Research Laboratory, Department of Civil Engineering, Indian Institute of Technology Madras, Chennai – 600036, Tamil Nadu, India.
Tel: +91 9567285864 | Email: gopika.indu@canberra.edu.au

ABSTRACT: This case study examines indoor air pollution in ten rural households in Pandeshwaram, South India, which rely on solid biomass fuels, such as firewood, for cooking. Indoor air quality measurements revealed high levels of air pollutants, significantly exceeding WHO standards and leading to respiratory issues, particularly affecting women and children. Interviews showed residents were unaware of the health risks as well as they lacked affordable, cleaner alternatives. The study further explored the feasibility of implementing a solar microgrid in the village to power electric stoves and lighting, offering a potential solution to reduce household air pollution. The preliminary analyses support this shift and suggest that while initial investments are considerable, they offer long-term savings and health benefits. This study concludes that solar microgrids could be a viable, sustainable energy alternative, and such a pilot-study can contribute to broader efforts to address rural indoor air pollution and support sustainable energy transitions in similar communities across India.

Technical Session III: Air quality health impacts and policy interventions

Health impact assessment of road traffic noise in two Indian cities

Lakshmi Pradeep[1], Shiva Nagendra S M[1]

[1]Department of Civil Engineering
Indian Institute of Technology
Madras Chennai – 600 036, India
Tel.: +91 9497773420,
E-mail: lakshmipradeep02@gmail.com;
snagendra@iitm.ac.in

ABSTRACT: Road traffic noise emerges as a primary contributor to the overall urban noise levels, leading to various health ramifications, including short-term and long-term effects. This study investigates the health and economic impacts of road traffic noise on residents in two major Indian cities, Chennai and Delhi. Disability-Adjusted Life Years (DALYs) is used to quantify the burden of noise-related health effects, such as annoyance, sleep disturbance, ischemic heart disease, and stroke, attributable to traffic noise. The noise level reduction by 3 dB(A) indicates potential DALY reductions of 19% in Chennai and 27% in Delhi, corresponding to savings of INR 6,054.51 crores and INR 7,467.49 crores, respectively. Sleep disturbance and annoyance are the primary contributors to the overall disease burden. These findings underscore the urgent need for noise abatement policies, emphasizing that traffic noise should be addressed as a significant public health risk within India's environmental health policies.

Technical Session III: Air quality health impacts and policy interventions

Factors affecting road dust and control measures: A review

Sourav Mishra[1], Suresh Pandian Elumalai[2]

[1]Department of Environmental Science and Engineering
Indian Institute of Technology (Indian School of Mines), Dhanbad
Dhanbad-826004, India.
Tel.: +91 8763030996, E-mail: 23dr0175@iitism.ac.in

[2]Department of Environmental Science and Engineering
Indian Institute of Technology (Indian School of Mines), Dhanbad
Dhanbad-826004, India
Tel.: +91 9471191703, E-mail: espandian@iitism.ac.in

ABSTRACT: Particulate matter in atmosphere affect air quality, human health through respiratory illness and aesthetics through visibility reduction. Three cities have shown that transportation emission and road dust contribute maximum share among all anthropogenic PM sources in all seasons with some exceptions. It is easier to evaluate vehicular exhaust emissions, but difficult to quantify road dust resuspension. Road-deposited sediments get re-entrained into the air by turbulence from vehicles and the friction caused by tire movement on the pavement. Road dust accumulation depends upon traffic density, vehicular speed, seasonal variation, tire type, pavement materials and texture, and road resurfacing. Road dust chemical profiles provide input to receptor models in SAS and HRA. Control measures for road dust include traffic control management, the street sweeping with dust binders, porous fencing, gravel roads and permeable pavers, with some challenges. There is a need of regulations to reduce the fine PM concentration below 20 μg/m3 to mitigate human health issues.

Technical Session III: Air quality health impacts and policy interventions

Indoor air quality assessment and monitoring of newly constructed classrooms in VVCE campus using IoT

Shilpa B S[1], Jahnavi Raj[2], Sneha S[2], Tajamul Rasool[2], Sowmya H N[3]

[1]Associate Professor, Department of Civil Engineering, Vidyavardhaka College of Engineering, Mysuru- 570002
Email: shilpa.bs@vvce.ac.in

[2]UG Students, Department of Civil Engineering, Vidyavardhaka College of Engineering, Mysuru- 570002

[3]Associate Professor, Dayananda Sagar College of Engineering, Bengaluru.

ABSTRACT: Indoor Air Quality (IAQ) is the state of the air within buildings, impacting occupants' health and comfort. As buildings strive for greater energy efficiency, managing IAQ becomes crucial for well-being and productivity, particularly with air quality deteriorating due to pollution. Real-time IAQ monitoring is facilitated by the Internet of Things (IoT), using sensors and connected systems to collect and analyze data. IoT devices strategically placed in buildings monitor various IAQ parameters like carbon dioxide, volatile organic compounds (VOCs), suspended particulate matter (SPM), and humidity. Building managers receive immediate alerts if pollutant levels exceed predefined thresholds, enabling quick corrective actions. This not only ensures healthier indoor environments but also enhances energy efficiency by optimizing ventilation. Poor IAQ significantly impacts students' health and academic performance. Exposure to pollutants such as mold spores, dust, and VOCs can lead to respiratory issues and discomfort, while inadequate ventilation in classrooms can cause fatigue and difficulty concentrating. Elevated carbon dioxide levels can impair cognitive function, affecting learning outcomes and potentially leading to absenteeism. Addressing IAQ in educational institutions is essential for promoting student well-being and academic success. By monitoring IAQ with IoT technology, institutions can ensure a healthier learning environment. This proactive approach ensures that elevated CO levels and imbalances in temperature and humidity are promptly corrected, improving health, comfort, and energy efficiency. Regular monitoring and improved ventilation are

recommended to mitigate health risks associated with fungal contamination. The measurements of SPM levels reveal high particulate concentrations, highlighting the need for better air quality management.

9th INDIAN INTERNATIONAL CONFERENCE ON AIR QUALITY MANAGEMENT IICAQM 2024

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3. The Association provides a platform for scientists, engineers, educators, and practitioners to exchange the latest advancements in air quality monitoring, modeling, control, policy, and health impacts.
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Prof. S.M. Shiva Nagendra leads air quality Research Group at the department of Civil Engineering. The air quality research group focuses on Urban Hotspot Air Quality Monitoring, Modelling and Control, Sensors for Air Pollution Monitoring, Personal Exposure and Health Impact, Real World Exhaust Emission Monitoring and Modelling, Ambient and Source Emission Control Technologies, Indoor Air Quality Monitoring, Modelling and Control, Emission Inventory and Source Apportionment, Machine Learning Techniques for Air Quality Classification and Prediction.

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