

Arunik Baruah

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SUMMARY

Postdoctoral Research Fellow with a PhD in Sustainable Development and Climate Change, specialising in air pollution measurements and developing machine learning-based spatial models. Experienced in scientific programming (R, Python), including work with large datasets in high-performance computing (HPC) environments.

EDUCATION

UNIVERSITY SCHOOL FOR ADVANCED STUDIES IUSS, PAVIA

Pavia, Italy

PhD in Sustainable Development and Climate Change

2021-2024

- PhD student within the Italian inter-university National Doctoral program in Sustainable Development and Climate Change (Defended on 26th March 2025; Awarded with Doctor Europaeus title).
- Worked on two European-Union funded projects – RI-URBANS and TRAFAIR.
- Hosted at the Dept. of Engineering “Enzo Ferrari”, University of Modena and Reggio Emilia, Italy

CENTRAL UNIVERSITY OF JHARKHAND

Ranchi, India

Integrated Master of Technology in Geo-informatics

2016-2021

- Final Grade: 8.21/10 (First Division with Distinction)
- Completed a five-year Integrated Engineering degree program combining both Bachelor's and Master's studies.
- Acquired a foundation in geospatial technology, remote sensing, GIS applications, and spatial modeling through an interdisciplinary curriculum.

PROFESSIONAL EXPERIENCE

DEPARTMENT OF STATISTICAL SCIENCES - UNIVERSITY OF BOLOGNA

Bologna, Italy

Postdoctoral Research Fellow

Nov 2024 – Present

Working as a Postdoctoral Research fellow at the Department of Statistical Sciences "Paolo Fortunati"

- Conduct statistical analysis to assess greenhouse gas emissions and their variation across different sectors to support improved quantification and mitigation planning.

UNIVERSITY OF MODENA AND REGGIO EMILIA

Modena, Italy

Research Collaborator (Occasional Contract)

Nov 2024 – Feb 2025

Worked on the EU-funded PRIN project DOUBTS - Dementia-friendly Outdoor Built Environments: Evidence among Outdoor Air Pollution, Artificial Light at Night (ALAN), Greenness and Dementia.

- Contributed to Milestone 4 – Exposure assessment, focusing on environmental exposure modeling.
- Conducted GIS-based georeferencing of study participants and assessed exposure to traffic-related air pollution, greenness, and artificial light at night.
- Supported interdisciplinary research on links between urban environmental factors and early-onset dementia.

UNIVERSITY OF BIRMINGHAM

Birmingham, United Kingdom

Visiting Researcher

April 2023 – Sept 2023

Worked in support of the RI-URBANS project which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101036245.

- Contributed to a citizen science campaign using mobile/static low-cost particulate matter sensors, overseeing data collection, analysis, and community engagement efforts for comprehensive air quality monitoring.
- Executed proper calibration procedures for the low-cost particulate matter sensors, ensuring data accuracy and reliability in alignment with quality standards.
- Developed an innovative machine learning approach to enhance urban particulate matter predictions, addressing critical data gaps and improving the accuracy of air quality predictions.

INDIAN INSTITUTE OF TECHNOLOGY (IIT), DELHI**Junior Research Fellow****New Delhi, India****Aug 2021 – Oct 2021**

Worked on Indian Space Research Organisation funded project on Indian Land Data Assimilation System.

- Developed algorithms for satellite data processing and integration into the Indian Land Data Assimilation System.
- Conducted validation and testing procedures to ensure the accuracy and reliability of ILDAS outputs.

NATIONAL INSTITUTE OF RURAL DEVELOPMENT**Project Fellow****Guwahati, India****Aug 2020 – July 2021**

- Conducted master's degree thesis research on agricultural residue burning impact in Indo-Gangetic Plain using remote sensing and modeling techniques.
- Contributed to a side project on shifting cultivation practices in Northeast India, funded by the North Eastern Council, Government of India.

INTERNATIONAL RICE RESEARCH INSTITUTE**Research Intern****Los Baños, Philippines****June 2019 – Aug 2019**

- Conducted analysis correlating various vegetation indices with atmospheric parameters, providing valuable insights into ecosystem health and climate interactions.

PUBLICATIONS

1. **Baruah, A.**, Bousiotis D., Damayanti S., Bigi, A., Ghermandi, G., Ghaffarpasand, O., Harrison R.M. & Pope F.D. A novel spatiotemporal prediction approach to fill air pollution data gaps using mobile sensors, machine learning and citizen science techniques (Nature Portfolio - npj Climate and Atmospheric Science). DOI: <https://doi.org/10.1038/s41612-024-00859-z>
2. **Baruah, A.**, Zivan, O., Bigi, A. & Ghermandi, G. Evaluation of low-cost gas sensors to quantify intra-urban variability of atmospheric pollutants. Environ. Sci.: Atmos. 3, 830–841, DOI: <https://doi.org/10.1039/D2EA00165A> (Royal Society of Chemistry, 2023).
3. Bousiotis D., Damayanti S., **Baruah A.**, Bigi, A., Beddows D.S.C., Harrison R.M. & Pope F.D. Pinpointing sources of pollution using citizen science and hyperlocal low-cost mobile source apportionment (Environment International, 2024). DOI: <https://doi.org/10.1016/j.envint.2024.109069>
4. Alajangi, S., Prasad, N. S. R. & **Baruah, A.** Monitoring and changing pattern of shifting cultivation and reclamation in hilly regions using Geospatial Technology. in Modern Cartography Series vol. 10 465–495, DOI: <https://doi.org/10.1016/B978-0-12-823895-0.00009-9> (Elsevier, 2021).
5. **Baruah, A.**, Bousiotis D., Damayanti S., Bigi, A., Ghermandi, G., Harrison R.M. & Pope F.D. Enhancing Urban PM_{2.5} Predictions: An Innovative Machine Learning Approach to Address Data Gaps, DOI: <https://doi.org/10.5194/egusphere-egu24-6448> (Conference proceedings EGU General Assembly, 2024).
6. Harrison R.M., Damayanti S., Bousiotis D., **Baruah, A.** & Pope F.D. Analysing High Resolution Ultrafine Particle Count Data to Differentiate Local Road Traffic from Background Contributions to Personal Exposure, DOI: <https://doi.org/10.5194/egusphere-egu25-8815> (Conference proceedings EGU General Assembly, 2025).

CONFERENCES

- ACTRIS Science Conference 2024, **Rennes, France (Oral presentation)** May 2024
- European Geosciences Union General Assembly 2024, **Vienna, Austria (Oral presentation)** April 2024
- American Geophysical Union Annual Meeting 2023, **San Francisco, CA, USA (Poster presentation)** Dec 2023
- European Aerosol Science Conference 2023, **Malaga, Spain (Poster presentation)** Sept 2023
- 13th International Conference on Air Quality – Science and Application, **Thessaloniki, Greece (Oral presentation)** July 2022
- 8th Annual National Research Conference on “Anthropogenic impact on the Environment, Society and Human Health, India - **Best paper award - Technical session (Oral presentation)** Jan 2021

GRANTS

Erasmus+ Traineeship Mobility Grant

April 2023 – Sept 2023

SKILLS

Programming: R, Python, SQL

Frameworks: caret, randomForest, xgboost, tidyverse (dplyr, tidyr, ggplot2, etc.), scikit-learn, pandas, numpy, PyTorch

Statistics and Machine Learning: Regression, Classification, Clustering, Ensemble Learning

Data Visualization Tools: Power BI, Tableau, Matplotlib, Seaborn

Database Management: MySQL, PostgreSQL, MongoDB

Soft Skills: Project Management, Global Engagement, Stakeholder Communication, Team Collaboration

ADVANCED COURSES AND WORKSHOPS

1. 3rd EUMETSAT/ESA/ECMWF Joint Training in Atmospheric Composition, **European Space Agency**
2. Compact Course Atmospheric Chemistry and Dynamics, **Institute of Energy and Climate Research, Forschungszentrum Jülich, Germany**
3. Numerical modeling of weather and climate, **University of Trento**
4. The chaotic nature of the atmosphere, ensemble methods and predictability, **Scuola Normale Superiore, Pisa**
5. From global to convection-permitting models, **Istituto Universitario di Studi Superiori, Pavia**
6. Aerosol optical properties, workshop by **Italian Aerosol Society**
7. AGORA International Doctoral summer school: Training school on characterization of atmospheric aerosol using in-situ and remote sensing techniques, **Andalusian Global ObseRvatory of the Atmosphere, Granada, Spain**

INVITED LECTURES

- Delivered an invited lecture on “Higher Education opportunities in Geospatial Sciences: Trends and future perspective” at an international webinar organised by Central University of Jharkhand, India.
- Delivered an invited lecture at an international webinar organised by “Anaajoree”, a non-profit organisation based in North-East India to discuss key aspects of atmospheric science studies in Europe.

LANGUAGES

1. English: Advanced (C1) in speaking, reading, writing.
2. Hindi: Advanced (C1) in speaking, reading, writing.
3. Italian: Basic (A2) in speaking, reading, writing.
4. Assamese: Native speaker

REFERENCES

- Dr. Alessandro Bigi
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- Dr. Grazia Ghermandi
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- Dr. Mario Lloyd Virgilio Martina
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