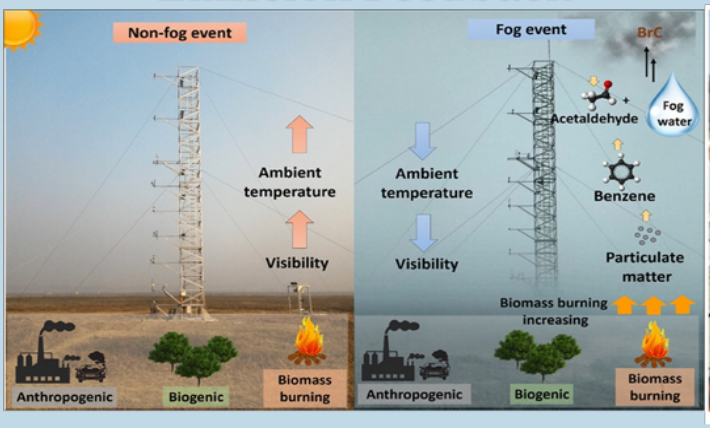
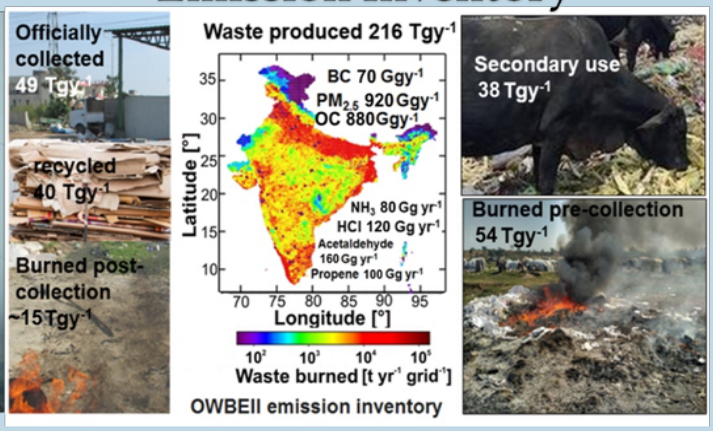
Department of

EARTH AND ENVIRONMENTAL SCIENCES

Emission Feedback

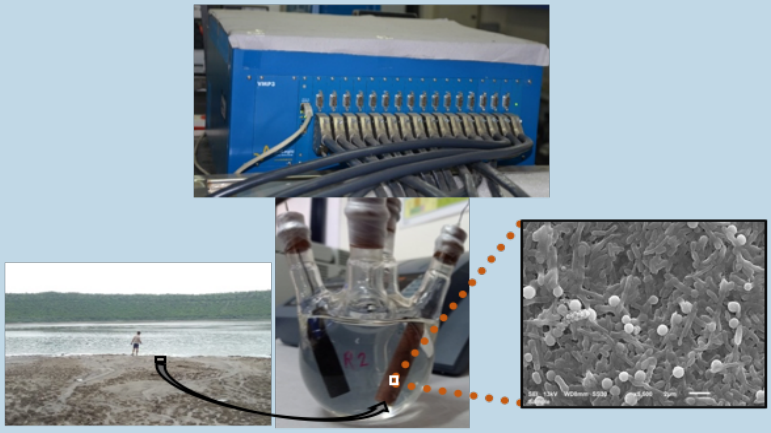


Emission Inventory



Coring Campaign

Environmental Electromicrobiology



Weather and Climate Modelling

Indian Institute of Science Education and Research Mohali (IISERM)

Foreword

The Indian Institutes of Science Education and Research (the IISERs) are a group of institutes set up by the Ministry of Human Resource Development (MHRD) of the Government of India (GOI), to facilitate high quality science education and research in the country. The first two IISERs were set up in Pune and Kolkata in 2006. The IISER at Mohali (IISER-M) began functioning in 2007. In subsequent years four more IISERs were set up at Bhopal, Trivandrum, Berhampur, and Tirupati. After functioning out of a transit campus located in Chandigarh for few years, IISER Mohali moved into its own permanent campus completely in 2013.

In June 2012, the institute organized itself into separate departments for administrative efficiency. In terms of research and teaching IISER Mohali continues to foster inter-disciplinary teaching and research across disciplines.

In its educational aspects, IISER Mohali is modelled on the highly successful Indian Institutes of Technology (the IITs). In its research-related aspects, IISER Mohali is modelled on the Indian Institute of Science (IISc) Bangalore.

All five IISERs were originally set up to bring together researchers who are pursuing cutting edge research in their individual disciplines and highly motivated graduate and undergraduate students.

The Department of Earth and Environmental Sciences is a vibrant department which seeks to pursue high profile research in the broad subject areas of Earth and Environmental Sciences, motivate undergraduates and graduates to undertake cutting edge research and provide them international exposure. The Department now has seven regular faculty members and one Inspire Faculty and is constantly looking for extremely motivated scientists with a high-profile research agenda and a flair for teaching to join the faculty team.

The Department currently conducts a PhD program and is supervising MS thesis projects across disciplines. The Department is running three minor's programs in Atmospheric Sciences, Earth Sciences, and in Earth and Environmental Sciences.

Faculty Profiles

S.No	Name	Designation	Research Area	Email (@iisermohali.ac.in)
1	Baerbel Sinha	Head, Associate Professor	Environmental Science	bsinha
2	Vinayak Sinha	Associate Professor	Atmospheric and Analytical Chemistry	vsinha
3	Anoop Ambili	Assistant Professor	Paleoclimatology & Geochemistry	anoop
4	Sunil A. Patil	Assistant Professor	Environmental Electromicrobiology & Biotechnology	sunil
5	Raju Attada	Assistant Professor	Atmospheric Modelling	rajuattada
6	Sourabh Bhattacharya	Assistant Professor	Economic Geology and Petrology	sourabh
7	Chandrakant Ojha	Assistant Professor	Microwave Remote Sensing	chandrakanta
8	Sharmila Bhattacharya	Inspire Faculty	Organic Geochemistry & Geobiology	sbhattacharya

Joined August 2010

Vinayak Sinha

Associate Professor

M.Sc., Sri Sathya Sai Institute of Higher Learning, Prashantinilayam, 2002

M.Tech, Indian Institute of Technology Delhi, 2004

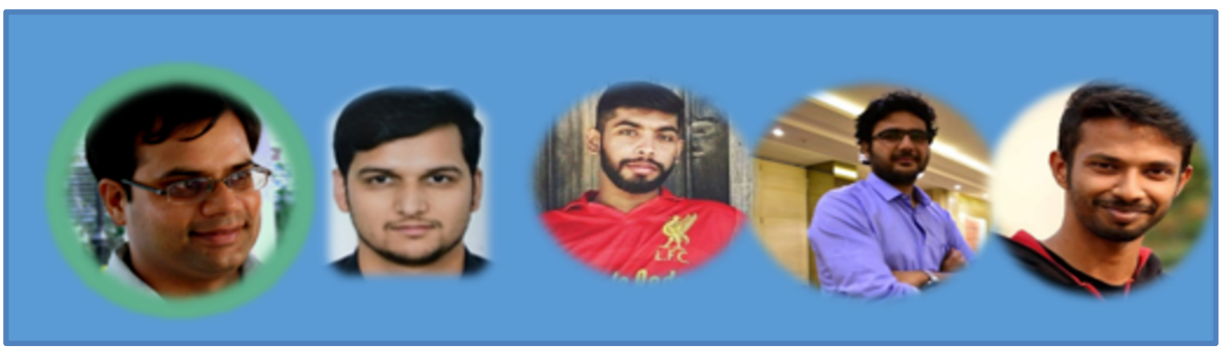
Ph.D., Johannes Gutenberg University & MPIC Mainz, 2007

Post Doc, Max Planck Institute for Chemistry, 2007-2010

Vinayak Sinha is guiding/has guided 6 Ph.D. & 12 M.Sc. thesis students

Selected Publications

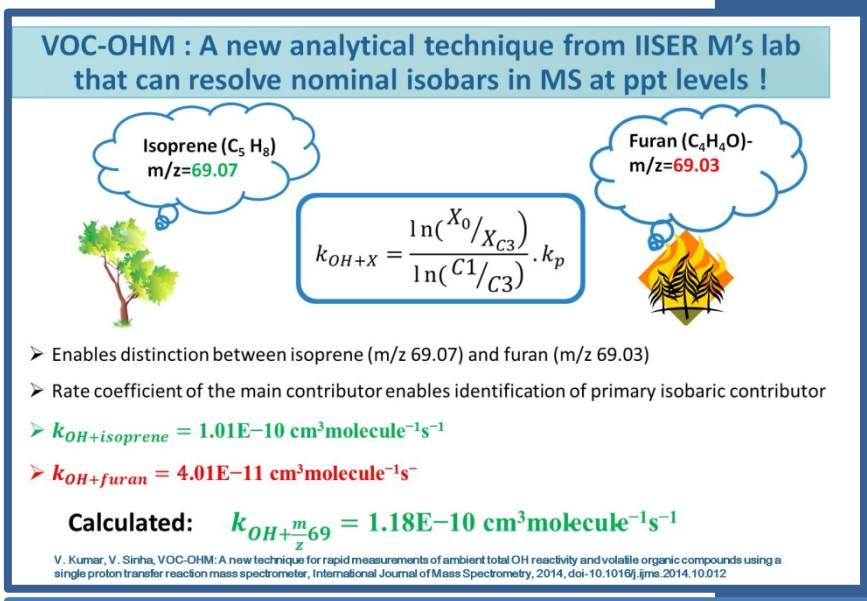
- Mishra, A. K., Sinha, B., Kumar, R., Barth, M., Hakkim, H., Kumar, V., Kumar, A., Datta, S., Guenther, A., and Sinha, V.: Cropland trees need to be included for accurate model simulations of land-atmosphere heat fluxes, temperature, boundary layer height, and ozone, Sci. Total Environ., 751, 141728, 2021.
- Mishra, A. K. and Sinha, V.: Emission drivers and variability of ambient isoprene, formaldehyde and acetaldehyde in north-west India during monsoon season, Environ. Pollut., 267, 115538, 2020.
- Kumar, A., Sinha, V., Shabin, M., Hakkim, H., Bonsang, B., and Gros, V.: Non methane hydrocarbon (NMHC) fingerprints of major urban and agricultural emission sources active in South Asia for use in source apportionment studies, Atmos. Chem. Phys., 20, 12133–12152, 2020.
- Vettikkat, L., Sinha, V., Datta, S., Kumar, A., Hakkim, H., Yadav, P., and Sinha, B., Significant emissions of dimethyl sulfide and monoterpenes by big-leaf mahogany trees: discovery of a missing dimethyl sulfide source to the atmospheric environment, Atmos. Chem. Phys., 20, 375–389, 2020.
- Kumar, V., Chandra, B. P., Sinha, V., Large unexplained suite of chemically reactive compounds present in ambient air due to biomass fires, Scientific Reports, 8, 626, https://www.nature.com/articles/s41598-017-19139-3, 2018.
- Sarkar, C., **Sinha, V.,** Kumar, V., Rupakheti, M., Panday, A.K., Mahata, K., Rupakheti, D., Kathayat, B., Lawrence, M.G., Overview of VOC emissions and chemistry from PTR-TOF-MS measurements during the SusKat-ABC campaign: High acetaldehyde, isoprene and isocyanic acid in wintertime air of the Kathmandu Valley, **Atmos. Chem. Phys.**, 16, 3979-4003, 2016.
- Chandra, B.P., **Sinha, V.,** Contribution of post-harvest agricultural paddy residue fires in the N.W. Indo-Gangetic Plain to ambient carcinogenic benzenoids, toxic isocyanic acid and carbon, **Environment International** 88, 187-197, 2016.
- **Sinha,V.**, Kumar,V., Sarkar,C., Chemical composition of pre-monsoon air in the Indo–Gangetic Plain measured using a new PTR-MS and air quality facility: high surface ozone and strong influence of biomass burning, **Atmos. Chem. Phys.**, 14, 5921-5941, 2014.
- **Sinha, V.,** Williams, J., Crowley, J., Lelieveld J., The Comparative Reactivity Method – A new tool to measure the total OH Reactivity of ambient air, **Atmos. Chem. Phys.**, 8, 2213-2227, 2008.

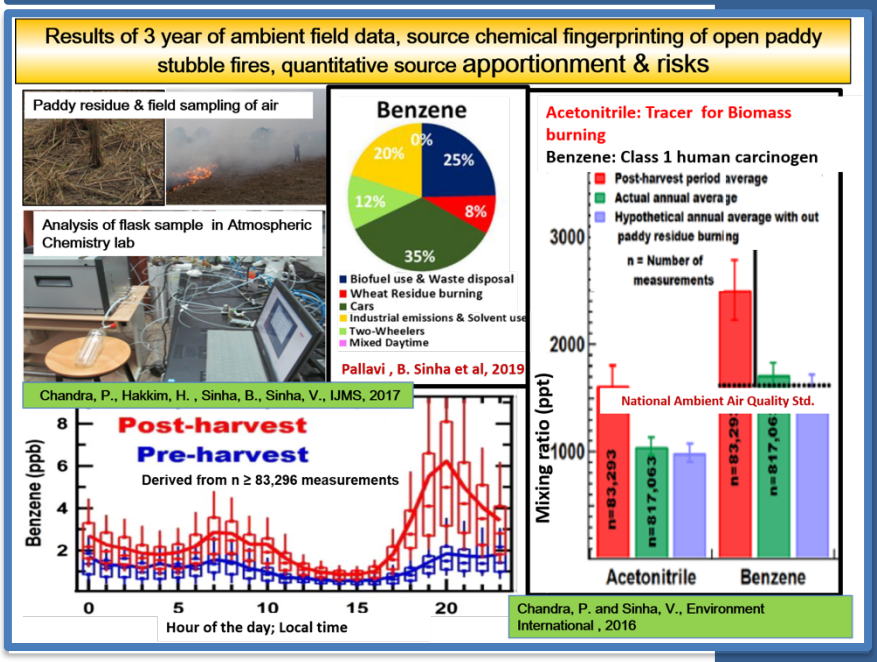


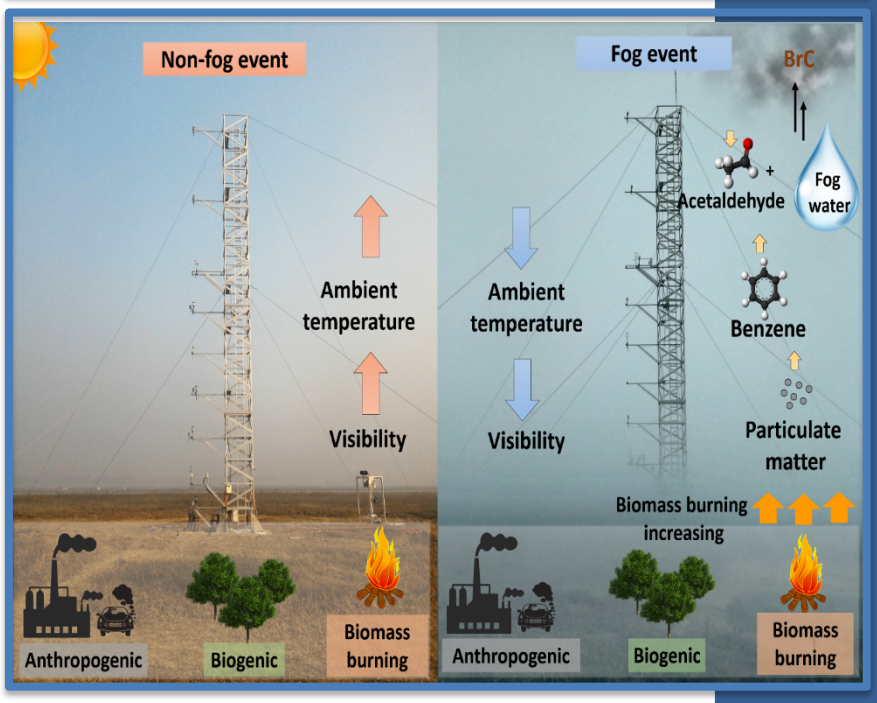
Research Interests

Our current research focus is centred on the real time atmospheric reactivity of hydroxyl radicals, emissions and chemistry of volatile organic compounds and the instantaneous ozone formation photochemistry, so as to develop a fundamental understanding of the processes that control the self cleansing (oxidizing) capacity of ambient air over the Indo Gangetic Plain. Towards this end, my group builds instruments (e.g. for quantifying OH reactivity) and deploys very sensitive online spectroscopic and mass spectrometric technqiues for quantifying the ultra trace atmospheric chemical constituents.

We are the only laboratory in India to have developed an instrument for quantifying atmospheric OH reactivity directly based on the innovative Comparative Reactivity Method (CRM) (Kumar and Sinha, 2014), that has been emulated by leading research groups worldwide (e.g. USA, France and Germany). OH reactivity is the key chemical parameter that constrains the total reactive pollutant loading of air masses and enables instantaneous ozone production rates and regimes to be quantified (Sinha et al. 2012). Our laboratory is also the first to deploy proton transfer reaction mass spectrometry (PTR-MS) technology within India and houses India's first PTR-MS. This instrument quantifies highly reactive volatile organic compounds (VOC's) in real-time at parts per trillion (ppt) level and has already been used to compile the first ambient dataset for reactive VOCs such as isoprene and acetaldehyde over the Indian region (Sinha et al. 2014).







Joined September 2011

Baerbel Sinha

Associate Professor

M.Sc., TU-Bergakademie Freiberg, Germany, 2004

Ph.D., Johannes Gutenberg University & MPIC Mainz, 2007

Post Doc, Max Planck Institute for Chemistry, 2007-2011

Baerbel Sinha is guiding/has guided 7 Ph.D students and 18 M.Sc. thesis students

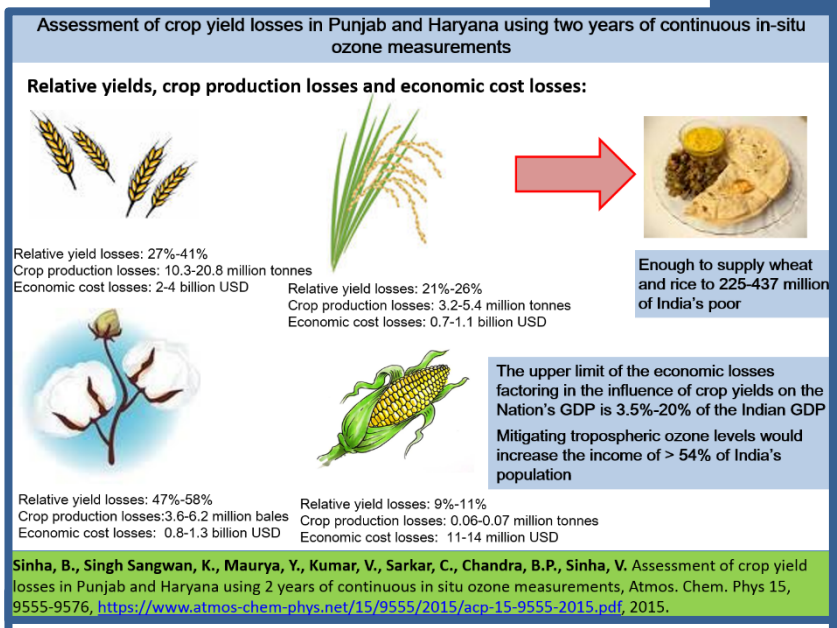
Selected Publications

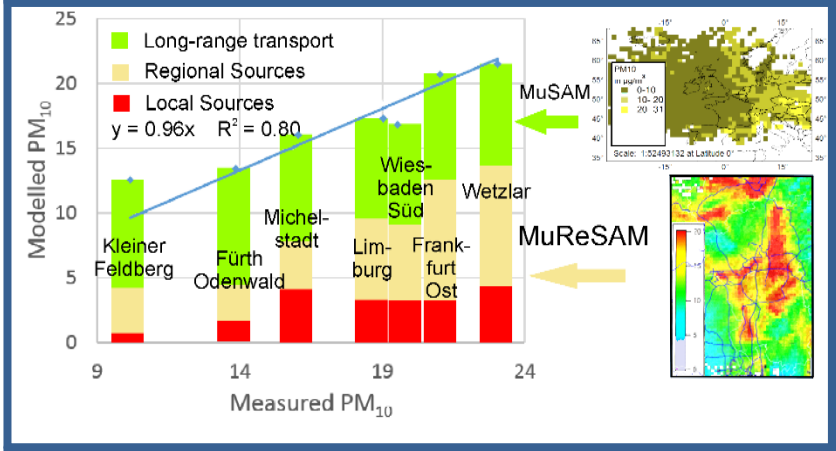
- Pawar, H. and **Sinha B.**, Humidity, density, and inlet aspiration efficiency correction improve accuracy of a low-cost sensor during field calibration at a suburban site in the north-western Indo-Gangetic Plain (NW-IGP). **Journal of Aerosol Science and Technology**, 54(6), 685-703, 2020.
- Pallavi, **Sinha, B**., Sinha, V., Source apportionment of volatile organic compounds in the north-west Indo–Gangetic Plain using positive matrix factorisation model, **Atmospheric Chemistry and Physics**, 15467–15482, 2019.
- Sharma, G., **Sinha, B.,** Pallavi, Hakkim, H., Chandra, B.P., Kumar, A., Sinha, V.: Gridded Emissions of CO, NOx SO_2, CO_2 NH_3, HCl, CH_4, $PM_{2.5}$, PM_{10}, BC, and NMVOC from Open Municipal Waste Burning in India, **Environmental Science and Technology**, 53, 4765-4774, 2019.
- Garg, S. and **Sinha, B.,** Determining the contribution of long-range transport, regional and local source areas, to PM10 mass loading in Hessen, Germany using a novel multi-receptor based statistical approach, **Atmospheric Environment** 167, 566-575, 2017.
- Harris, E., **Sinha, B.**, van Pinxteren, D., Tilgner, A., Fomba, K. W., Schneider, J., Roth, A., Gnauk, T., Fahlbusch, B., Mertes, S., Lee, T., Collett, J., Foley, S., Borrmann, S., Hoppe, P., Herrmann, H., Enhanced role of transition metal ion catalysis during in-cloud oxidation of SO_2. **Science** 340, 727-730, 2013.
- Pöhlker, C., Wiedemann, K., **Sinha, B.**, Shiraiwa, M., Gunthe, S. S., Smith M., Hang, S., Artaxo, P., Chen, Q., Cheng, Y., Elbert, W., Gilles, M.K., Kilcoyne, A. L. D., Moffet, R., Weigand, M., Martin, S. T., C., Pöschl, U., Andreae, M. O., Biogenic potassium salt particles as seeds for secondary organic aerosol in the Amazon, **Science** 337, 1075-1078, 2012.
- Pöschl, U., Martin, S. T., **Sinha, B.**, Chen, Q., Gunthe, S. S., Huffman, J. A., Borrmann, S., Farmer, D. K., Garland, R. M., Helas, G., Jimenez, J. L., King, S. M., Manzi, A., Mikhailov, E., Pauliquevis, T., Petters, M. D., Prenni, A. J., Roldin, P., Rose, D., Schneider, J., Su, H., Zorn, S. R., Artaxo, P., Andreae, M. O., Rainforest aerosols as biogenic nuclei of clouds and precipitation, **Science**, 329, 1513-1516, 2010.
- Musat, N., Halm, H., **Winterholler, B.**, Hoppe, P., Peduzzi, S., Hillion, F., Horreard, F., Amann, R., Jørgensen, B. B., Kuypers, M. M.M., A single cell view on the ecophysiology of anaerobic phototrophic bacteria. **Proceedings of the National Academy of Science of the United States of America**, 105, 17861-17866, 2008.

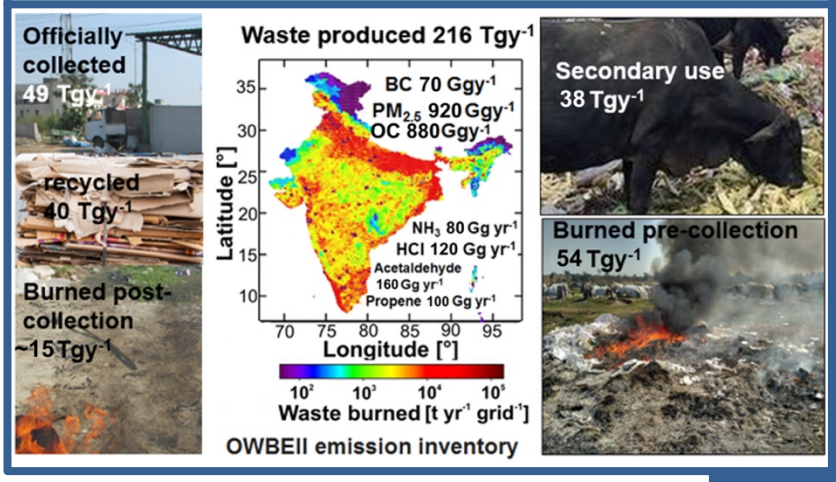
Research Interests

Poor air quality over the Indo Gangetic Plain has become a matter of public debate and concern. Our research group works on improving air quality action plans by conducting source apportionment studies (Pallavi et al., 2019), deploying low cost air pollution sensors (Pawar and Sinha 2020) and developing emission inventories (Sharma et al., 2019). We also seek to understand the impact of air pollution on vegetation.

We also use sophisticated single particle techniques such as Scanning Electron Microscopy, Atomic Force Microscopy and Nano Secondary Ion Mass Spectrometry aim to understand the effect of aerosol surface properties and mixing state on initiating and sustaining rainfall (Pöschl et al. 2010, Pöhlker et al. 2012) and on the direct climate forcing of aerosol. We investigate multiphase and heterogeneous reactions taking place on the surface of aerosol particles (Harris et al. 2013) with the purpose of improving global climate model predictions of secondary inorganic (Harris et al. 2013) and secondary organic particle formation (Pöschl et al. 2010).







Joined March 2017

Anoop Ambili

Assistant Professor

M.Sc., Pondicherry Central University, Pondicherry, India, 2007

Ph.D., University of Potsdam, Potsdam, Germany, 2013

PostDoc, German Research Center for Geoscience (GFZ Potsdam), Germany, 2013-2014

PostDoc, Indian Institute of Science Education and Research Kolkata, 2014-2015

Inspire Faculty, Indian Institute of Science Education and Research Mohali, 2015-2017

Dr. Anoop Ambili is guiding/has guided 4 Ph.D students and 7 M.Sc. thesis students

Selected Publications

- Misra, S, Bhattacharya, S., Mishra, P.K., Misra, K.G., Agrawal, S., **Anoop, A.,** Vegetational responses to monsoon variability during Late Holocene: Inferences based on carbon isotope and pollen record from the sedimentary sequence in Dzukou valley, NE India, Catena 194, Article number 104697, 2020.
- Mishra, P.K., Ankit, Y., Gautam, P.K., C.G., L., Singh, P., **Anoop, A.,** Inverse relationship between south-west and north-east monsoon during the late Holocene: Geochemical and sedimentological record from Ennamangalam Lake, southern India, Catena 182, Article number 104117, 2019.
- Mishra, P.K., Chauhan, P.R., Diwate, P., Parth, S., **Anoop, A**., Holocene climate variability and cultural dynamics in the Indian subcontinent, Episodes 43 (1), 552-562, 2020.
- Ankit, Y., Mishra, Praveen K., Kumar, P., Jha, Deepak K., Kumar, Vivek V., Ambili, V., **Anoop, A**., 2017. Molecular distribution and carbon isotope of n-alkanes from Ashtamudi Estuary, South India: Assessment of organic matter sources and paleoclimatic implications. **Marine Chemistry,** 196, Pages 62-70, 2017
- Prasad, S., **Anoop, A**., et al., Prolonged monsoon droughts and links to Indo-Pacific warm pool: a Holocene record from Lonar Lake, Central India. **Earth and Planetary Science Letters** 391, 171-182, 2014. (Top 2% cited)
- **Anoop, A**., Prasad, S., Plessen, B., Naumann, R., Menzel, P., Basavaiah, N., Weise, S., Gaye, B., Brauer, A., Palaeoenvironmental implications of evaporative Gaylussite crystals from Lonar Lake, Central India. **Journal of Quaternary Science** 28 (4), 349-359, 2013. (Top 10% cited)
- **Anoop, A**., Prasad, S., Basavaiah, N., Brauer, A., Shahzad, F., Deenadayalan K., Tectonic versus climate influence on landscape evolution: a case study from the upper Spiti valley, NW Himalaya. **Geomorphology** 145-146, 32-44, 2012. (Top 25% cited)

Research Interests

Our research is aimed at multi-proxy paleoclimate reconstruction, with special focus on developing transfer functions for quantification of climate variability and understanding the impact of climate change on different components of the geo-ecosystems. We use lacustrine sediments from the Indian subcontinent as climate archives for deciphering past environmental changes. The developed paleoclimate dataset aims to improve the understanding of monsoon variability and the complex forcing mechanisms (solar insolation, internal teleconnections for e.g., El Niño-Southern Oscillation, tropical-midlatitude interactions).

Research Highlights

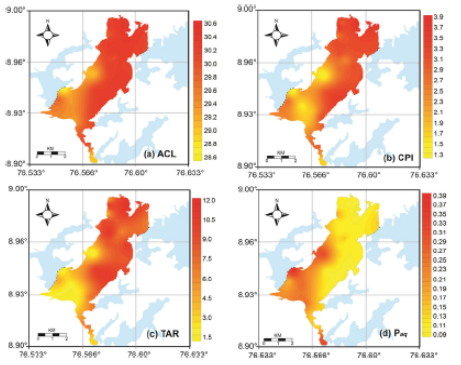


Fig.1. Spatial distribution of *n*-alkane indices (a) ACL, (b) CPI, (c) TAR and (d) P_{aq}.

- Baseline information on *n*-alkanes and carbon isotope in Ashtamudi Estuary sediments.
- Estimation of terrigenous versus recycled Organic Matter.
- Estimation of terrigenous versus aquatic productivity.

We evaluated the applicability of *n*-alkane indices to assess the relative contribution of terrestrial versus marine organic matter inputs to the estuarine environment.

- Quantitative apportion of organic matter sources in Ashtamudi sediments using End-member modelling of compound-specific carbon isotope values.
- The modern calibration from Ashtamudi Estuary provides potential in using *n*-alkane distribution in conjunction with carbon isotope as part of a high-resolution multi-proxy paleoclimate reconstruction from the region.

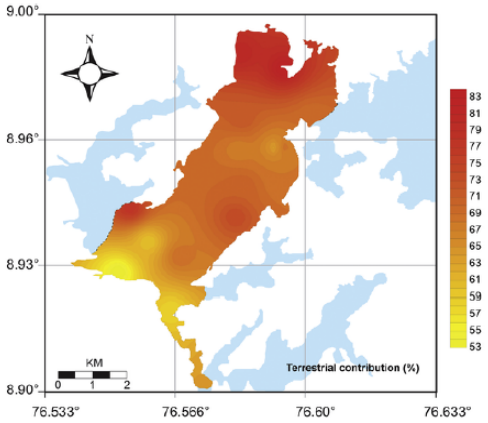


Fig.2. Spatial representation of terrigenous contribution in Ashtamudi Estuary based on the end member modelling of compound specific $\delta^{13}C$ values.

Ankit, Y., Prem, K., Mishra, P.K., **Anoop, A.**, 2017. Molecular distribution and carbon isotope of n-alkanes from Ashtamudi Estuary, South India: Assessment of organic matter source and paleoclimatic implications. Marine Chemistry. (doi.org/10.1016/j.marchem.2017.08.002)

A combination of geomorphic, sedimentological, geochemical, biomarker (*n*-alkane) in conjunction with isotopic data is used to understand the Holocene paleoclimate fluctuations. We are currently working on lacustrine sediments (e.g. Ahansar Lake, Kashmir valley; Ashtamudi Estuary, Kerala; Rushikulya continental shelf sediments; Ennamangalam Lake, Tamil Nadu) from various climate sensitive zones of Indian subcontinent. We perform modern calibration approach to identify proxies that are sensitive to environmental changes and use the identified proxies to generate long-term high-resolution palaeoclimate data.

Joined August 2017

Sunil A Patil

Assistant Professor

M.Sc., Shivaji University, Kolhapur, 2005

Ph.D*., S.P. Pune University, Pune, 2011

*DAAD doctoral scholar at TU Braunschweig, Germany, 2008-2010

Marie Skłodowska-Curie postdoc, Lund University, Sweden, 2011-2012

Marie Skłodowska-Curie fellow, Ghent University, Belgium, 2013-2016

Senior Alexander von Humboldt fellow, TU Braunschweig, Germany, 2016-2017

Dr. Sunil is guiding/has guided 7 doctoral & 9 M.S. thesis students

Selected Publications

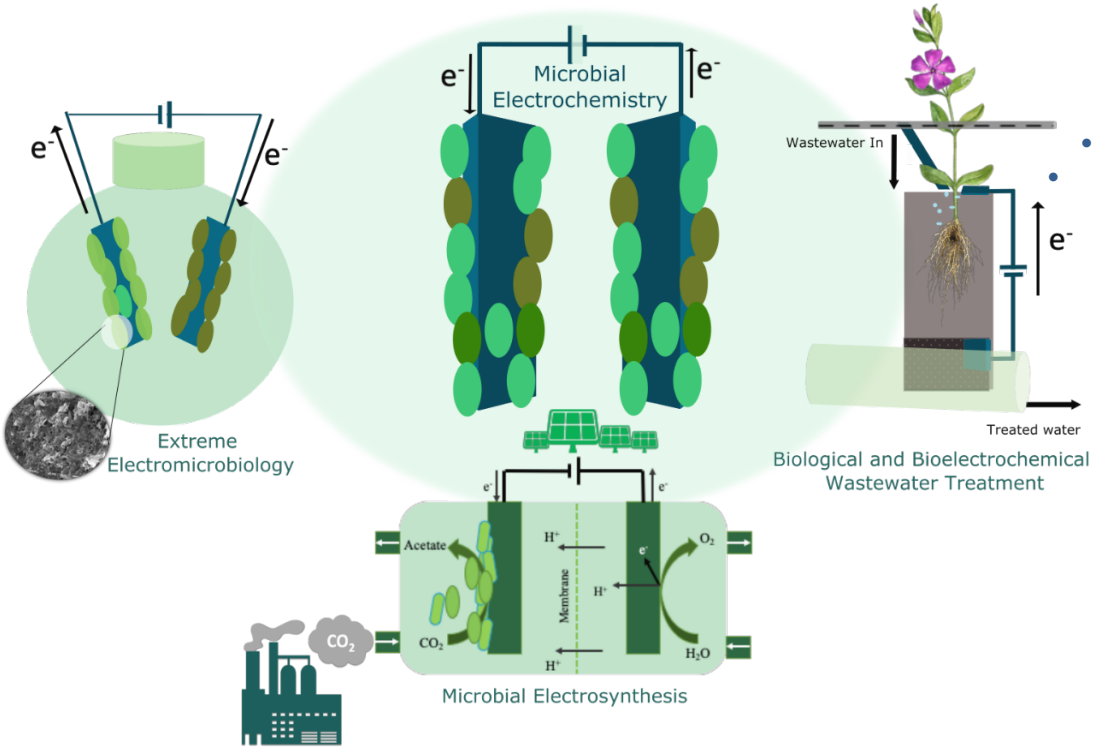
- Roy M., Yadav R., Chiranjeevi P. and **Patil S.A.** Direct utilization of industrial carbon dioxide with low impurities for acetate production via microbial electrosynthesis. **Bioresource Technology**, 320 (Part A), 124289. 2021
- Yadav S. and **Patil S.A.** Microbial electroactive biofilms dominated by *Geoalkalibacter* spp. from a highly saline–alkaline environment. **npj Biofilms and Microbiomes**, 6, 38. 2020
- Chiranjeevi P. and **Patil S.A.** Strategies for improving the electroactivity and specific metabolic functionality of microorganisms for various microbial electrochemical technologies. **Biotechnology Advances,** 39, 107468. 2020
- Yadav R.K., Chiranjeevi P., Sukrampal and **Patil S.A.** Integrated drip hydroponics-microbial fuel cell system for wastewater treatment and resource recovery. **Bioresource Technology Reports**, 9, 100392. 2020
- Moss C., **Patil S.A.**, and Schröder U. Scratching the surface – How decisive are microscopic surface structures on growth and performance of electrochemically active bacteria? **Frontiers in Energy Research** 7, 18. 2019
- Chen S., **Patil S.A.**, Brown R.K., Schröder U. Strategies for optimizing the power output of microbial fuel cells: Transitioning from fundamental studies to practical implementation, **Applied Energy**, 233, 15-28. 2019
- Arends, J.B.A., **Patil, S.A.,** Roume, H. and Rabaey, K. Continuous long-term electricity-driven bioproduction of carboxylates and isopropanol from CO_2 with a mixed microbial community**. Journal of CO_2 Utilization**, 20, 141–149. 2017
- **Patil S.A.,** Arends J.B.A., Vanwonterghem I., van Meerbergen, J., Guo K., Tyson G.W. and Rabaey K. Selective enrichment establishes a stable performing community for microbial electrosynthesis of acetate from CO_2. **Environmental Science and Technology**, 49, 8833-8843. 2015
- **Patil S.A.,** Gildemyn S., Pant D., Zengler K., Logan B.E. and Rabaey K. A logical data representation framework for electricity-driven bioproduction processes. **Biotechnology Advances**, 33, 736-744. 2015
- **Patil S.A.,** Górecki K., Hägerhäll C. and Gorton L. Cisplatin-induced elongation of Shewanella oneidensis MR-1 cells improves microbe–electrode interactions for use in microbial fuel cells. **Energy and Environmental Science**, 6, 2626–2630. 2013
- Millo D., Harnisch F., **Patil S.A.,** Schröder U., Hildebrandt P. In situ spectroelectrochemical investigation of electrocatalytic microbial biofilms by surface-enhanced resonance Raman spectroscopy. **Angewandte Chemie International Edition**, 50(11), 2625-2627. 2011
- **Patil, S. A.,** Harnisch, F., Kapadnis, B. and Schröder, U., Electroactive mixed culture biofilms in microbial bioelectrochemical systems: The role of temperature for biofilm formation and performance. **Biosensors and Bioelectronics,** 26, 803–808, 2010

Research Interests

Our research activities are aimed at advancing the understanding of Electromicrobiology, a new sub-discipline of Environmental Microbiology, and contributing to the development of sustainable biotechnologies for the valorization of liquid and gaseous wastes. To this end, we use highly interdisciplinary microbial electrochemistry approaches wherein microbial respiratory and metabolic reactions are linked to the electrodes or conductive materials in bioelectrochemical systems. Currently, our research group is working on:

- Electromicrobiology of the extreme environments
- Renewable electricity-driven bioproduction of chemicals from CO_2
- Integrated biological and bioelectrochemical processes for wastewater treatment and resource recovery

We use anaerobic microbiology, electrochemistry, genomics, microscopy, bioengineering, and various analytical tools and techniques routinely in our research activities.



For more details on our research activities, please refer to http://14.139.227.202/Faculty/eemblab/research.html

Joined April 2019

Raju Attada

Assistant Professor

M.Sc., Andhra University, Visakhapatnam, India, 2008

Ph.D., Indian Institute of Tropical Meteorology, Pune, India, 2015

Postdoctoral Researcher, King Abdullah University of Science & Technology (KAUST), Saudi Arabia, 2015-2019

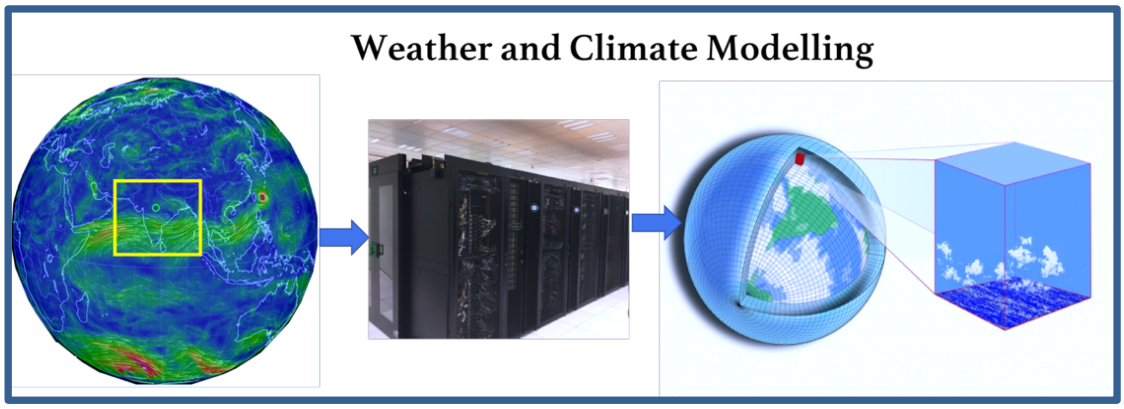
Dr. Raju is guiding 1 Postdoctoral and 3 Ph.D & 3 M.S. thesis students

Selected Publications

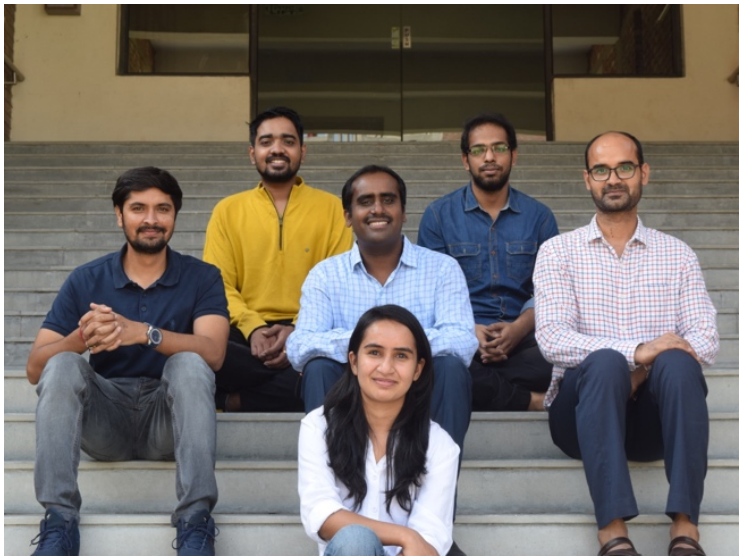
- Hoteit, I., et al., **Raju Attada**: Towards an End-to-End Analysis and Prediction System for Weather, Climate, and Marine Applications in the Red Sea, Bull. Amer. Meteor. Soc., 102, https://doi.org/10.1175/BAMS-D-19-0005.1, 2021.
- **Raju Attada,** Hari Prasad Dasari, Ravi Kumar Kunchala, Sabique Langodan, Niranjan Kumar Kondapalli, Omar Knio and Ibrahim Hoteit. Evaluating Cumulus Parameterization Schemes for the Simulation of Arabian Peninsula Winter Rainfall. **J. Hydrometeor.,** 21, 1089–1114, 2020
- **Raju Attada,** Prashant Kumar, Anant Parekh, Ravi Kumar K, C. Nagaraju, J. S. Chowdary and Nagarjuna D, (2019) Evaluation of Upper Tropospheric Humidity in WRF Model during Indian Summer Monsoon. ***Asia-Pacific Journal of Atmospheric Sciences,*** doi:10.1007/s13143-018-0090-3.
- **Raju Attada,** Anant Parekh, J. S. Chowdary and C. Gnanaseelan, (2018a) Reanalysis of the Indian Summer Monsoon: Four-dimensional data assimilation of AIRS retrievals in a regional data assimilation and modeling framework. ***Climate Dynamics***, DOI 10.1007/s00382-017-3781-z.
- **Raju Attada,** Hari Prasad Dasari, Anant Parekh, J. S. Chowdary, Sabique Langodan, Omar Knio and Ibrahim Hoteit, (2018b) The Role of the Indian Summer Monsoon Variability on Arabian Peninsula Summer Climate. ***Climate Dynamics,*** 50:2905–2923.
- **Raju Attada**, Hari Prasad Dasari, J. S. Chowdary, Ramesh Kumar Yadav, Omar Knio and Ibrahim Hoteit, (2018c) Surface Air Temperature Variability over the Arabian Peninsula and its Links to Circulation Patterns. ***International Journal of Climatology, 1–20,*** https://doi.org/10.1002/joc.5821.
- **Raju Attada,** Prashant Kumar and Hari Prasad, (2018d) Assessment of land surface models in a high resolution atmospheric model during Indian Summer Monsoon. ***Pure and Applied Geophysics,*** https://doi.org/10.1007/s00024-018-1868-z.
- **Raju Attada**, Anant Parekh, J. S. Chowdary and C. Gnanaseelan, (2015a) Assessment of the Indian summer monsoon in the WRF regional climate model. ***Climate Dynamics***, Volume 44, Issue 11, 3077-3100.
- **Raju Attada**, Anant Parekh, Prashant Kumar and C. Gnanaseelan, (2015b) Evaluation of the impact of AIRS profiles on prediction of Indian summer monsoon using WRF variational data assimilation system. ***Journal of Geophys. Res. Atmos.***, 120, DOI: 10.1002/2014JD023024.

Research Interests

Atmospheric processes and climate change take place on a wide range of spatial scales from global to regional and local scales. Our group aims at analyzing, simulating and predicting the regional weather and climate aspects, including extremes, over India using high-resolution climate models.



The high-resolution information will be beneficial for climate assessments, to study the impacts of climate change on human and natural systems, and to develop national adaptation and mitigation strategies. The group is also focusing on understanding the regional/local weather and climate phenomena, and their variability and changes, through dynamical downscaling and analysis of observations. We are also working on developing cloud-resolving modelling systems of mesoscale convective systems and their predictions at seasonal scales, and the future projections of extremes at regional and local scales. Our group research activities at IISERM also involve advanced data assimilation techniques to improve the simulations and forecast of regional weather extremes, including rainfall and dust storms. We are also interested in prediction of meteorological variables using Machine learning approaches.



Joined January 2021

Sourabh Bhattacharya

Assistant Professor

Ph.D., IIT Kharagpur 2014

Postdoctoral Researcher, Indian Institute of Science Bangalore 2015

DST-INSPIRE Faculty, University of Delhi, 2015-2018

Visiting Asst. Professor, IIT Bhubaneswar, 2019

Asst. Professor, IIT Bhubaneswar, 2020

Dr. Sourabh is guiding/has guided 1 PhD and 16 M.Sc. (Geology) students

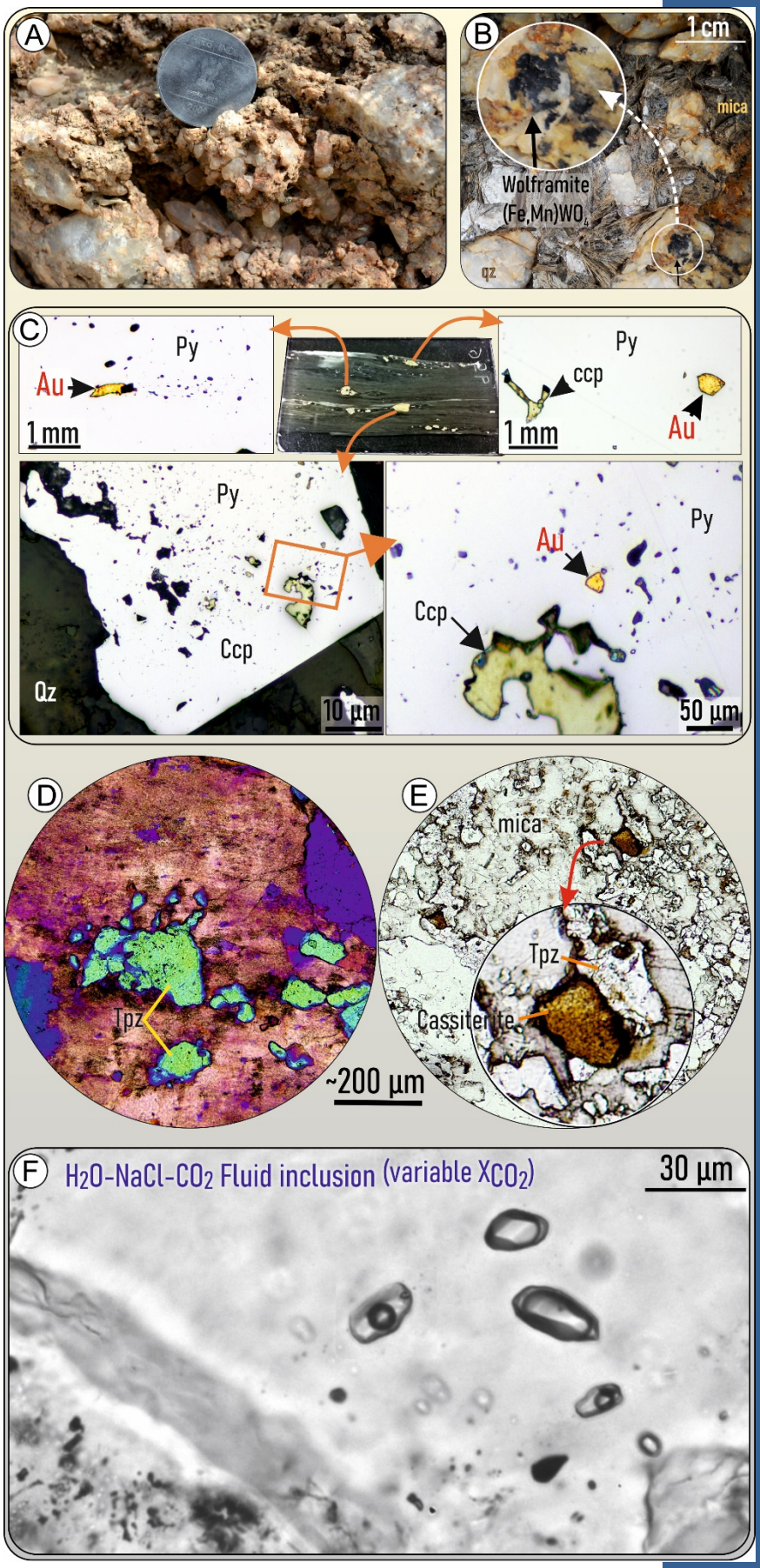
Selected Publications

- Pandit, **Sourabh Bhattacharya**, M.K. Panigrahi. Dissecting through the metallogenic potentials of older granitoids-case studies from Bastar and Eastern Dharwar cratons India. Journal of Geological Society, London, Special Publications, 489, SP489-2019. https://doi.org/10.1144/SP489- 2019-342 (2020)
- Kesarwani, S. Sarangi, R. Srinivasan, B.G. George, S.K. Singh, **Sourabh Bhattacharya**, V.N. Vasudev; Origin of granodiorite hosted Neoarchaean orogenic gold ore deposits: Stable isotopic and geochemical constraints with example from the Dharwar craton, southern India. Ore Geology Reviews, 107, 754-779. (2019)
- **Sourabh Bhattacharya**, Mruganka K. Panigrahi: Volatiles associated with granitoid intrusives around orogenic gold deposits in Ramagiri and Penakacherla regions of Eastern Dharwar Craton, South India. Journal of the Geological Society of India 11/2017; 90(5): 569-576. https://doi.org/10.1007/s12594-017-0753-1 (2017)
- **Sourabh Bhattacharya**, M.K. Panigrahi, H.K. Sachan, A. Kharya: Oxygen isotope ratio of quartz veins from the auriferous Ramagiri–Penakacherla schist belt and surrounding granitoids in the Eastern Dharwar craton: A case for a possible link between gold mineralization and granite magmatism. Ore Geology Reviews 04/2014; 63: 201 – 208. (2014)
- **Sourabh Bhattacharya**, Mruganka K. Panigrahi, M. Jayananda: Mineral thermobarometry and fluid inclusion studies on the Closepet Granite, Eastern Dharwar Craton, south India: Implications to emplacement and evolution of late-stage fluid. Journal of Asian Earth Sciences 04/2014; 91:1- 18. https://doi.org/10.1016/j.jseaes.2014.04.004 (2014)
- **Sourabh Bhattacharya**, M.K. Panigrahi: Heterogeneity in fluid characteristics in the Ramagiri-Penakacherla sector of the Eastern Dharwar Craton: Implications to gold metallogeny. Russian Geology and Geophysics 11/2011; 52(11-11): 1436 - 1447. https://doi.org/10.1016/j.rgg.2011.10. 012 (2011)

Research Interests

With specialization in Economic Geology, my interest is in granite-affiliated hydrothermal ore systems, fluid inclusions and lower-crustal fluid regime; and to tie-up such records with lithospheric evolution in India. The main thrust is on decoding the genetic factors and processes that lie at the core of granite-metal associations, thereby promoting the metal budget of system through the course of melt extraction, its evolution and subsequent hydrothermal degassing. My approach includes, but not limited to, petrological phase equilibria, mineral-chemical, fluid inclusion and stable isotope techniques.

My recent studies appreciate the auriferous potential of late Archean granitoids in parts of the Eastern Dharwar Craton, south India. The estimated P-T and oxygen (fO_2) and halogen fugacity (f_{HF}/f_{HCl}) conditions favour the gold-carrying efficiency of magma-derived late-stage fluids in concomitance with crystallizing magma. The ongoing studies deal with genetic attributes of F- and B-rich peraluminous granite systems with anomalous fertility for rare metals.



Miarolitic cavities marking late-stage fluid exsolution ***(A)*** *and wolframite-rich quartz-mica pegmatite* ***(B)*** *in tungsteniferous Degana granite (DG), Rajasthan; Auriferous quartz-sulphide stringers from Ramagiri gold camp* ***(C)****; Photomic -rographs of variably altered DG showing - relict topaz in K-feldspar linked to sub-solidus potassic alteration (XPL+quartz plate)* ***(D)****, and cassiterite in topaz-rich greisen assemblage* ***(E)****; Fluid inclusion assemblage in W-rich pegmatites showing H2O-CO2-NaCl inclusions with varying H2O/CO2 ratio* ***(F)****.*

Joined February 2021

Chandrakanta Ojha

Assistant Professor

M.Sc., Delhi University, New Delhi, India, 2008

M.Tech, IIT Bombay, Mumbai, India, 2011

Ph.D., University of Rome 'La Sapienza', Rome, Italy, 2015

Research Fellow, IREA-CNR, Napoli, Italy, 2012-2016

Post Doc, Arizona State University, USA, 2016-2020

Scientist, Geoscience Australia, Australia, 2020-2021

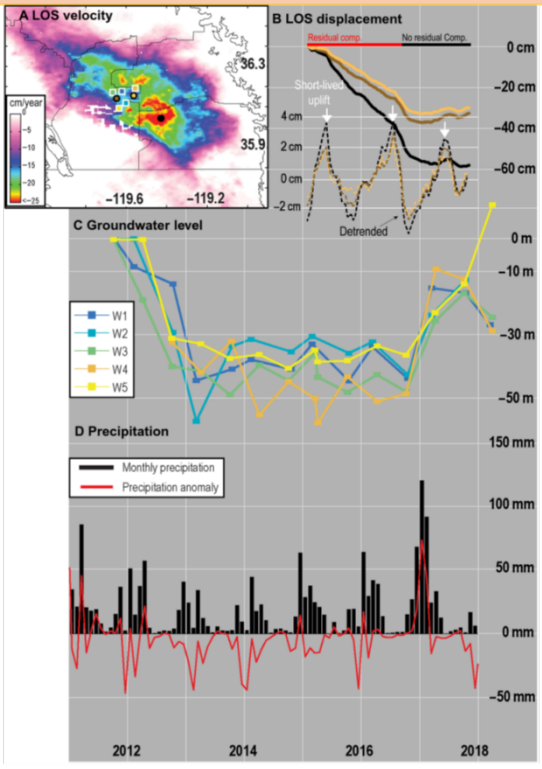
Selected Publications

- **Ojha C.,** Shirzaei M., and Werth S., Recovery of aquifer-systems in Southwest US following 2012-2015 drought: evidence from InSAR, GRACE and groundwater level data, **Journal of Hydrology**, Vol. 587, 2020, doi: https://doi.org/10.1016/j.jhydrol.2020.124943
- Blackwell E., Shirzaei M., **Ojha C.,** and Werth S., Tracking California's sinking coast from space: implications for relative sea-level rise SAR interferometry for measuring coastal subsidence, **Science Advance**, Vol. 6, no. 31, eaba4551, 2020, doi: 10.1126/sciadv.aba4551
- Sherpa S., Shirzaei M., **Ojha C.**, Werth S., and Hostache R., Probabilistic Mapping of August 2018 Flood of Kerala, India, Using Space-borne Synthetic Aperture Radar, **IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing**, Vol. 13, 896-913, 2020, doi: 10.1109/JSTARS.2020.2970337
- **Ojha C.,** Werth S., and Shirzaei M., Groundwater loss and aquifer-system compaction in San Joaquin Valley during 2012 - 2015 drought, **Journal of Geophysical Research: Solid Earth**, Vol. 124, 3, 3127-3143, 2019, doi: https://doi.org/10.1029/2018JB016083
- **Ojha C**., Fusco A., and Pinto M., Interferometric SAR Phase Denoising Using Proximity Based K-SVD Technique, **Sensors**, 19, 2684, 2019, doi: https://doi.org/10.3390/s19122684
- Shirzaei M., **Ojha C.**, Werth S., Carlson G., and Vivoni E., Comment on Short-lived pause in Central California subsidence after heavy winter precipitation of 2017 by K. D. Murray and R. B. Lohman, **Science Advance**, Vol. 5, 6, eaav803., 2019, doi: 10.1126/sciadv.aav8038
- **Ojha C.,** Shirzaei M., Werth S, Argus D., and Farr T., Sustained groundwater loss in California's Central Valley exacerbated by intense drought periods, **Water Resources Research**, Vol. 54, 7, 4449-4460, 2018, doi: https://doi.org/10.1029/2017WR022250
- Scifoni S., Bonano M., Marsella M., Sonnessa A., Tagliafierro V., Manunta M., Lanari R., **Ojha C.**, and Sciotti M., On the joint exploitation of long-term DInSAR time series and geological information for the investigation of ground settlements in the city of Roma (Italy), **Remote Sensing of Environment**, Vol. 182, 113-127, 2016, doi: https://doi.org/10.1016/j.rse.2016.04.017
- **Ojha C.**, Manunta M., Lanari R., and Pepe A., The Constrained-Network Propagation (C-NetP) Technique to Improve SBAS-DInSAR Deformation Time-Series Retrieval, **IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing**, Vol. 8, 4910 – 4921, 2015, doi: 10.1109/JSTARS.2015.2482358

Research Interests

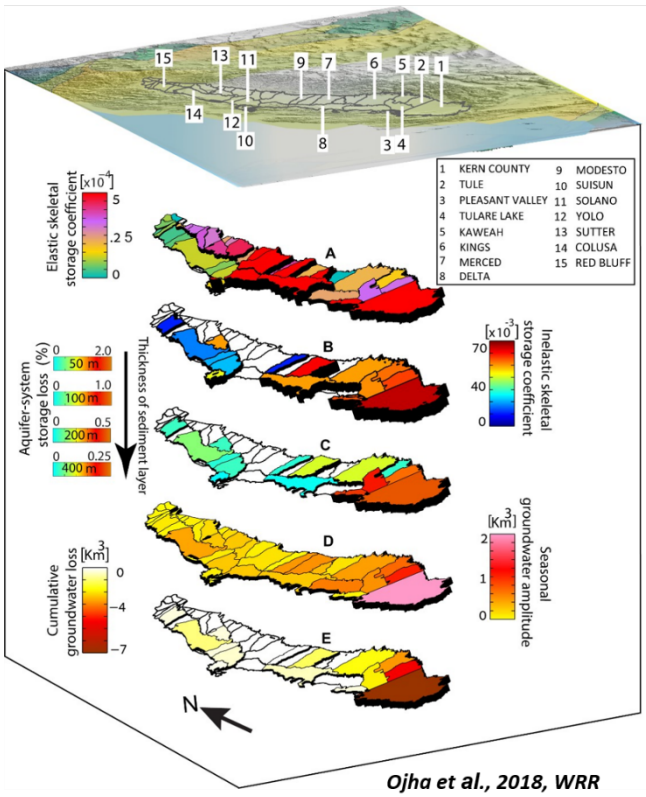
My research focus on developing new advanced methods and algorithms for the advancement of various satellite imaging techniques acquired by new generation Synthetic Aperture Radar (SAR) satellites and its diverse application on Earth's surface deformation phenomena. Such phenomena include monitoring of landslides and land subsidence areas, flood mapping, glacier dynamics, pre and post seismic studies, groundwater dynamics, urban infrastructure, coastal hazard monitoring etc. In the recent decades, Interferometric Synthetic Aperture Radar (InSAR) measurements have provided tremendous excitement in the geodetic communities because of their unparalleled spatial coverage and resolution. InSAR technique has been used to measure the change in distance between satellite and ground surface, as well as the backscattered signal strength. This allows quantifying geometric and radiometric changes of the ground surface at unprecedented spatiotemporal resolution and over regional scales. In that context, our research group will work on developing an advance semi-automated high performance multi-temporal InSAR processing algorithm that fully integrates and exploits parallel computing approach and analyzes 1000s of SAR images covering major sites of India affected by natural and anthropogenic hazards. Exploring further the InSAR capability, we will design a framework integrating different multi-sensor geodetic data such as GPS, GRACE and hydraulic head level with InSAR-based measurements for diverse application.

Synergy between InSAR-derived surface deformation, groundwater level, and precipitation data



Shirzaei et al., 2019, Science Advance

Groundwater dynamic using satellite remote sensing



Ojha et al., 2018, WRR

Joined November, 2017

Sharmila Bhattacharya

Inspire Faculty

B.Sc. Geology, Presidency College, Kolkata, 2007

M.Sc. Applied Geology, Presidency College, Kolkata, 2009

Ph.D. Organic Geochemistry, IIT Bombay, 2015

D. S. Kothari Fellow, University of Calcutta, 2017

Selected Publications

- Misra, S., **Bhattacharya, S.**, Mishra, P.K., Misra, K.G., Agrawal, S., Anoop, A., 2020. Vegetational responses to monsoon variability during Late Holocene: Inferences based on carbon isotope and pollen record from the sedimentary sequence in Dzukou valley, NE India**. Catena** 194, 104697.
- Tewari, A., D'Rozario, A., **Bhattacharya, S.**, Barua, A., Bera, M., Bera, S., Dutta, S., 2019. Biomarker signatures of iconic Glossopteris plant. **Palaeogeography, Palaeoclimatology, Palaeoecology** 531, Part B, 108887.
- **Bhattacharya, S.**, Khan, M.A., More, S., Paruya, D.K., Chakraborty, T., Bera, S., Dutta, S., 2018 Amber embalms essential oils: A rare preservation of volatile biological compounds in fossil resins from eastern Himalaya. **Palaios** 33, 218–227.
- Dutta, S., Mehrotra, R.C., Paul, S., Tiwari, R.P., **Bhattacharya, S.**, Srivastava, G., Zoramthara, C., 2017. Remarkable preservation of terpenoids and record of volatile signalling in plant-animal interactions from Miocene amber. **Scientific Reports** 7, 1–6.
- **Bhattacharya, S.**, Dutta, S., Summons, R.E., 2017. A distinctive biomarker assemblage in Infra-Cambrian oil and sediment from western India: Molecular signatures of eukaryotic sterols and prokaryotic carotenoids. **Precambrian Research** 290, 101–112.
- **Bhattacharya,S.**, Dutta, S., 2015. Neoproterozoic-Early Cambrian biota and ancient niche: A synthesis from molecular markers and palynomorphs from Bikaner-Nagaur Basin, western India. **Precambrian Research** 266, 361–374.
- **Bhattacharya, S.,** Dutta, S., Dutta, R., 2014. Molecular fossils in Cretaceous condensate from western India. **Journal of Earth System Science** 123, 923–934.
- Dutta, S., **Bhattacharya, S.**, Raju, S.V., 2013. Biomarker signatures from Neoproterozoic-Early Cambrian oil, western India. **Organic Geochemistry** 56, 68–80.
- Chatterjee, A., **Bhattacharya, S.**, 2013. Identification of regional-scale cuspate–lobate folds in Singhbhum region, India using satellite remote sensing. **Current Science** 104, 31–34

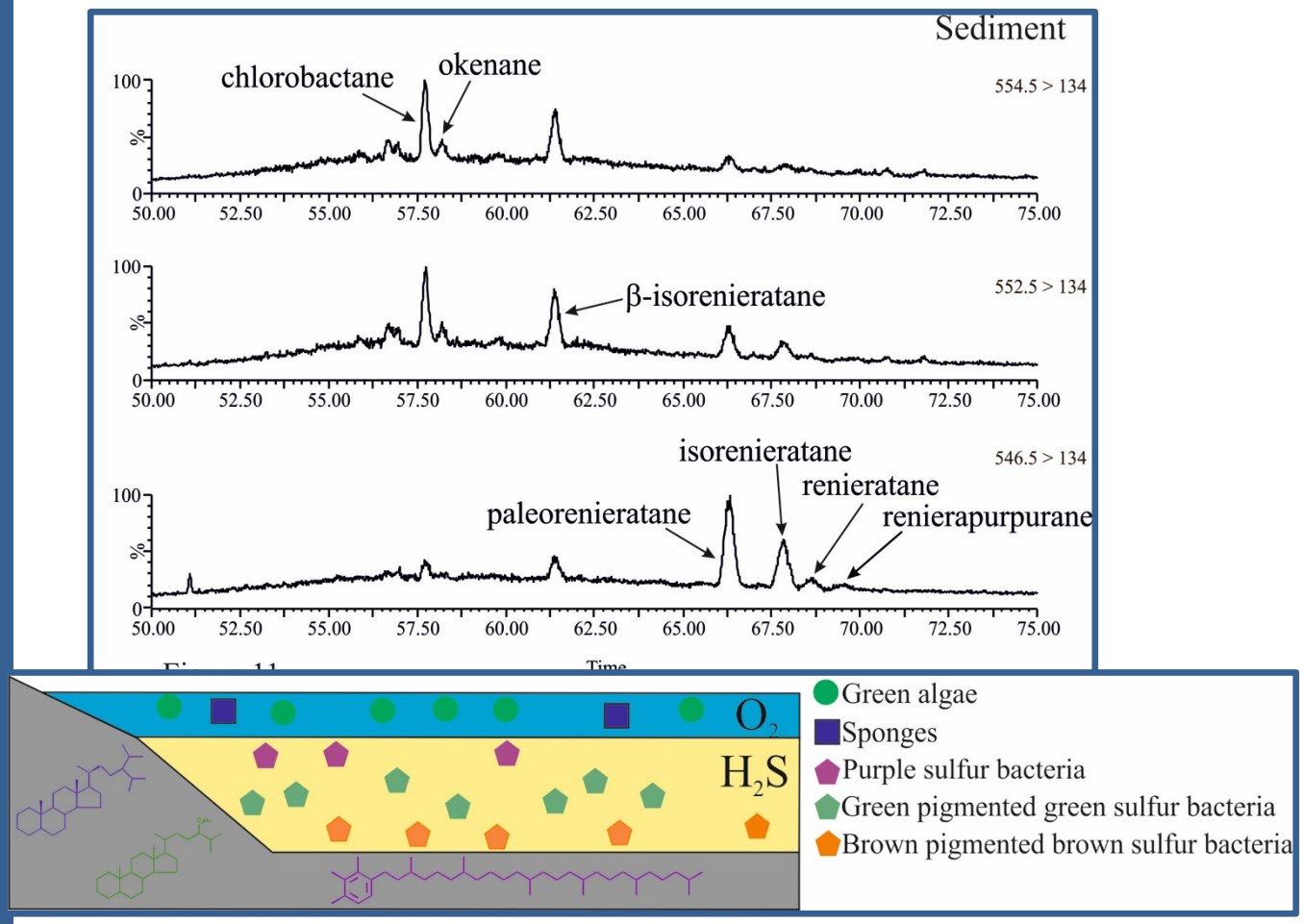
Research Interests

I am an organic geochemist and my fundamental research interest lies in deciphering the ancient biotic forms and palaeo-ecosystems. The “molecular organic fossils” (n-alkanes and terpenoids) and their stable isotopes are utilized to unravel a plethora of information spanning a diverse range of biota from microbes to complex flora and fauna and across the entire geological time scale. Over the last few decades, precise identification of hundreds of biomarkers and the isotopic compositions has significantly improved our understanding of the biogeochemical cycles of deep time on Earth. With the expanding database of organic compounds in soil and sediments, we are now using organic geochemical techniques for identifying pollutants and detrimental anthropogenic activities in the various environmental realms, particularly in lacustrine systems (Renuka and Rewalsar lakes, Himachal Pradesh).

A wide spectrum of natural organic products such as crude oil, coal, carbonaceous mudrocks, fossilized flora and ambers has been sampled from sedimentary basins in India. The various analytical techniques such as gas chromatography mass spectrometry (GC-MS), two dimensional gas chromatography time-of-flight mass spectrometry (GC×GC TOFMS), Rock-Eval Pyrolyzer, Fourier Transform Infrared (FTIR) Spectroscopy, Pyrolysis GC-MS (Pyro GC-MS), gas chromatography isotope ratio mass spectrometry (GC-IRMS) and multiple reaction monitoring (MRM) have been employed for the acquisition of data. The organic constituents (acyclic compounds and cyclic terpenoids) and stable carbon isotope data derived from the investigated samples provide information pertaining to ancient life forms and past operative processes on the planet elucidating marine biota and their palaeohabitats; characterizing the biological affinity of terrestrial vegetation; fluctuating biodiversity; ancient biosynthetic pathways; past redox potential and salinity; taphonomic alteration of deceased organic remains upon burial, diagenesis and catagenesis. The elucidation of the molecular structures in the sediments and correlation studies particularly shed light on the structural innovations of biota responding to the perpetually changing environmental conditions and offer broader perspective on the palaeobiogeography of the continents. Additionally, the biomarker dataset have been applied to develop insights of Petroleum Geochemistry such as crude oil-source rock correlation, thermal maturity of rocks and oil and degree of biodegradation thus fingerprinting the provenance and evolution of hydrocarbons over time which is valuable knowledge for practising geochemists in petroleum industries.

Research Highlights

- Molecular fossils reported from Infracambrian sequences from western India.
- This unique consortium was not recorded in other global Infracambrian successions.
- The molecular relicts aided in the reconstruction of the palaeowater column.



The distribution of carotenoid compounds in the aromatic hydrocarbon fractions in (sediment (RAC-A/B/D.LST/5) of Neoproterozoic-Early Cambrian Bikaner-Nagaur Basin sample. An array of biomarkers diagnostic for photic zone anoxia are detected in the oil and sediment samples. A graphical representation of the biota and habitat in the marine column and molecular fossils in the sediments is provided. Bhattacharya et al. (2017)

Details and Indices

Honorary Faculty

Professor A.R. Ravishankara

University Distinguished Professor, Colorado State University

Former Honorary, Adjunct & Visiting Faculty

Professor Ashok Sahni

Ex Department of Earth Sciences, Punjab University, Chandigarh

Professor Sampat K. Tandon

Ex Department of Geology, University of Delhi, Delhi

Professor A.R. Ravishankara

University Distinguished Professor, Colorado State University

Former Inspire Faculty

Dr. V. Lakshmi Narayanan

Dr. Shubhra Sharma

Faculty – Research Support

Dr. Vinayak Sinha

Max Planck Research Partner Group (2011-2016)	Rs 119.37 Lakh
DST Climate Change with B. Sinha as CoI(2017-2019)	Rs 151 Lakh
UGC Indo-Israel project (2018-2021)	Rs 141 Lakh

Dr. Barbel Sinha

NCAP-COALESCE (2016-2021)	Rs 106 Lakh

Dr. Anoop Ambili

INSPIRE Faculty Grant (2015-2020)	Rs 35 Lakh
MOEF-CC research grant with S. Bhattacharya as CoI (2019-20.	Rs 40 Lakh

Dr. Sunil Patil

DBT research grant (2019-2022)	Rs 50.60 Lakh
SERB Start-up research grant (2019-2021)	Rs 32.27 Lakh
DST/TWD/EWO-WTI grant (CoI: Dr. AK Yadav, CSIR-IMMT) (2020-23)	Rs. 65.83 lakhs

Dr. Raju Attada

SERB Start-up research grant (2020-2022)	Rs 32.15 Lakh

Dr. Sharmila Bhattacharya

INSPIRE Faculty grant (2018-2022)	Rs 35 lakhs

Dr. Shubhra Sharma

INSPIRE Faculty grant (2018-2022) Rs 17.5 lakhs

Dr. V. Lakshmi Narayanan

INSPIRE Faculty Grant (2014-2017) Rs 17.5 Lakh

Faculty - Recognitions

Dr. Vinayak Sinha

- **NASI-SCOPUS Young Scientist Award 2016**: in the subject area of Earth, Atmospheric and Oceanic Sciences
- **Best Teacher Award 2017** given by Indian Institute of Science Education and Research Mohali
- **Scientific Steering Committee (SSC) Member since 2015 and Co-chair** (since Sep 2017 SSC meeting held at Oxford) **of iLEAPS** (Integrated Land Ecosystem-Atmosphere Processes Study), **an ICSU, WCRP and Future Earth Global Research Project**
- **Scientific Steering Committee Member** (2019-2022) of the International Commission on Global Atmospheric Chemistry and Air Pollution (iCACGP) under the International Science Council.
- **Editor** (Subject: Atmospheric Chemistry and Physics) for **Earth System Science Data,** an international peer reviewed open access journal **(I.F: 10.9 in 2020)** published by EGU's Copernicus Publications, Gottingen, Europe

Dr. Baerbel Sinha

- **Scientific Steering Committee (SSC) Member** for the Tropospheric Ozone Assessment Report, Phase II (TOAR-II, 2020-2024) and International Global Atmospheric Chemistry Programme (IGAC) Program
- **Editorial Advisory Board Member** Environmental Science and Technology, published by the American Chemical Society

Dr. Anoop Ambili

- Awarded INSPIRE Faculty position, India (2015 - 2020)

Dr. Sunil Patil

- **Elected board member,** International Society of Microbial Electrochemistry and Technology (ISMET) (since Oct 2020)
- **Associate Editor,** Microbiotechnology specialty section of Frontiers in Microbiology, Frontiers in Bioengineering and Biotechnology and Frontiers in Environmental Science journals
- **Applied Energy – 2020 highly cited paper award**: Strategies for optimizing the power output of microbial fuel cells: Transitioning from fundamental studies to practical implementation

- **Guest Editor**, Special issue on "Microbial Electrochemical Technologies", Journal - Bioresource Technology Reports (Dec. 2019)
- **Founding Member**, Electrochemical Society in India (ECSI), Chandigarh Local Chapter (Nov. 2019)
- **Editorial board member**: Bioresource Technology Reports (since 2017)

Student - Recognitions

Chinmoy Sarkar (PhD scholar, EES, IISER Mohali)

- **Fulbright-Kalam Climate Fellowship** for Postdoctoral studies in USA

Ashish Kumar (PhD scholar, EES, IISER Mohali)

- **European Geosciences Union (EGU) Outstanding Student Poster Presentation (OSPP) award** in atmospheric sciences at the EGU General Assembly 2019 held in Vienna Austria.

Ankit Yadav (PhD scholar, EES, IISER Mohali)

- Awarded **VW-Stiftung travel grant** provided by Volkswagen Foundation in 2018.
- **Best presentation award** at summer school titled 'Stable Isotopes in Ancient and Contemporary Environments, University of Konstanz' in 2018.
- **International travel grant** from INQUA 2019 Congress Support to attend 20th INQUA Congress in Dublin, 2019.
- **International travel grant** by Helmholtz Centre Potsdam-GFZ German Research Centre for Geosciences to attend 5th International Young Earth Scientists (YES) Congress 2019 "Rocking Earth's Future" in Berlin, 2019.
- **Best presentation award** at 5th International Young Earth Scientists (YES) Congress 2019 "Rocking Earth's Future

Vinod Kumar (PhD scholar, EES, IISER Mohali)

- **Alexander von Humboldt Postdoctoral Fellowship** for pursuing postdoctoral studies in Germany
- **INSPIRE fellowship** (2014-2018) for pursuing doctoral studies
- **International travel grant** from DST, to present a talk at iLEAPs Open Science Conference in Oxford, UK, 2017.
- **International travel grant** from Max Planck Institute for Chemistry, Mainz to take part in CINDI 2 field campaign in Cabauw, Netherlands, 2016.
- **First prize in poster presentation** in 7th national seminar on Synergistic Aspects of Chemistry and Other Sciences (SACOS) 2015, Punjabi University Patiala, India.
- **2014 International Journal of Mass Spectrometry Best Student Paper Award** from Elsevier and American Society of Mass spectrometry
- **Member of the organising committee for the International** Integrated Land Ecosystem Atmosphere Processes Study (**iLEAPS) Early-Career Scientist Workshop 10-12 May 2014, Nanjing, China.**
- **International Travel Grant** from Integrated Land Ecosystem-Atmosphere Process Study to participate in 4th ILEAPS science conference in Nanjing, China. 2014.

- **International Travel Grant** from International Centre for Integrated Mountain Development (ICIMOD) to participate in WRF-CHEM workshop in Kathmandu, Nepal and to present a talk at SARAS workshop in Pokhran, Nepal. 2014.

Lejish Vettikat (MSc thesis student, EES, IISER Mohali)

- **European Geosciences Union (EGU) Outstanding Student Poster Presentation (OSPP) award** in atmospheric sciences at the EGU General Assembly 2019 held in Vienna Austria.

B. Praphulla Chandra (PhD scholar, EES, IISER Mohali)

- IGAC **Early Career Travel Grant** to attend the IGAC Science Conference, 2016.
- **International Travel Grant** from Institute for Advanced Sustainability Studies (IASS), Potsdam to present a talk at European Geosciences Union (EGU) general assembly in Vienna, Austria, 2016.
- **International Travel Grant** from the German Federal Environment Agency and World Meteorological Organisation (WMO) to participate in the 29th GAWTEC Training Course, 2015.
- **Travel Grant** from Indian Institute of Science (IISc), Bangalore to present the poster at National Climate Science Conference" at IISc Bangalore, 2015.
- **International Travel Grant** from the Max Planck-DST project to present the poster at The Second Workshop on Atmospheric Composition and the Summer Monsoon (ACAM) and training school at Bangkok Thailand, 2015.

Abhishek Mishra (PhD scholar, EES, IISER Mohali)

- **International travel grant** from Atmospheric Composition and the Asian Monsoon (ACAM) to present a talk in The Third Workshop on Atmospheric Composition and the Asian Monsoon (ACAM) and Second ACAM Training School at Jinan University, Guangzhou, China, 2017.
- **International travel grant** from Max Planck Institute for chemistry, Mainz to take part in CINDI 2 field campaign in Cabauw, Netherlands, 2016.
- **2018 NCAR Advanced Study Program's Graduate Student (GVP) Fellowship** at National Center of Atmospheric Research (NCAR), Boulder USA.

Haseeb Hakkim (PhD scholar, EES, IISER Mohali)

- **First prize in poster presentation** in National Climate Science Conference, Divecha Centre for Climate Change, Indian Institute of Science (IISc), Bangalore, 2015

Harshitha Pawar (PhD scholar, EES, IISER Mohali)

- **Best poster presentation award** at National Climate Science Conference, IISC Bangalore, 2015
- **International travel grant** from International Centre for Integrated Mountain Development (ICIMOD) to participate and to present a talk at Second Workshop On Atmospheric Composition And The Asian Monsoon (ACAM)", Bangkok (July 08-10, 2015).
- **International travel grant** from the American Geophysical Union for attending the AGU Fall meeting 2018, 10-14 December 2018 in Washington, D.C., U.S.A.

Pallavi (PhD scholar, EES, IISER Mohali)

- **International travel grant** from the American Geophysical Union for attending the AGU Fall meeting 2018, 10-14 December 2018 in Washington, D.C., U.S.A.

Gaurav Sharma (PhD scholar, EES, IISER Mohali)

- **International travel grant** from the American Geophysical Union for attending the AGU Fall meeting 2018, 10-14 December 2018 in Washington, D.C., U.S.A.

Ravi Kumar Yadav (PhD scholar, EES, IISER Mohali)

- **Best oral presentation award** at the SPARC-funded Indo-Belgian workshop on "Upscaling and field-scale application of bioelectrochemical systems for wastewater treatment and bioenergy recovery" held at IIT Kharagpur (26-27th Feb 2020).

Rashmi Kiran (PhD scholar, EES, IISER Mohali)

- **Travel grant** from the Biotech Research Society of India (BRSI) to present research work at the "International Conference on New Horizons in Biotechnology (NHBT) 2019" Trivandrum, Kerala (20-24 Nov 2019).

Sukrampal (PhD scholar, EES, IISER Mohali)

- **Travel grant** from the Biotech Research Society of India (BRSI) to present research work at the "International Conference on New Horizons in Biotechnology (NHBT) 2019" Trivandrum, Kerala (20-24 Nov 2019).

Moumita Roy (PhD scholar, EES, IISER Mohali)

- **Travel grant** from the Biotech Research Society of India (BRSI) to present research work at the "International Conference on New Horizons in Biotechnology (NHBT) 2019" Trivandrum, Kerala (20-24 Nov 2019).

Srishti **(PhD scholar, IISER Mohali)**

- **Prime Ministers' Research Fellowship (PMRF) 2020**

Nischal Sharma **(PhD scholar, EES, IISER Mohali)**

• **Prime Minister's Research Fellowship for Postdoctoral studies**

Alumni – Current Position

M.Sc. Final year thesis students

Name	Batch	(M.Sc. Thesis guide) and current position
Apurv Saxena	MS07	(Dr. Vinayak Sinha) Faculty at Allen Career Institute
Vinod Kumar	MS08	(Dr. Vinayak Sinha) Humboldt fellow, MPI for chemistry, Germany
Himanchu Sachan	MS08	(Dr. Baerbel Sinha) Assistant Manager, Canara Bank
P. Borwankar	MS08	(Dr. Baerbel Sinha) Software Engineer, Light Information Systems
Yash Maurya	MS09	(Dr. Vinayak Sinha) Marketing officer, Gujarat Gas Limited
Harshita Pawar	MS10	(Dr. Vinayak Sinha) Ph.D. scholar at IISER Mohali
Haseeb Hakim	MS10	(Dr. Vinayak Sinha) Ph.D. scholar at IISER Mohali
Tess George	MS11	(Dr. Baerbel Sinha) Ph.D. scholar at IISER Mohali
Vaishali Vardhan	MS11	(Dr. Baerbel Sinha) Ph.D. scholar at University College Cork
Bharti Sophaul	MS12	(Dr. Vinayak Sinha) Postgraduate student, Sheridan College, Canada.
Mohammmad Shabin	MS12	(Dr. Vinayak Sinha) Ph.D. scholar at IISER Mohali
Ankit Yadav	MS12	(Dr. Anoop Ambili) Ph.D. scholar at IISER Mohali
Nimya S.S.	MS12	(Dr. Baerbel Sinha) Ph.D. scholar at IITM Pune
Ebin George	MS12	(Dr. Baerbel Sinha) Assistant branch manager, SBI
Sunil Kumar	MS13	(Dr. Anoop Ambili) Ph.D. scholar at IISER Mohali
S. Parth	MS13	(Dr. Anoop Ambili) Ph.D. scholar Haifa University, Israel
Aditya Kumar Singh	MS13	(Dr. Baerbel Sinha) Junior Associate, SBI
Kalik K. Vishisth	MS13	(Dr. Vinayak Sinha) Ph.D. scholar at IITM Pune
Abhishek Verma	MS13	(Dr. Vinayak Sinha) Faculty at Allen Career Institute
Sukhwinder Singh	MS13	(Dr. Baerbel Sinha) Project assistant, IISER Mohali
Lejish V P	MS14	(Dr. Vinayak Sinha) Ph.D. scholar University of Eastern Finland
Ravi Kumar Yadav	MS14	(Dr. Sunil Patil) Ph.D. scholar at IISER Mohali
Ravineet Yadav	MS14	(Dr. Sunil Patil) Ph.D. scholar at IISER Mohali
Vidit Parker	MS15	(Dr. Baerbel Sinha) Project assistant, IISER Mohali
Rohit Kumar	MS13	(Dr. Sunil Patil) Ph.D. scholar at Institute of Technology, Estonian University of Life Sciences, Estonia
Srishti	MS15	(Dr. Sunil Patil) Ph.D. scholar at IISER Mohali
Ramandeep Singh	MS15	(Dr. Sunil Patil) Ph.D. scholar at IISER Mohali
Ajay Kumar	MS15	(Dr. Anoop A.) Ph.D. scholar at IISER Mohali

Ph.D. students

Name	year	(Ph.D. supervisor) and current position
Dr. Chinmoy Sarkar	2016	(Dr. Vinayak Sinha) Postdoctoral Research Fellow at the University of California, Irvine.
Dr. Vinod Kumar	2018	(Dr. Vinayak Sinha) Alexander von Humboldt Postdoctoral Fellow, Max Planck Institute for Chemistry, Germany
Dr. Prafulla Boggarapu Chandra	2018	(Dr. Vinayak Sinha) Assistant Professor, Shri Sathya Sai Institute of higher learning, Puttaparthy
Dr. Saryu Garg	2018	(Dr. Baerbel Sinha) Science Educator, Punjab, India

Publications from the Department

IISER Mohali authors bold, Publications until Feb 2021 are listed

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2. **Roy M., Yadav, R., Chiranjeevi P. and Patil S.A.** Direct utilization of industrial carbon dioxide with low impurities for acetate production via microbial electrosynthesis. Bioresource Technology, 320 (Part A), 124289. 2021.
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5. **Mishra, A.K.**, **Sinha, B.**, Kumar, R., Barth, M., **Hakkim, H., Kumara, V., Kumar, A., Dutta, S.**, Guenther, A. and **Sinha, V.**, Cropland trees need to be included for accurate model simulations of land-atmosphere heat fluxes, temperature, boundary layer height, and ozone, Science of The Total Environment, Vol.,751, 141728, 2021
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2020

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International Collaborations

Sustainable Atmosphere for the Kathmandu Valley (SusKat):

The IISER Mohali team (C. Sarkar, V. Kumar & Dr. V. Sinha) operated a PTR-TOF-MS during this international field campaign. The SusKat measurement campaign was conducted in December 2012 - January 2013 in Kathmandu, Nepal, provided a comprehensive assessment of various aspects of air pollution in the Kathmandu valley through a combination of intensive sampling and focused model simulations. The initiative was spearheaded by the Institute for Advanced Sustainability Studies (IASS) Potsdam, Germany and the International Centre for Integrated Mountain Development (ICIMOD). Eighteen research groups from nine countries participated in the SusKat field experiment.

Multi Axis Doas aerosols and trace gases intercomparison (MADCAT):

The IISER Mohali team (V. Kumar, V. Sinha) participated in the MADCAT campaign with their DOAS system. Thirteen international research groups participated in this intercomparsion campaign which was held at the Max Planck Institute (MPI) for Chemistry in Mainz, Germany, in June-July 2013.

Cabauw Intercomparison of Nitrogen Dioxide Measuring Instruments (CINDI-2):

In September 2016 the IISER Mohali team participated in the CINDI-2 campaign, held in Cabauw, the Netherlands. The campaing involves the comparison of a host of ground-based DOAS instruments for measuring atmospheric Nitrogen Dioxide (NO2) amounts. It is the second large scale international campaign addressing the intercalibration of remote sensing instruments using the DOAS technique to monitor air quality in support of satellites. More than 40 instruments operated by 30 groups participated to this field campaign.

International DST- Max Planck Research Partner Group on Tropospheric OH reactivity and VOC measurements:

The international Max Planck Research Partner Group is a collaboration between Dr. Vinayak Sinha (IISER Mohali) and Prof. Jos Lelieveld (Director Air Chemistry, MPI for Chemistry Mainz). The research group provides ample opportunity for student exchange. Vinod Kumar (MS08) and Biplob Nandi (MS10) visited the MPIC Mainz for a summer project and Hella Ride (PhD student, MPIC-Mainz) visited IISER Mohali. Six senior scientists from MPIC, Mainz also visited IISER Mohali. The group has been operating a DOAS jointly with Dr. Thomas Wagner MPIC for five years.

First direct measurements of chemical ozone production in India

The IISER Mohali Atmospheric Chemistry group in collaboration with TERI University Delhi hosted a research group from Birmingham University, UK, to perform the first direct measurements of atmospheric ozone production in India.

Admissions

Integrated BS-MS program admissions : Admissions to the integrated BS-MS program are handled centrally by a joint admissions committee consisting of members representing all five IISERs, and all admitted candidates are provided with a fellowship, subject to a minimum level of academic performance.
BS-MS students that have finished two years of coursework in all the science subjects are required to choose any one out of the four main science subjects (i.e., biology, chemistry, physics or mathematics) as a 'major' subject. The Department of Earth and Environmental Sciences does not currently offer a major.

MS thesis project: The Department of Earth and Environmental Sciences accepts MS-students from all major disciplines with research interests in earth and environmental sciences for MS-thesis projects. The department strongly recommends that prospective MS thesis project students undertake a summer project with their prospective advisor or take an elective course offered by the department prior to finalizing their choice for a 5th year MS-project.

Integrated MS-Ph.D program admissions : Admissions to this program are overseen by the respective departments. Eligibility criteria are routinely advertised on the institute's website, and the admissions are conducted in the summer of each year. The Department of Earth and Environmental Sciences does not currently offer an integrated MS-Ph.D program.

Ph.D admissions : Ph.D admissions are done at the beginning of each semester, twice a year, and advertisements appear on the website towards the end of each semester. Candidates who apply through an online application process are screened for eligibility and shortlisting criteria, and invited for examinations/interviews.

Summer Progams : The department participates in three kinds of summer research training programs : (i) IISER's own BS-MS students are required to do summer projects. Some do it at IISER-M; (ii) IISER participates in an inter-academy summer program co-ordinated by the Indian Academy of Sciences, Bangalore, which allots some summer students to research supervisors at IISER; (iii) IISER-M advertises a summer program open to students from around the country, in the month of February/March.

Administration

Director: Prof. J Gowrishankar, e-mail director@iisermohali.ac.in

Dean (Faculty): Prof. J Gowrishankar, e-mail deanfaculty@iisermohali.ac.in

Dean (Academics): Prof. Jasjeet Singh Bagla, e-mail deanacad@iisermohali.ac.in

Dean (Students): Dr. Anu Sablok, e-mail deanstudents@iisermohali.ac.in

Dean (R&D): Dr. Kausik Chattopadhyay, e-mail dord@iisermohali.ac.in

Dean International and Outreach: Dr. N.G. Prasad, e-mail deanoutreach@iisermohali.ac.in

Registrar: Dr. Jagdeep Singh, e-mail registrar@iisermohali.ac.in

HOD EES: Dr. B. Sinha, e-mail headees@iisermohali.ac.in