

Bio-data of PI (India)

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1. Date of Birth: 10 January 1977

2. Academic Qualification:

Bachelor in Science (B.Sc): Chemistry (Honours), 2000, University of Calcutta

Master in Science (M.Sc): Chemistry, 2002, University of Calcutta

Doctor in Philosophy (Ph.D): 2009, University of Calcutta

Thesis title: “Studies on the formation, transformation and removal of atmospheric aerosols in and around Kolkata, India”

3. Positions held after Ph.D.:

A) Post-Doc Fellow in National Atmospheric Research Laboratory, Gadanki, India from May, 2009 to August, 2010

B) Faculty Fellow in Bose Institute, Kolkata from September 2010 to January 2014

C) Assistant Professor in Bose Institute, Kolkata from January 2014 to July 2018

D) Associate Professor in Bose Institute, Kolkata from July 2018 till date

4. Publication related information:

Total number of publications in peer-reviewed international journals: 44

Total citation: 780; h-index: 16; i10 index: 24

(Google Scholar as on November 2020)

5. List of publications

1. Biswas, H., A. Chatterjee, S .K. Mukhopadhyaya, T. K. De, S.Sen, and T. K. Jana.(2005). Estimation of ammonia exchange at the land–ocean boundary condition of Sundarban mangrove, north east coast of Bay of Bengal, India. *Atmospheric Environment*, 39, 4489-4499.
2. Chatterjee, A., C. Dutta, S. Sen, K. Ghosh, N. Biswas, D. Ganguly, and T. K. Jana.(2006). Formation, transformation, and removal of aerosol over a tropical mangrove forest. *Journal of Geophysical Research: Atmospheres*, 111, D24.
3. Som, D., C. Dutta, A. Chatterjee, D. Mallick, T.K.Jana, and S. Sen.(2007).Studies on commuters' exposure to BTEX in passenger cars in Kolkata, India. *Science of the Total Environment*, 372,426-432
4. Dutta, C., D. Som, A. Chatterjee, A.K.Mukherjee, T.K.Jana, and S.Sen. (2009). Mixing ratios of carbonyls and BTEX in ambient air of Kolkata, India and their associated health risk.

- Environmental monitoring and assessment*, 148,97-107
5. Chatterjee, A, A Jayaraman, T.N Rao, and S Raha (2010). In-cloud and below-cloud scavenging of aerosol ionic species over a tropical rural atmosphere in India. *Journal of Atmospheric Chemistry*,66,27-40
 6. Chatterjee, A, A Adak, A K. Singh, M K. Srivastava, S. K. Ghosh, S.Tiwari, P. C. S. Devara, S. Raha. (2010). Aerosol chemistry over a high altitude station at north eastern Himalayas, India. *PLoS-One*,5,e11122
 7. Dutta, C., A. Chatterjee, T. K. Jana, A. K. Mukherjee, and S. Sen. (2010). Contribution from the primary and secondary sources to the atmospheric formaldehyde in Kolkata,India. *Science of the Total Environment*,408,4744-4748
 8. Chatterjee, A., C. Dutta, T. K. Jana, and S. Sen. (2011).Fine mode aerosol chemistry over a tropical urban atmosphere: characterization of ionic and carbonaceous species. *Journal of Atmospheric Chemistry*, 69,83-100
 9. Chatterjee, A, S. K. Ghosh, A. Adak, A. K. Singh, P. C. S. Devara, and S. Raha.(2012).Effect of dust and anthropogenic aerosols on columnar aerosol optical properties over Darjeeling (2200 m asl), eastern Himalayas, India. *PLoS-One*, 7, e40286
 10. Chatterjee,A.,Sarkar,C.,Adak,A.,Mukherjee,U.,Ghosh,S.K.,&Raha,S.(2013).Ambient air quality during Diwali festival over Kolkata—a mega-city in India. *Aerosol and Air Quality Research*,13,1133-1144
 11. Ganesan, A. L., Chatterjee, A., Prinn, R. G., Harth, C. M., Salameh, P. K., Manning, A. J.,...& O' Doherty, S. (2013). The variability of methane, nitrous oxide and sulfur hexafluoride in Northeast India.*Atmospheric Chemistry and Physics*,13,10633-10644
 12. Sarkar,C., Chatterjee,A., Majumdar,D., Ghosh,S.K., Srivastava,A., Raha,S. (2014).Volatile organic compounds over Eastern Himalaya, India: temporal variation and source characterization using Positive Matrix Factorization. *Atmospheric Chemistry and Physics Discussions*, 14(23), 32133-32175.
 13. Adak,A.,Chatterjee,A.,Singh,A.K.,Sarkar,C.,Ghosh,S.,&Raha,S.(2014).Atmospheric Fine Mode Particulates at Eastern Himalaya, India: Role of Meteorology, Long-Range Transport and Local Anthropogenic Sources. *Aerosol and Air Quality Research*,14(1),440-450.
 14. A Sen et al., (2014) Atmospheric fine and coarse mode aerosols at different environments in India and the Bay of Bengal during winter 2014,*MAPAN*,29,273-284
 15. Sarkar,C.,Chatterjee,A.,Singh,A.K.,Ghosh,S.K.,&Raha,S.(2015).Characterization of Black Carbon Aerosols over Darjeeling- A High Altitude Himalayan Station in Eastern India. *Aerosol Air Qual. Res.*,15,465-478.
 16. Sharma,S.K.,Mandal,T,Shenoy,D.M.,Chatterjee,A,Saxena,M.,Saraswati (2015). *Bulletin of Environmental Contamination and Toxicology*,95,661-669
 17. Das,S.K.,Chatterjee,A.,Ghosh,S.K.,&Raha,S.(2015).Fog-induced changes in optical and physical properties of transported aerosols over Sundarban, India. *Aerosol and Air Quality Research*,15(4),1201.
 18. Das,S.K.,Chatterjee,A.,Ghosh,S.K.,&Raha,S.(2015).An integrated campaign for investigation of winter-time continental haze over Indo-Gangetic Basin and its radiative effects. *Science of the Total Environment*,533,370-382.
 19. Sen,A.,Ahammed,Y.N.,Banerjee,T.,Chatterjee,A.,Choudhuri,A.K.,Das,T.,...&Mandal,T.K. (2016). Spatial variability in ambient atmospheric fine and coarse mode aerosols over Indo-Gangetic plains, India and adjoining oceans during the onset of summer monsoons, 2014.*Atmospheric Pollution Research*,7(3),521-532.
 20. Sharma,S.K.,Mandal,T.K.,Srivastava,M.K.,Chatterjee,A.,Jain,S.,Saxena,M.,...&Ghosh,S.K. (2016).Spatio-temporal variation in chemical characteristics of PM10 over Indo Gangetic Plain of India. *Environmental Science and Pollution Research*,23(18),18809-18822.
 21. Tyagi, S., Tiwari, S., Mishra, A., Chatterjee, A., & Bisht, D. S. (2016). Chemical Characteristics of Precipitation during Winter Season over Delhi: Source Identification of Measured Species. *Earth Science India*,9.
 22. Roy,A.,Chatterjee,A.,Tiwari,S.,Sarkar,C.,Das,S.K.,Ghosh,S.K.,&Raha,S.(2016).Precipitation

- chemistry over urban, rural and high altitude Himalayan stations in eastern India. *Atmospheric Research*, 181,44-53.
23. Sen, A., Abdelmaksoud, A.S., Ahammed, Y.N., Banerjee, T., Bhat, M.A., Chatterjee, A., ...& Gadi, R. (2017). Variations in particulate matter over Indo-Gangetic Plains and Indo-Himalayan Range during four field campaigns in winter monsoon and summer monsoon: Role of pollution pathways. *Atmospheric Environment*, 154, 200-224.
 24. Roy, A., Chatterjee, A., Sarkar, C., Das, S.K., Ghosh, S.K., & Raha, S. (2017). A study on aerosol-cloud condensation nuclei (CCN) activation over eastern Himalaya in India. *Atmospheric Research*, 189, 69-81.
 25. Sarkar, C., Chatterjee, A., Majumdar, D., Roy, A., Srivastava, A., Ghosh, S.K., & Raha, S. (2017). How the Atmosphere over Eastern Himalaya, India is Polluted with Carbonyl Compounds? Temporal Variability and Identification of Sources. *Aerosol and Air Quality Research*, 17(9), 2206-2223.
 26. Ganesan, A.L., Rigby, M., Lunt, M.F., Parker, R.J., Boesch, H., Goulding, N., Umezawa, T., Zahn, A., Chatterjee, A., Prinn, R.G., Tiwari, Y.K., Schoot, M., Krummel, P. (2017). Atmospheric observations show accurate reporting and little growth in India's methane emissions. *Nature Communications*, 8(1), 836.
 27. Ray, D., Chatterjee, A., Majumdar, D., Ghosh, S. K., & Raha, S. (2017). Polycyclic aromatic hydrocarbons over a tropical urban and a high altitude Himalayan Station in India: Temporal variation and source apportionment. *Atmospheric Research*, 197, 331-341.
 28. Ray, D., Bhattacharya, T.S., Chatterjee, A., Singha, A., Ghosh, S.K., & Raha, S. (2018). Hygroscopic Coating of Sulfuric Acid Shields Oxidant Attack on the Atmospheric Pollutant Benzo (a) pyrene Bound to Model Soot Particles. *Scientific reports*, 8(1), 129.
 29. Sen, A., Karapurkar, S., Saxena, M., Shenoy, D., Chatterjee, A. et al. (2018). Stable carbon and nitrogen isotopic composition of PM₁₀ over Indo-Gangetic Plains, adjoining regions and Indo-Himalayan Range during a winter 2014 campaign. *Environmental Science and Pollution Research*, 25, 26279-26296.
 30. Abhinandan Ghosh, Arindam Roy, Abhijit Chatterjee, Sanat K Das, Sanjay K Ghosh and Sibaji Raha (2019). Impact of Transported Biomass Burning Plumes on the Size Segregated Aerosol Chemistry: A Case Study over a Tropical Urban Atmosphere in Eastern India. *Aerosol and Air Quality Research*, 19, 163-180.
 31. Chatterjee, A., A. Roy, S. Chakraborty, C. Sarkar, S. Singh, A K Karipot, S K Ghosh, A Mitra, and S Raha (2018). Biosphere Atmosphere Exchange of CO₂, H₂O Vapour and Energy during Spring over a High Altitude Himalayan Forest at Eastern India. *Aerosol and Air Quality Research*, 18.
 32. Sarkar, C., Roy, A., Chatterjee, A., Ghosh, S.K. and Raha, S (2019). Factors controlling the long-term (2009-2015) trend of PM_{2.5} and Black Carbon aerosols at eastern Himalaya, India. *Science of the Total Environment*, 656, 280-296.
 33. Priyadarshini, S. Verma*, A. Chatterjee, S. K. Sharma and T. K. Mandal (2019). Characterization of submicron aerosol ionic and carbonaceous species over a tropical urban atmosphere at lower Indo-Gangetic Plain. *Aerosol and Air Quality Research*, 19, 129-147
 34. A Chatterjee, P C.S. Devara , R Balasubramanian , Daniel A. Jaffe (2019). Aerosol Climate Change Connection (AC3) Special Issue: An Overview. *Aerosol and Air Quality Research*, 19: 1-4, 2019
 35. Jain S., Sharma, S., Srivastava, M., Chatterjee, A., Singh, R., Saxena, M., Mandal, T. K. (2019). Source apportionment of PM₁₀ over three urban atmosphere at Indo-Gangetic Plain in India: An approach using different receptor model. *Archives of Environmental Contamination and Toxicology*, 76, 114-128.
 36. C Sarkar, C Venkataraman, S Yadav, H C. Phuleria and A Chatterjee (2019). Origin and properties of soluble brown carbon in freshly emitted and aged ambient aerosols over an urban site in India. *Environmental Pollution*, 254, 113077
 37. A Roy, A Chatterjee, A Ghosh, S K Das, S K Ghosh and S Raha (2019). Below-cloud scavenging of size-segregated aerosols and its effect on rainwater acidity and nutrient

- deposition: A long-term (2009–2018) and real-time observation over eastern Himalaya. *Science of The Total Environment*, 674, 223-233.
38. A Ghosh, A Roy, S K Das, S K Ghosh, S Raha and A Chatterjee (2019). Identification of most preferable reaction pathways for chloride depletion from size segregated sea-salt aerosols: A study over high altitude Himalaya, tropical urban metropolis and tropical coastal mangrove forest in eastern India. *Chemosphere*, 245, 125673
 39. D Ray, A Ghosh, A Chatterjee, S K. Ghosh, S Raha (2019). Size-specific PAHs and Associated Health Risks over a Tropical Urban Metropolis: Role of Long-range Transport and Meteorology, *Aerosol and Air Quality Research*, 19, 2446-2463
 40. A Chatterjee, M Dutta, A Ghosh, S K. Ghosh, A Roy (2020). Relative role of black carbon and sea-salt aerosols as cloud condensation nuclei over a high altitude urban atmosphere in eastern Himalaya. *Science of The Total Environment*, 742, 140468
 41. A Chatterjee, 2020. Use of Hypochlorite Solution as Disinfectant during COVID-19 Outbreak in India: From the Perspective of Human Health and Atmospheric Chemistry. *Aerosol and Air Quality Research*, 20, 1516-1519
 42. A Rai, S Mukherjee, A Chatterjee, N Choudhary, G Kotnala, T. K. Mandal, S. K. Sharma (2020). Seasonal Variation of OC, EC, and WSOC of PM₁₀ and Their CWT Analysis Over the Eastern Himalaya. *Aerosol Science and Engineering*, 4, 26-40
 43. Sharma, S. K., N Choudhary, G Kotnala, D Das, S Mukherjee, A Ghosh, Vijayan N, A Rai, A Chatterjee, T K Mandal (2020). Wintertime carbonaceous species and trace metals in PM₁₀ in Darjeeling: a high altitude town in the eastern Himalayas. *Urban Climate*, 34, 100668
 44. A. Chatterjee, S. Mukherjee, M. Dutta, A. Ghosh, S. K. Ghosh and A. Roy (2021). High rise in carbonaceous aerosols under very low anthropogenic emissions over eastern Himalaya, India: Impact of lockdown for COVID-19 outbreak. *Atmospheric Environment*, 244, 117947.

6. Invited lectures

- “Sundarban mangrove ecosystem- A savior of Kolkata from atmospheric aerosol pollution”, CSIR-Central Glass and Ceramic Research Institute (CGCRI), Kolkata, 13 March, 2020
- International conference on “Air Pollution Monitoring” held at Mahatma Gandhi University, Kottayam, Kerala, India during 9-11 March, 2019.
- International workshop on “Air Pollution Extreme”, organized by Columbia University, New York, USA and sponsored by NASA, USA held at Columbia University during 1-2 November, 2018. “Below cloud scavenging of size-segregated aerosols over eastern Himalaya in India: A long-term observation”.
- International conference on “Aerosol, Air quality and Climate Change”, organized by HNB Garhwal University, Srinagar, Uttarakhand during 21-23 October, 2018
- Committee on Space Research (COSPAR) held at Los Angeles, USA during 14-22 July 2018. “Transported and aged black carbon act as better CCN than transported and aged sea-salt aerosols”.
- International Workshop on Climate Extremes: Observation, Analyses and Modelling held during 27-28 February, 2017 in Kolkata. “Role of Aerosols on the Formation of Cloud Droplets through Cloud Condensation Nuclei (CCN): A First-ever Study over Eastern Himalaya”.
- Understanding, Predicting and Projecting Climate Change over Asian Region (UPCAR) at Tirupati during 26-28 June 2017. “The Quality of Air over Eastern Himalaya in India: Threats to Human Health and Climate”.
- International conference on “solving the mystery of carbon tetrachloride” organized by Swiss Federal Laboratories for Materials Science and Technology, Zurich, Switzerland, Universities Space Research Association, USA and NASA, USA and funded by United

Nation Environment Program (UNEP) held at Zurich, Switzerland during 5-6 October, 2015. “Carbon tetrachloride over eastern Himalaya in India: A well deviation from Global trend”.

- Invited lecture at the Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, USA during December 2015.

7. Supervising students

A) Ph. D. students

Serial No.	Name	Fellowship	Topics	Status
01	Chirantan Sarkar	UGC Ad-hoc, Govt of India	Gaseous and particulate carbonaceous compounds over eastern Himalaya	<i>Awarded in 2016</i>
02	Arindam Roy	CSIR Ad-hoc, Govt of India	Aerosol- precipitation interaction over eastern Himalaya	<i>Awarded in 2020</i>
03	Abhinandan Ghosh	DST-SERB IRHPA scheme, Govtof	Size- segregated aerosol chemistry	Senior Research Fellow
04	Monami Dutta	CSIR, India	Aerosol-cloud interaction over Himalaya	Senior Research Fellow
05	Sauryadeep Mukherjee	MoEFCC, Govt of India	Carbonaceous aerosols	Junior Research Fellow
06	Durba Das	Intramural Project	Biogenic aerosols over Himalaya	Project Associate

B) Post-doctoral/Research Associates

Serial No.	Name	Fellowship	Topics	Status
01	Dr Chirantan Sarkar	DST-SERB IRHPA sceme, Govt of India	Aerosol transport	Terminated October 2017
02	Dr Debajyoti Ray	DST-SERB IRHPA sceme, Govt of India (PI of one of the programwhere Dr Ray worked)	Size- segregated PAHs	Terminated

C) Project Assistant: 07

D) Master degree thesis/dissertation/project: 29

8. Professional services:

- 1) Review of scientific articles: 79
- 2) Editorial Board Member: International journal, "Aerosol and Air Quality Research"

9. Extramural projects

Sl. No	Title of the Project	Funding Agency	Year of Sanction	Cost (INR)	Status
01	Modeling carbonaceous aerosol source influence and atmospheric effects" National Carbonaceous Aerosol Program (NCAP) As PI	Ministry of Environment, Forest and Climate Change (MoEFCC), Govt of India	2017	1,06,07,740	Currently Running
02	"Biosphere-Atmosphere Exchange of CO ₂ , H ₂ O and Energy over a High Altitude Forest Canopy at Eastern Himalaya, India" As PI	Ministry of Earth Sciences (MoES), Govt of India	2012	62,62,400	Completed (no cost extension)
03	"Study of Cosmic Ray Interactions and cosmic ray aerosol cloud connection in the context of regional climate change" *As PI	Department of Science and Technology (DST), IRHPA Scheme, Govt of India	2012	16,26,16,000	Completed
04	Understanding the Role of Local and Transported Biogenic and anthropogenic Aerosols on Microphysical and Chemical Properties of Low-level Clouds over	Department of Science and Technology (DST), Govt of India	2018	74,08,800	Currently running

	Eastern Himalaya, India *As PI				
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10. Developmental activities

- a) I have developed a facility for the studies on biosphere-atmosphere exchange of Greenhouse Gases in a remote forest at Darjeeling. A 50 m tall tower was erected and several analyzers were installed at various heights of the tower to measure Greenhouse Gases and other atmospheric parameters. A small laboratory was built at the site too. Around 1 hectre of land was acquired from the West Bengal Forest Department, where the study is being carried out. This is the first ever study over a high altitude Himalayan site.
- b) I have initiated and developed a facility with MIT,USA for the collaborative research on High Resolution Continuous Monitoring of Greenhouse Gases at Darjeeling
- c) I have initiated and developed a facility for the collaborative research on VOCs/PAHs with National Environmental Engineering Research Institute (NEERI), India.
- d) I have conducted various campaign studies for air quality and climate change studies over remote pristine sites in Sundarban mangrove forests.
- e) I have developed the facility for cloud microphysical studies at Darjeeling campus of Bose Institute. This includes monitoring of condensation and cloud condensation nuclei, aerosol spectrometer, fog and cloud sampler etc.

11. Other Achievement



Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India has launched National Clean Air Program (later renamed as National Clean Air Mission) in January 2019 with the vision to combat air pollution in India, building action plans and strategies. The aim is to reduce the air pollution by 20-30 % in 2024 with respect to 2017 (as base year). The major activities include identification and quantification of major natural and anthropogenic sources, emission inventories followed by building action plans to mitigate air pollution for major polluted cities (122 as of now) in different states in India.

I am working as the Nodal Scientist and Knowledge Partner for the state of West Bengal under this national mission.