**DIVECHA CENTRE
FOR CLIMATE CHANGE**

Newsletter of the

DIVECHA CENTRE FOR CLIMATE CHANGE

Future Earth webinar series

The 20th Jeremy Grantham lecture

Inter-collegiate quiz on climate and environment 2024

National training programme on aerosols and climate

**Indian Institute of Science
Bengaluru
www.iisc.ac.in**

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From the Chair

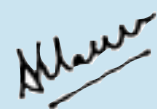**News and Events:**

Research Highlights:

FROM THE CHAIR

Greetings!

The United Nations Climate Change Conference (COP29) was held in Baku, Azerbaijan from 11th to 22nd November 2024. This conference was not as successful as many developing countries had hoped. There were no serious discussions on the rapid reduction of the consumption of fossil fuels. According to International Energy Agency, the total fossil fuel subsidy given by most countries in 2022 exceeded 1000 billion dollars. The reduction of fossil fuel subsidy is essential to make a transition to clean energy world. Most nations failed to agree on binding commitments to phase out fossil fuel subsidies. The discussion has shifted from how to mitigate climate change to adapting to climate change. The rich countries may be able to adapt to climate change but the developing countries will find it very difficult. In some tropical countries the temperature and humidity will reach values that will make air-conditioning essential. Since less that 5% of the households in the tropics have air-conditioners, there will be serious consequences during humid heat waves. Masai herders in Kenya have found that their cattle have not been able to tolerate heat waves and hence have switched from cattle to smaller animals like goats. These herders whose carbon emission per capita is the lowest in the world are suffering because of the high carbon emission per capita by the rich countries.

The major focus of the COP29 was on the "Loss and damage fund" to assist countries that are facing the brunt of the impact of global warming. The developing countries suggested a target of one trillion dollars fund for loss and damages fund. This goal could not be attained. The economist William Nordhaus has argued that Europe, India, and many low-income regions are vulnerable to significant damages over the next century whereas the United States appears to be less vulnerable to climate change than many countries. Unless major contributors to the cumulative carbon dioxide emission since 1850 cooperate with rest of the world to reduce carbon emissions, the future of our planet is at risk.

S. K. Satheesh

Dr. Hariram Kannan, Generative AI Engineer, IBM, Bengaluru, delivering his talk on 3rd October 2024.

Science Awareness Webinar IX on Artificial intelligence (AI)-Driven Research: Catalysing Innovation Across Scientific Disciplines

The Future Earth Global Secretariat Hub South Asia, DCCC, hosted a webinar on "Artificial intelligence (AI)-Driven Research: Catalysing Innovation Across Scientific Disciplines" by Mr. Hariram Kannan, Generative AI Engineer, IBM, Bengaluru, on 3rd October 2024. Artificial Intelligence is reshaping how scientific research is conducted, enabling breakthroughs across disciplines ranging from biology to materials science. This is the broad field focused on making machines "intelligent." It includes everything from simple rule-based systems to advanced algorithms like Natural Language Processing (NLP), search and optimization, and robotics. By automating complex data analysis and uncovering patterns previously hidden from human observation, AI is empowering researchers to tackle some of the most intricate challenges of our time.

Mr. Hariram Kannan emphasized the importance of AI in real world applications such as drug discovery. AI accelerates drug design and protein structure prediction. Similarly, Machine Learning (ML) is a subset of AI

that trains models to learn from data. Instead of following pre-set rules, ML learns patterns in data and makes predictions. It includes supervised learning, unsupervised learning, reinforcement learning, and deep learning. Supervised learning trains on labelled data for predictions (e.g., Linear Regression). Unsupervised learning finds hidden patterns without labels (e.g., K-means Clustering). Reinforcement learning is done by trial and error, maximizing rewards in dynamic environments. Deep learning is a specialized part of ML that uses complex, multi-layered neural networks to tackle data-rich, complex problems. By adding layers ("depth") to neural networks, it models hierarchical patterns within data and powers applications in image recognition, NLP, and autonomous systems.

Mr. Hariram Kannan presented two case studies on the real world applications of AI. One was the AlphaFold and AI in identifying drug targets that enable to predict protein structure. The second case study was the importance of Generative AI in real world applications. Leveraging deep learning models, Generative AI produces new content, from text to images, mimicking human creativity. It is the foundation for popular tools like ChatGPT and DALL-E. Breaking down these layers helps us see how AI techniques interconnect, each offering unique capabilities that, together, create the intelligent tools we use today. Overall, the use of AI in scientific research can create powerful solutions.

Science Awareness Webinar X on Air Pollution Issues in Himalayas, South Asia and Oceania

The Future Earth Global Secretariat Hub South Asia, DCCC, hosted a webinar on "Air Pollution Issues in Himalayas, South Asia and Oceania" by Umesh Chandra Kulshrestha, Professor, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi, on 16th October 2024. Air pollution is the major cause of climate change in the present era. It is also responsible for human health issues. Millions of people have respiratory and other cancer like chronic diseases due to air pollution in urban and industrial areas. Consumption of fossil fuel has drastically increased during the past few decades in Asia to meet energy and food supply needs. The combustion of fossil fuels is a major source of gaseous and particulate pollutants. In addition, fuel wood, dung cakes, crop residue and other biomass materials are also commonly used as energy sources. Approximately 80% of rural households in India use such unprocessed

solid biomasses for cooking. Burning of agricultural crop residue is another issue which emits huge amounts of aerosols and gaseous pollutants more dominating in the Indo-Gangetic plains. Pollution is not confined to local sources; long-range transport of pollutants from regions like Europe, the Middle East, and East Asia impacts the Himalayas, the Indian Ocean, and the Bay of Bengal, affecting key atmospheric processes such as cloud formation, precipitation, and monsoon patterns.

Dr. Umesh Chandra emphasized the importance of applying remote sensing data to provide a holistic picture of the air pollution scenario. Addressing air pollution on a broader scale, including the Himalayas, South Asia, and Oceania, is necessary but challenging due to the vast areas involved. Traditional ground-based monitoring approaches are costly and difficult to implement in large regions. Remote sensing offers a more efficient alternative for monitoring major pollutants like SO_2, NO_2, black carbon, O_3, and CO. It enables continuous, near-real-time atmospheric monitoring through satellite-based instruments such as MODIS, Sentinel (including the TROPOMI instrument), etc., which deliver high-resolution data with both fine spatial and temporal coverage. Remote sensing enables the tracking of transboundary pollutant transport, vertical profiling of atmospheric components, and integration with chemical transport models to assess climate feedback mechanisms. However, validation of satellite data through selective ground-based measurements is essential for accuracy. Dr. Umesh Chandra also stated that there is a significant need to integrate satellite observations with local air pollution chemistry measurements for a more comprehensive understanding of air pollution dynamics in South Asia and beyond.

Science Awareness Webinar XI on Transportation noise and cardiovascular health

The Future Earth Global Secretariat Hub South Asia, DCCC, hosted a webinar on "Transportation noise and cardiovascular health" by Prof. Dr. Thomas Münzel, Senior Professor and Environmental Cardiologist in the Department of Cardiology at the University Medical Center of Johannes Gutenberg University Mainz, Germany, on 18th December 2024. Epidemiological studies have found that transportation noise increases the risk for cardiovascular morbidity and mortality, with solid evidence for ischemic heart disease, heart failure, and stroke. According to the World

Dr. Thomas Münzel, Senior Professor and Environmental Cardiologist, University Medical Center, Johannes Gutenberg University Mainz, Germany, delivering his talk on 18th December 2024.

Health Organization, at least 1.6 million healthy life years are lost annually from traffic-related noise in Western Europe.

Traffic noise at night causes fragmentation and shortening of sleep, elevation of stress hormone levels, and increased oxidative stress in the vasculature and the brain. These factors can promote vascular (endothelial) dysfunction, inflammation, and arterial hypertension, thus elevating cardiovascular risk. His talk focussed on the indirect, nonauditory cardiovascular health effects of noise. Prof. Thomas provided an updated overview of epidemiological research on the effects of transportation noise on cardiovascular risk factors and disease, and mechanistic insights based on the latest clinical and experimental studies and proposed new risk markers to address noise-induced cardiovascular effects in the general population. He also discussed the potential effects of noise on vascular dysfunction, oxidative stress, and inflammation in humans and animals. He elaborately explained the underlying patho mechanisms by alterations of gene networks, epigenetic pathways, circadian rhythm, signal transduction along the neuronal-cardiovascular axis, and metabolism. He also described current and future noise mitigation strategies. He concluded by emphasizing that the current evidence of noise is a significant contributor to cardiovascular disease.

Prof. Kate Raworth delivering the Grantham lecture on 19th December 2024.

The Divecha Centre for Climate Change organised the annual Jeremy Grantham Lecture on "Doughnut Economics and Climate Change: From Theory to Practice" by Prof. Kate Raworth, Senior Associate, Oxford University, on 19th December 2024. 'Doughnut Economics' envisions an economy that aims to meet the needs of all people within the means of the living planet. How does this differ from more traditional economic approaches and what does it start to look like in practice?

Prof. Kate Raworth, who is the author of the book Doughnut Economics, deliberated on the core concepts, with a focus on how they inform ways of thinking about climate change. The challenge we face today is to meet the needs of all within the means of the planet. In other words, to ensure that no one falls short on life's essentials (from food and housing to healthcare and political voice), while ensuring that collectively we do not overshoot our pressure on Earth's life-supporting systems. The Doughnut of social and planetary boundaries is an approach to framing that challenge.

The environmental ceiling consists of nine planetary boundaries, beyond which lie unacceptable environmental degradation and potential tipping

points in Earth systems. The twelve dimensions of the social foundation are derived from internationally agreed minimum social standards, as identified by the world's governments in the Sustainable Development Goals in 2015. Between social and planetary boundaries lies an environmentally safe and socially just space in which humanity can thrive. Doughnut Economics aims to meet the needs of all people within the means of the living planet, by creating regenerative and distributive economies.

Doughnut Economics proposes an economic mindset that is fit for the 21st century context and challenges. It is not a set of policies and institutions, but rather a way of thinking that brings about the regenerative and distributive dynamics that this century calls for. Drawing on insights from diverse schools of economic thought - including ecological, feminist, institutional, behavioural and complexity economics - it sets out seven ways to think like a 21st century economist in order to bring the world's economies into the safe and just space for humanity.

The starting point of Doughnut Economics is to change the goal from endless GDP growth to thriving in the Doughnut. At the same time, begin economic analysis by seeing the big picture and recognizing that the economy is embedded within, and dependent upon, society and the living world. Doughnut Economics recognizes that human behaviour can be nurtured to be cooperative and caring, just as it can be competitive and individualistic. It also recognizes that economies, societies, and the rest of the living world, are complex, interdependent systems that are best understood through the lens of systems thinking. It calls for turning today's degenerative economies into regenerative ones, and divisive economies into far more distributive ones.

Lastly, Doughnut Economics recognizes that growth is a healthy phase of life, but nothing grows forever and things that succeed do so by growing until it is time to grow up and thrive instead.

(*Left to Right*) Prof. S.K. Satheesh, Chair, DCCC, Justice Santosh Hegde, Justice A. V. Chandrashekar, Dr. H. Paramesh, Visiting Prof., DCCC, Prof. J. Srinivasan, Distinguished Scientist, DCCC attending the event on 21st September 2024.

Dr. H. Paramesh was selected as the White coat legend of India for the year 2024 for his contribution to children's health care and environment protection.

A documentary highlighting the work done by Dr. H. Paramesh was produced by Docflix and "Mankind for serving life". This documentary released on 21st September 2024 in a function attended by eminent doctors and Judges in Bengaluru and the faculty of Divecha Centre for Climate Change.

The documentary highlighted how the rural background of Dr. H. Paramesh inculcated a concern for environment and the community. He was the first pediatric pulmonologist in India. He was elected a fellow of the American Academy of Pediatrics, USA in 1976. He established the Lakeside Medical Centre and hospital in 1982.

INTER-COLLEGIATE QUIZ ON CLIMATE AND ENVIRONMENT 2024

Students from various colleges who took part in the quiz contest with the distinguished faculties and other members of DCCC community on 12ᵗʰ Nov 2024.

The Divecha Centre for Climate Change conducted a quiz contest for college students on 12ᵗʰ November 2024 for 1ˢᵗ and 2ⁿᵈ Pre-University college students to create awareness about the climate and environment. About 90 college students along with their faculty participated in the event. In the first round a written exam on science topics was conducted where two participants from each college had to take the exam. Based on these exams, three colleges were selected for the final oral quiz round.

The following three colleges were selected for the final oral quiz round
1.   Kendriya Vidyalaya, IISc
2.   Mysore Education Society Prof. B.R. Subba Rao Pre-University college
3.   St. Claret Pre-University college

In the final round of the quiz, St. Claret came first followed by Kendriya Vidyalaya, IISc in the second place and Mysore Education Society Prof. B.R. Subba Rao Pre-University college came in the third place. The winners were awarded trophies, books and certificates. There was also the audience round in between the main round. The students who answered correctly were given attractive prizes. All the participants also received the participation certificates at the valedictory function of the event. Prof. Satheesh, Chair, DCCC, gave away the prizes and certificates.

NATIONAL TRAINING PROGRAMME ON AEROSOLS AND CLIMATE

Participants of the aerosol training programme with the chair and faculties of DCCC.

The Divecha Centre for Climate Change conducted a two-week training programme on "Aerosols and Climate" at the Indian Institute of Science, Bengaluru from 9th to 20th December 2024. There were 20 lectures that covered the basics of atmospheric aerosols, their climate and health implications, areas such as radiative transfer, bioaerosols, remote sensing of aerosols, atmospheric instrumentation, and the effects of aerosols on turbulence, and satellite-to-Earth free-space optical communication.

The lectures were delivered by the faculty and scientists at Divecha Centre for Climate Change, and Indian Institute of Science Education and Research Thiruvananthapuram, and were attended by 52 students from all parts of India. The participants actively took part in the 30 hours of hands-on tutorial sessions in the afternoon hours, which covered satellite remote sensing of aerosols, radiative transfer computations, visits to the aerosol research laboratory, and introduction to aerosol modelling. On the last day the participants recieved a certificate at the valedictory function which was handed out by Prof. S. K. Satheesh, Chair DCCC.

YOUNG SCIENTISTS' MEET ON CLIMATE ACTION

Lecture delivered during the hybrid meeting of young scientists conducted from 10th to 12th December 2024.

An hybrid meeting of young scientists was organised by Divecha Centre for Climate Change along with the central and South Asian partner of The World Academy of Sciences at Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India from 10th to 12th December 2024. The theme of the meeting was "Climate Action: Addressing Causes and Impact". There were 12 speakers from India, Sri Lanka, Bangladesh, Nepal and Iran. They covered topics ranging from the impact of climate change, water management, paleoclimate and the interactions between ocean and atmosphere. The young scientists who participated in this meeting took active part in the deliberations.

Prof. J. Srinivasan elaborated on the impact of climate change in developing countries. He said that the ability of people in developing countries to adapt to global warming beyond 2^0C is limited. The high impact but low-probability event like the slowing down of the Atlantic Meridional Ocean Circulation (AMOC) will alter the tropical climate dramatically. Prof. Arindam Chakraborty explained how the El Nino Southern Oscillation impacts summer monsoon rainfall over South Asia. He also spoke about a new mechanism proposed recently that relies on moisture flux convergence.

VISIT OF DR. CAROLINE MASIELLO FROM RICE UNIVERSITY, TEXAS, U.S.A.

Dr. Caroline Masiello (*Third from left*) with visiting professors and researchers of DCCC on 19th November 2024.

Dr. Caroline Masiello, Director of the Sustainability Institute at Rice University, Texas, U.S.A., visited the Divecha Centre for Climate Change, IISc, on 19th Nov 2024 for a collaborative interaction with researchers. A leading expert in biogeochemistry and sustainability science, Prof. Masiello's research focuses on biogeochemical cycles as well as areas of ecology and one Health. The shared interest in studying biogeochemical cycles in the context of climate change at Divecha Centre fostered productive discussions on potential collaborations aimed at addressing global sustainability challenges.

Dr. Rohini Mattoo spoke on climate change and soil microbiology, highlighting common interests in environmental protection. Dr. H. Paramesh highlighted health and climate change policies, discussing initiatives such as face masks for traffic police, reducing school bag weights to promote spinal health of children, and mitigating sound, and light pollution Dr. R. Srinivasan focused on addressing plastic pollution and groundwater contamination by uranium. Dr. Sravanthi Choragudi briefly discussed the gender-climate change nexus, with specific focus on women and welfare in rural areas.

VISIT OF THE DELEGATION FROM DARTMOUTH COLLEGE

Delegations from Dartmouth College with DCCC faculty and researchers on 13th December 2024.

A delegation of 6 faculty from Dartmouth College visited the Divecha Centre for Climate on 13th December 2024 to discuss avenues for joint research related to climate change and sustainability.

The delegation included:

- David Kotz, Provost and Pat and John Rosenwald Professor, Computer Science
- Geoffrey G. Parker, Interim Faculty Director of the Irving Institute at Dartmouth
- Angelika Hofmann, Director of Research Programs at the Irving Institute at Dartmouth
- Anant Sundaram, Clinical Professor of Business Administration
- Amit Chakrabarti, Professor of Computer Science
- Andrila Hait, Research Programs, Irving institute

The delegation was led by Prof. David Kotz, Provost, Dartmouth College. Prof. Angelika Hofmann, Director, Research Programs, indicated that Dartmouth college has received funding from the Grantham foundation for the protection of the environment. There was discussion on joint-research in the area of energy policy and monsoon variability.

PLANETARY HEALTH FROM DIFFERENT PERSPECTIVES

Delegations from University of Zurich Switzerland, University of Uganda and IISc at the Swissnex Trialogue event held between 1st December to 5th December 2024.

Complex challenges posed by climate change, environmental degradation, economic interests and an overall declining planetary health cannot be addressed in isolation or from the perspective of a single discipline. Yet, the opportunity for researchers, clinicians, veterinarians, policymakers and others to meet and freely debate solutions and new approaches to these challenges is rare.

The Trialogue Days on Planetary Health, held from 1st to 5th December this year at the Indian Institute of Science, by the University of Zurich, the Infectious Disease Institute at Makerere University, Swissnex in India and the Indian Institute of Science invited professionals across disciplines and generations to discuss planetary health from different perspectives.

In ten blocks, about 70 participants talked about the foundations of life on Earth, such as air and water, and how they and other factors like increasing temperature are connected to human health, e.g. by a wider appearance of vector-borne diseases carried by mosquitos, the emergence of new diseases when they cross over from non-human to the human species and

the spread of infectious diseases due to poor hygiene and sanitation. The blocks also addressed the necessary infrastructure to build resilient health systems and decarbonise hospitals and urban transport, ways in which new technologies can be used for better diagnostics, and how we need to rethink education to build capacity in the next generations to adopt an inclusive, adaptable mindset that tackles challenges with a system thinking perspective.

Dr. H. Paramesh, Visiting Professor at the Divecha Centre for Climate Change brought in a holistic perspective on the effects of poor air quality, starting from the unborn child to the end of life. He shared the stage with Pratima Singh, a policy maker at iFOREST, Prof. Milo Puhan, Director of the Epidemiology, Biostatistics and Prevention Institute at the University of Zurich and Mr. Nirwan, who contributed with insights on leveraging large data sets provided by geospatial information systems for possible interventions to improve air quality, keeping the complexity of underlying interests and stakeholders in mind.

The discussions were framed by a field trip to a village on the outskirts of Bengaluru to get a perspective on health care and animal care in rural settings, and gaming sessions, where the participants entered into action-mode centered around games on city planning, decarbonisation, and collective decision-making. The Trialogue Days are envisioned to be an ongoing practice to enable interdisciplinary conversations and collaboration across professions, continents, genders and career stages. The next Trialogue Days are set to take place in Zurich in 2026.

Dr. Raj Kishore (*Extreme Right*), DCCC, IISc, with other delegations who attended the COP29 event at Baku, Azerbaijan held between 10th to 20th November 2024.

On behalf of Divecha Centre for Climate Change, Indian Institute of Science, Dr. Raj Kishore Singh, Visiting Scientist at DCCC, attended the Conference of the Parties - United Nations Framework Convention on Climate Change (COP29 - UNFCCC) held in Baku, Azerbaijan from 10th to 20th November 2024. The conference witnessed intense discussions on financing mitigation and adaptation initiatives, alongside the deployment of advanced technology and expertise to reduce emissions and capture carbon effectively.

A significant focus was on the financial requirements for decarbonizing industries and establishing robust adaptation mechanisms. Estimates suggest an annual investment of $6.7 trillion is essential for comprehensive decarbonization. The dialogues also emphasized deeper engagement with industries and enhanced coordination among stakeholders to achieve these goals. One of the key insights shared was the underutilization of carbon trading mechanisms established under Article 6.4 of the Paris Agreement— only 2% of their potential has been materialized so far. The current rate of $10 per ton of carbon is considered insufficient; experts highlighted the necessity of increasing this to $100 per ton to unlock the full potential

of carbon markets. A clear and consistent policy framework is critical to attract investors and scale up efforts. Dr. Raj had the privilege of engaging with several renowned individuals such as the Deputy Minister Sarvan Jafarov of the Ministry of Agriculture, Republic of Azerbaijan, Dr. Martin Frick, Director of the World Food Program, Indian spiritual leader Sadhguru Jaggi Vasudev and others where he discussed the impact of climate change on agricultural productivity, sustainability and other key issues. The conference also highlighted concerns over the commercialization of the UNFCCC corridors.

Dr. Raj Kishore also attended the United Nations Biodiversity Conference of the Parties (COP16) to the UN Convention on Biological Diversity (CBD) was a conference that was held from October 21st to November 1st, 2024 in Cali, Colombia. One of the key highlights of the summit was the emphasis on the role of wildlife in carbon sequestration and land restoration. Another significant focus was the restoration of degraded lands. Dr. Raj participated in the release of India's inclusive National Biodiversity Strategy and Action Plan (NBSAP), aligned with the Kunming-Montreal Biodiversity Framework. This landmark event was attended by the Honourable Minister of State for Environment, Forest, and Climate Change, Shri Kirti Vardhan and the Executive Secretary of the Convention on Biological Diversity, Ms. Astrid Schomaker.

Dr. Raj Kishore (*Fourth from Left*), DCCC, IISc, with other delegations who attended the COP16 event held from October 21st to November 1st, 2024 in Cali, Colombia.

A SIMPLE MODEL FOR ATMOSPHERIC REFRACTIVE INDEX FLUCTUATIONS IN THE TROPICS

Laser beams propagating through the atmosphere are distorted by turbulence. Random fluctuations in atmospheric temperature (and consequently refractive index) lead to scintillations and signal attenuation and could adversely affect wireless optical communication, laser remote sensing, and optical astronomy. It is essential to quantify the fluctuations in refractive index to model and build these optical systems. However, due to the complexity and cost of the sensors involved, it is not an easy task. A common approach followed is to make use of existing models. But, due to the abundance of solar radiation and the resulting stronger surface layer dynamics in the tropics, these models fail to provide accurate values in the tropics as compared to the locations from where they were developed. This points to the need for developing region-specific models. Using three-year weather station measurements from a semi-arid location in the Deccan Plateau, researchers from IISER Thiruvananthapuram and Divecha Centre for Climate Change developed a new model which performs better compared to the existing models. This simple model takes into account the two major sources of atmospheric refractive index fluctuations: temperature and wind speed gradients.

Reference: Hegde, R., Anand, N., Satheesh, S.K., Moorthy, K.K. (2024), Modeling the atmospheric refractive index structure parameter using micrometeorological observations, Applied Optics, 63 (16), pp. E10-E17
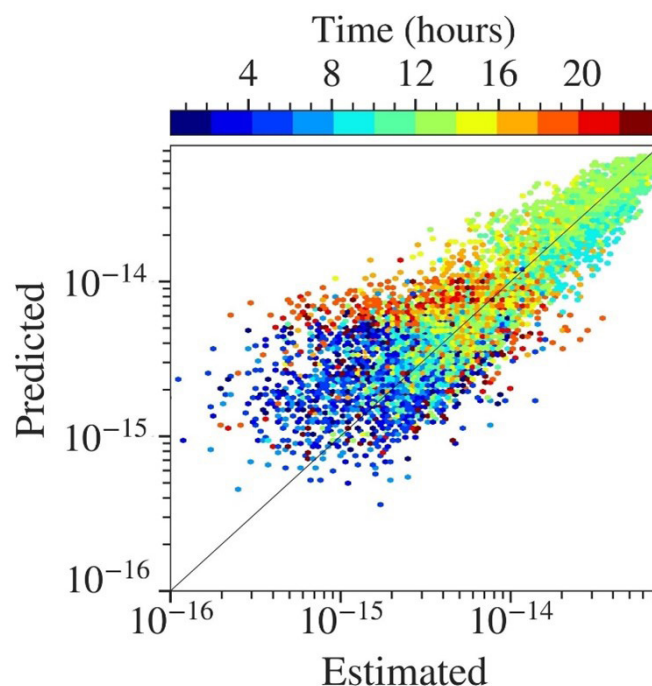

Figure: Comparison of refractive index fluctuations measured using the new simple model (predicted) with a collocated complex sensor (estimated).

DECISION SUPPORT SYSTEM FOR AIR QUALITY MANAGEMENT IN DELHI, INDIA

This paper discusses the newly developed Decision Support System for air quality management activities in Delhi, India. Besides the standard air quality forecasts, DSS provides the contribution of Delhi, its surrounding districts, and stubble-burning fires mainly occurring in the neighbouring states of Punjab and Haryana to the PM2.5 in Delhi. DSS also quantifies the effects of local and neighbourhood emission-source-level interventions on the pollution in Delhi.

The DSS-simulated Air Quality Index (AQI) for the post-monsoon and winter seasons of 2021–2022 shows high accuracy (up to 80 %) and a very low false alarm ratio (20 %) from day 1 to day 5 of the forecasts, especially when the ambient AQI is > 300. During the post-monsoon season (winter season), emissions from Delhi, the rest of the National Capital Region (NCR)'s districts, biomass-burning activities, and all other remaining regions on average contribute 34.4 % (33.4 %), 31 % (40.2 %), 7.3 % (0.1 %), and 27.3 % (26.4 %), respectively, to the PM2.5 in Delhi. During peak pollution events (stubble-burning periods or wintertime), however, the contribution from the main sources (farm fires in Punjab–Haryana or local sources within Delhi) could reach 65 %–69 %.

According to DSS, a 20 % (40 %) reduction in anthropogenic emissions across all NCR districts would result in a 12 % (24 %) reduction in PM2.5 in Delhi on a seasonal mean basis. DSS is a critical tool for policymakers because it provides all such information daily through a single simulation.

Reference: Govardhan, G., Ghude, S.D., Kumar, R., Sharma, S., Gunwani, P., Jena, C., Yadav, P., Ingle, S.,Debnath, S., Pawar, P., Acharja, P., Jat, R., Kalita, G., Ambulkar, R., Kulkarni, S., Kaginalkar, A.,Soni, V.K., Nanjundiah, R.S., Rajeevan, M.(2024) Decision Support System version 1.0 (DSS v1.0) for air quality management in Delhi, India .In: Geoscientific Model Development, 17 (7), pp. 2617-2640.
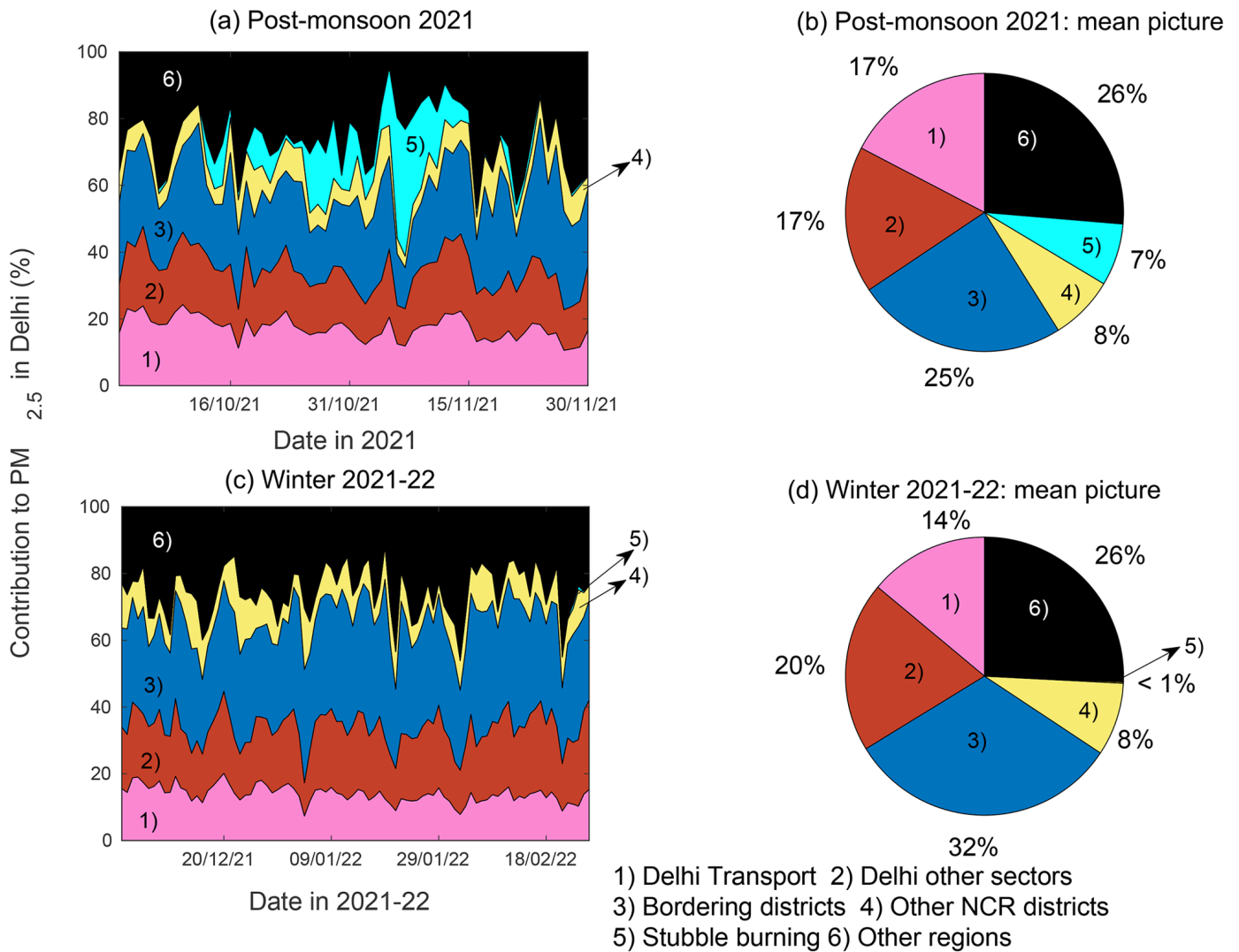
Figure: Source apportionment of PM2.5 mass concentration in Delhi for (a) post-monsoon 2021 on a daily mean basis, (b) post-monsoon 2021 on a seasonal mean basis, (c) winter 2021–2022 on a daily mean basis, and (d) winter 2022 on a seasonal mean basis. The numbers written on the pie charts indicate the percentage contribution of the particular source to PM2.5 in Delhi. Day 1 forecasts have been used to generate this figure.

Students from Delhi Public Schools, Bengaluru North and Amrithsar, Punjab visited the Divecha Centre on 18th October 2024.

Prof. S K Satheesh, Chair, DCCC, facilitated at the National Conference of Developmental Paediatrics held at J. N. TATA Auditorium from 31st August to 1st September 2024 .