

DR. ANURAG KUMAR

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Date of Birth: 31 January 1991 | Permanent Address: RML-135, Rangamatia, Post: Sindri, Dist: Dhanbad, Jharkhand – 828122

EDUCATION

2014 – 2021 Ph.D., Indian Institute of Science Education and Research (IISER) Kolkata, India

Thesis: Understanding the Hydrological, Carbon and Nitrogen Cycle in the Ganga River Basin: Insights from Stable Isotopes

Supervisor: Prof. Prasanta Sanyal

2009 – 2014 BS–MS, Indian Institute of Science Education and Research (IISER) Kolkata, India

Thesis: Characterization of Paleosol at an Isotopic Level and its Implication to Past Climate and Vegetation: A Case Study from the Rayka Section near Mahi River, Gujarat

Subject: Geological Sciences

RESEARCH INTEREST

My research focuses on paleoclimate reconstruction using stable isotopes of carbon, hydrogen and nitrogen. I apply compound-specific isotope analysis and lipid biomarkers to reconstruct past environmental and climatic conditions. A key aspect of my work involves developing modern analogues to improve the reliability of paleoclimate proxies and to better understand biogeochemical pathways influencing isotopic signatures. In addition, I use stable isotope and geochemical analyses of river water, groundwater and precipitation to investigate present-day processes, which provide a framework for interpreting past climate signals. My work integrates proxy development, modern process studies and geochemical tools to understand climate variability across temporal scales.

LABORATORY FACILITY

The Environmental Laboratory at Birbal Sahni Institute of Palaeosciences (BSIP) is equipped with advanced instrumentation and facilities to support comprehensive environmental and geochemical research. The laboratory houses a Metrohm Ion Chromatography System for the simultaneous determination of cations and anions in water samples. The lab is also equipped with a Hanna Multiparameter Probe for in-situ measurement of key physicochemical parameters. For compound-specific isotope analysis, the laboratory maintains a complete sample preparation setup, including an ASE 350 Accelerated Solvent Extractor, Column Chromatography setup, Equitron Rotary Evaporator, furnace, hot air oven, centrifuge, sonicator and a double-distilled water purification system. Additional facilities include grab and depth water samplers, as well as instruments for measuring pH, electrical conductivity (EC), salinity and solar radiation flux. In addition, dedicated precipitation and moisture collection stations are available, enabling detailed geochemical and isotopic investigations.

We welcome motivated PhD candidates (self-funded) and collaborators who are interested in working in our laboratory. Contact: anuragkumar@bsip.res.in , anuragkumar.geo@gmail.com

PROFESSIONAL EXPERIENCE

- **Scientist C:** 01/07/2024 – Present, Birbal Sahni Institute of Palaeosciences, India
- **Scientist B:** 21/06/2021 – 30/06/2024, Birbal Sahni Institute of Palaeosciences, India
- **Senior Research Fellow:** 25/07/2020 – 24/10/2020, IISER Kolkata, India (NCAOR Project)
- **Research Fellow:** 01/04/2020 – 30/06/2020, IISER Kolkata, India (SERB Project)
- **WARI Fellow:** 15/05/2017 – 15/09/2017, University of Nebraska–Lincoln, USA
- **INSPIRE Fellow:** 03/01/2015 – 10/03/2020, IISER Kolkata, India

- **Junior Research Fellow:** 25/07/2014 – 02/01/2015, IISER Kolkata, India (SERB Project)
- **Intern:** 28/05/2013 – 26/07/2013, Indian Institute of Tropical Meteorology, India

SPONSORED PROJECTS

- **SERB-SRG Grant (2023–2026):** “The Role of Water Isotopes in Understanding the Hydrological Cycle and its Implication to Palaeoclimatic Studies” — INR 25.32 lakhs.
- **ANRF-IRG Grant (2026–Present):** “Isotope Fingerprinting of Atmospheric Moisture, Rainwater and Surface Water to Estimate Evapotranspiration Contribution to Local Precipitation from the Central Ganga Basin: Insights from Lucknow, Uttar Pradesh” — INR 55.57 lakhs.

PUBLICATIONS

Citations: 205 | h-index: 6 | i10-index: 5 | Cumulative Impact Factor: 70.5

1. Kumar, A., Sanyal, P., & Agrawal, S. (2019). Spatial distribution of $\delta^{18}\text{O}$ values of water in the Ganga river basin: Insight into the hydrological processes. *Journal of Hydrology*, 571, 225–234. **(Impact Factor: 7.3)**
2. Sarangi, V., Kumar, A., & Sanyal, P. (2019). Effect of pedogenesis on the stable isotopic composition of calcretes and n-alkanes: Implications for palaeoenvironmental reconstruction. *Sedimentology*, 66(5), 1560–1579. **(Impact Factor: 3.4)**
3. Dasgupta, B., Ajay, A., Kumar, A., Thamban, M., & Sanyal, P. (2021). Isoscape of surface runoff in high mountain catchments: An alternate model for meteoric water characterization and its implications. *Journal of Geophysical Research: Atmospheres*, 126(16), e2020JD033950. **(Impact Factor: 3.8)**
4. Kumar, A., Ajay, A., Dasgupta, B., Bhadury, P., & Sanyal, P. (2023). Deciphering the nitrate sources and processes in the Ganga river using dual isotopes of nitrate and Bayesian mixing model. *Environmental Research*, 216, 114744. **(Impact Factor: 8.2)**
5. Sanyal, P., Adhya, S. P., Mandal, R., Roy, B., Dasgupta, B., Samantaray, S., Sen, R., et al. (2024). The geologic history of plants and climate in India. *Annual Review of Earth and Planetary Sciences*, 52(1), 639–661. **(Impact Factor: 15.6)**
6. Kumar, A., Basu, S., Ajay, A., Jha, D. K., & Sanyal, P. (2024). Quantitative delineation of water sources in the river Ganga using stable water isotopes. *River Research and Applications*, 40(2), 177–190. **(Impact Factor: 2.0)**
7. Phartiyal, B., Tiwari, A., Kawsar, M., Manoj, M. C., Shekhar, M., Ali, S. N., Bhushan, R., Pachchigar, R. R., Kumar, A., & Sharma, A. (2024). Millennial to centennial-scale climate oscillations since 15,000 cal yrs BP from Kanwar wetland in the Central Ganga Plain, India. *Quaternary Science Reviews*, 335, 108760. **(Impact Factor: 3.3)**
8. Tiwari, P., Thakur, B., Srivastava, P., Gahlaud, S. K. S., Bose, T., Kumar, A., Bhushan, R., & Agnihotri, R. (2024). Was LIA synchronous with equa-tropical climate? A multiproxy study from the southwest coast of India. *Quaternary International*, 709, 66–81. **(Impact Factor: 2.2)**
9. Sen, A., Mukhopadhyay, S., Stüeken, E. E., Samanta, P., Sarkar, S., Bose, S., Agarwal, S., & Kumar, A. (2025). Evolving marine sedimentation, redox stratification, and biogeochemical cycling in mid-to-low-latitudinal non-frozen waters during late Neoproterozoic global-scale climatic transitions. *Precambrian Research*, 417, 107661. **(Impact Factor: 2.7)**
10. Murthy, S., Mishra, D. P., Uhl, D., Saxena, A., Singh, V. P., Mathews, R. P., Kumar, A., & Pandey, B. (2025). Palynofloral and geochemical evidence for Permian–Triassic transition from Talcher Coalfield, Son-Mahanadi Basin, India: Insights into age, palaeovegetation, palaeoclimate and palaeowildfire. *Geoscience Frontiers*, 16(4), 102086. **(Impact Factor: 12.7)**
11. Roy, B., Thiede, R., Simon, S., Kumar, A., Moharana, S., Dey, S., & Elling, F. J. (2025). Elevation controls bacterial branched GDGT-based temperature proxies: A regional to global perspective. *Global and Planetary Change*, 105101. **(Impact Factor: 4.7)**
12. Kumar, M., Agrawal, S., Sarangi, V., Farooqui, A., Singh, P., Ali, S. N., Morthekai, P., et al. (2025). Plant phenotypic adjustments in response to changes in atmospheric pCO_2 : Insights from $\delta^{13}\text{C}$ values and stomatal index in C3 plant leaves. *Isotopes in Environmental and Health Studies*, 61(6), 600–616. **(Impact Factor: 1.4)**

13. Prasanna, K., Kumar, A., Sharma, A., Chakraborty, S., & Rangarajan, R. (2025). Temporal patterns and intra-seasonal isotopic characteristics of Indian summer monsoon precipitation in Lucknow, India. *In International Conference on Water and Food Security in the Face of Climate Change*, pp. 285–296. Springer Nature Switzerland. (Conference paper)
14. Choudhuri, A., Plummer, P. S., Ghnahlalla, M., El Albani, A., Sarkar, S., Bouougri, E. H., Reisberg, L., Kumar, A., & Bose, T. (2026). New trail-like features associated with microbial mats from the early Neoproterozoic Sirbu Shale Member (Upper Vindhyan Group), Vindhyan Basin, central India. *Australian Journal of Earth Sciences*, 73(1), 132–153. (Impact Factor: 0.9)
15. Bose, T., Shekhar, M., Yadava, A. K., Mishra, A., Pandey, A., & Kumar, A. (2026). Radiocarbon dating identifies the Indian Banyan tree in Munger as the oldest accurately dated *Ficus benghalensis* in the world. *Quaternary Research*, 1–8. (Impact Factor: 2.3)

TECHNICAL SKILLS

- **Instrumentation:** Proficient in operating a range of analytical and sample-preparation instruments, including the Metrohm Eco-IC Ion Chromatograph; isotope-ratio mass spectrometers (MAT 253, MAT 253 Plus, Delta V Advantage) interfaced with Gas Bench II, GC-MS-MS, Kiel IV Carbonate device, Elemental Analyzer (Flash 2000), and GC-C-IRMS; and nutrient analyzers (SAN++, SKYLAR). Additional hands-on experience with a Multiparameter Water Analyzer, Rotary Evaporator, Accelerated Solvent Extractor, Micro-Mill, Freeze Dryer, Microwave Extractor, Spectrophotometer, Grain Size Analyzer and thin-section preparation techniques.
- **Software:** Working knowledge of Ferret, ArcGIS, R Studio, MATLAB, and Origin (basic proficiency), along with SigmaPlot, CorelDRAW and MS Office.

INVITED TALKS

- Keynote Speaker, Uttar Pradesh Ground Water Conference (UPGWC-2023), organized by the Uttar Pradesh Ground Water Board — “Use of Environmental Isotopes in Water Resource Management: Insights from the Ganga River Basin” (27 February 2023).
- Keynote Speaker, UltraTech Cement Limited, Tanda, Ambedkar Nagar, Uttar Pradesh (26–28 December 2023).

GRANTS AND FELLOWSHIPS

S. No.	Award	Awarding Agency	Year
1	IAEA Training Grant	International Atomic Energy Agency, Vienna	2022
2	JpGU Travel Grant	Japan Geophysical Union, Japan	2019
3	AGU Student Travel Grant	American Geophysical Union, USA	2019
4	CSIR International Travel Grant	CSIR	2019
5	WARI Fellowship	IUSSTF / DST	2017
6	Senior Research Fellowship	DST INSPIRE (AORC)	2016
7	IAEA Training Grant	International Atomic Energy Agency, Vienna	2016
8	IAEA Training Grant	International Atomic Energy Agency, Vienna	2016
9	IAEA Conference Grant	International Atomic Energy Agency, Vienna	2015
10	Junior Research Fellowship	DST INSPIRE (AORC)	2014
11	INSPIRE Fellowship (BS-MS)	DST INSPIRE (SHE)	2009

TEACHING EXPERIENCE

Birbal Sahni Institute of Palaeosciences (AcSIR Courses), 2021–2025

- Earth System Science, Hydrology & Hydrosphere, Biogeochemistry, Research Methodology, Organic & Inorganic Geochemistry.

IISER Kolkata, 2016–2018

- Teaching Assistant: Hydrology and Geodynamics (ES2102).

SUPERVISION

- M.Sc. Thesis: 6 completed (water isotope studies, paleoclimate reconstruction).
- 1–2 Month Internships: 3 completed (geochemical analysis).
- Ph.D. Advisory Committee Member: 1 Ongoing (AcSIR, BSIP Lucknow).

FIELD WORK EXPERIENCE

- Conducted extensive field campaigns along the Ganga river (Source to Sink) to collect water samples for geochemical and isotopic analysis.
- Carried out fieldwork at Kavar Lake (Bihar) and Surha Taal (Ballia, U.P.), retrieving long sediment cores from the lake centers using a platform-based corer.
- Led coring expeditions along the Yamuna, Chambal, and Betwa rivers, recovering approximately 14 sediment cores to reconstruct the evolutionary history of the Ganga Basin.
- Performed structural geology mapping across Sikkim, Galudih, and Ghatsila.
- Undertook fluvial and marine sediment studies in Ahmedabad and Chandipur.

CONFERENCES

- American Geophysical Union Meeting, 2019, San Francisco, USA, 9–13 December 2019. *Isotopic signature of river water, rainwater and groundwater across the Ganga river basin.*
- Japan Geoscience Union Meeting, 2019, Japan, 26–30 May 2019. *Dynamics of carbon and nitrogen influx in large river systems: Isotopic study from the river Ganga, India.*
- International Symposium on Isotope Hydrology: Revisiting Foundations and Exploring Frontiers, Vienna, Austria, 11–15 May 2015 (CN-225). *Isotopic variations ($\delta^{18}\text{O}$ and δD) in large river systems and its implication to water budget: A case study from the river Ganges, India.*

TRAININGS

- International Training Course on Data Quality Assurance in Stable Isotope Laboratories, IAEA Vienna (22–24 November 2022; deputed by the Department of Atomic Energy, India).
- WARI Fellowship, University of Nebraska–Lincoln, USA (15 May 2017 – 15 September 2017). *Use of isotopes and isotopomers to evaluate nitrate source and fate in the vadose zone and groundwater.*
- Training Course on Principles and Application of Isotope Hydrology Methods, Vienna, Austria (10–21 October 2016).
- Training Course on Application of Environmental Isotopes in Rivers and Lakes, Vienna, Austria (16–27 November 2015).
- IISER Kolkata Winter School on Number Theory, “Waring’s Problem,” December 2010.
- Undergraduate Training Program in Mathematics, IIT Patna, May 2011.

LANGUAGES

- Advanced: English
- Mother Tongue: Hindi