Neelarun Mukherjee

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Curriculum Vitae as of January 2024

Education

- **The University of Texas at Austin** 2021 – 2026 (expected)
  Ph.D., Earth and Planetary Sciences (Hydrology) GPA 3.96/4.0
  Advisors: Dr. M Bayani Cardenas & Dr. Jingyi Ann Chen
  Research Topic: Flow and transport processes in supra-permafrost aquifers in the Arctic.

- **Indian Institute of Technology, Kharagpur** 2016 – 2021
  5-yr Integrated M.Sc. in Exploration Geophysics GPA 8.46/10.0
  Micro-specialization in Micro-fluidics and Nano-patterning Class rank: 03
  Thesis Advisors: Dr. Abhijit Mukherjee & Dr. Aditya Bandopadhyay

Work Experience

- **UT Department of Earth and Planetary Sciences** Aug. 2021 – Present
  Graduate Research Assistant Texas, U.S.
  - Developing a process-based understanding of the flow of groundwater and reactive transport of DOC in supra-permafrost aquifers in continuous permafrost regions using a modeling-observation-experiment framework.
  - Develop a statistical model to estimate water and organic carbon fluxes in a permafrost watershed across hydrologic states

- **University of Texas at Austin** Aug. 2023 – May. 2023
  Teaching Assistant Texas, U.S.
  - **Spring 2023:** Instructed laboratory sections (60 students across various disciplines) for GEO 401: Introduction to Geology: Over 150 hours of teaching experience
  - **Fall 2022:** Instructed laboratory sections and class (90 students across various disciplines) for COE 301: Introduction to Computer Programming: Over 150 hours of teaching experience.

- **Indian Institute of Technology, Kharagpur** Jul. 2018 – Aug. 2021
  Undergraduate Research Assistant West Bengal, India
  - **Effect of changes in seawater head on seawater-groundwater interaction**
    · Numerical modeling of groundwater flow due to diurnal and seasonal head variation for pre and post-monsoon period, considering matrix compression and rebound.
  - **Thermal Transport in Connected Aquifers** Advisor: Dr. Saibal Gupta
    · Determination of mixing rate considering reactive transport of some specific elements responsible as radiogenic heat source using coupled flow and heat transport model

- **University of Alberta** Nov. 2020 – Apr. 2021
  Research Intern, Advisor: Dr. Peichun Amy Tsai Edmonton, Canada
  - **Three-dimensional Flow Field of Low-Capillary-Number Microfluidic Emulsions**
    · Numerical simulations of mass-transfer and phase change across immiscible interfaces between supercritical CO_2 using VOF in a T-Junction microfluidic channel
    · Investigation of different droplet formation pressure regimes in a T-junction microchannel

- **UMR METIS, Sorbonne Université** Apr. 2020 – Jul. 2020
  Research Intern, Advisor: Dr. Damien Jougnot Paris, France
  - **Numerical study of Rayleigh Taylor Instabilities in porous media with geoelectrics**
    · Developed a flow and transport code for Rayleigh Taylor Instability in porous media.
    · Coupled effective conductivity calculation with flow and transport by current injection through it as the instability evolves
    · Analyzed anisotropy with the change in mixing length using inverse formulation

- **Geosciences Rennes, Université de Rennes1** May. 2019 – Jul. 2019
  Research Intern, Advisor: Dr. Yves Meheust Rennes, France
  - **Numerical simulations and Experimental study of CO_2 sequestration in deep aquifers**
    · Designed and performed a 3D experiment for laser scanning of Rayleigh Taylor instability of miscible fluids in a porous media
    · Studied the variation of onset time and mixing length in pore scale for density-driven instability
    · Analyzed anisotropy with the change in mixing length using inverse formulation

Manuscripts in Preparation

- **Mukherjee, N.,**, Neilson B.T., Chen, J., Kling, G.W., Cardenas, M.B., Groundwater-dependent headwater stream in the Arctic: subsurface-to-surface fluxes of water and organic matter.

- Virappane, S., **Mukherjee, N.**, Azadi, R., Tsai, P.A., Three-dimensional Flow Field in Microfluidic Emulsions

Conference Publications (Talks* & Posters†)

- **Mukherjee, N.***, Cardenas, M. B., Chen, J., Neilson, B., and Kling, G. W. (2022). Supra-permafrost groundwater's contribution to stream flow and organic matter chemistry in the Arctic: estimation using combined mechanistic and statistical approaches. *AGU Fall Meeting*, Chicago, Illinois.

- Keith, D. G., **Mukherjee, N.**†, Cameron, M. D., Cabraal, S. A., Schmidt, L., Turetcaia, A., Nguyen, W.D., Bennett, P.C., Shanahan, T.M. and Cardenas, M. B. (2022).

Hydrologic, Geophysical, and Geochemical Characterization of an Aquifer along the Beach of a Barrier Island. *AGU Fall Meeting*, Chicago, Illinois.

- **Mukherjee, N.**†, Dhar, J., Jougnot, D., and Méheust, Y. (2021). Characterizing Rayleigh Taylor Instability and Convection in a Porous Medium with Geoelectric Monitoring. *AGU Fall Meeting*, New Orleans, Louisiana.
- Dhar, J., **Mukherjee, N.**⋆, Nadal, F., Le Borgne, T., Meunier, P., and Meheust, Y. (2019) Gravitational instability and convection in a granular porous medium: pore scale experimental study and implications for solubility trapping of CO2, *AGU Fall Meeting*, San Francisco, CA.

Monograph

- **Mukherjee, N.,** (2021). Numerical modeling of seawater intrusion considering diurnal head changes of seawater and matrix compression and rebound *Master's Thesis*, Indian Institute of Technology, Kharagpur. doi:10.13140/RG.2.2.15345.25443.

Awards, Fellowships, and Scholarships

- **Travel Grant for PFLOTRAN Reactive Transport Workshop** Nov 2023
  CUAHSI Richland, Washington
  Travel grant awarded for attending Reactive Transport Workshop with sophisticated reaction networks based on proposal submission at Pacific Northwest National Laboratory
- **Summer Off-Campus Research Grant** May. 2023
  The University of Texas at Austin Austin, TX
  Summer scholarship to carry out off-campus field expedition to Toolik Field Station, Alaska
- **Dean's List, International Student Affairs** Jul. 2021
  Indian Institute of Technology, Kharagpur West Bengal, India
  Award for getting involved in three international research projects in two years during undergraduate studies
- **Prof. Supriya Mohan Sengupta Memorial Award** Jan. 2022
  Indian Institute of Technology, Kharagpur West Bengal, India
  Award for best master's thesis in the Department of Geology and Geophysics batch of 2021
- **Best Undergraduate Project Award** Jul. 2021
  Indian Institute of Technology, Kharagpur West Bengal, India
  Award for best bachelor's project in the Department of Geology and Geophysics batch of 2021
- **University of Alberta Research Experience (UARE)** Jan. 2020
  Department of Mechanical Engineering, University of Alberta Edmonton, Canada
  Fully funded summer internship for three months at the University of Alberta on a selected research project

- **CNRS Research Scholarship** May. 2019
  Geosciences Rennes Rennes, France
  Fully funded summer internship for three months to work on a CNRS-funded project in France
- **Inspire Scholarship** Mar. 2019 – May, 2021
  Department of Science and Technology (DST), Govt. of India West Bengal, India
  Partial payment of Tuition fees for 5 years to pursue a degree in Basic sciences in IIT

Professional Affiliations

- American Geophysical Union (AGU)
- Geological Society of America (GSA)

Leadership & Outreach

- **University of Texas at Austin** Aug. 2022 – Aug. 2023
  Mentor Austin, TX
  - Provided comprehensive mentorship to a new international graduate student within the Department of Earth and Planetary Sciences, offering guidance on academic and cultural integration, facilitating a smooth transition into the academic environment
  - Successfully instructed two advanced graduate class sessions in groundwater hydrology during the absence of lead instructor Dr. M Bayani Cardenas, demonstrating expertise in delivering complex subject matter to a high-level academic audience.
- **Kiker Elementary School** May. 2022
  Instructor Austin, TX
  - Created engaging and interactive modules to introduce elementary school students to basic geology concepts, fostering active learning and hands-on exploration
- **Indian Institute of Technology, Kharagpur** May. 2017 – July 2019
  Mentor West Bengal, India
  - Guided and mentored a group of four freshmen, providing valuable academic advice and assisting with course selection, study strategies, and resource navigation
  - Facilitated career exploration by identifying individual interests, researching internship opportunities, and fostering connections within professional networks.
- **TeamKART, Formula SAE Team, IIT Kharagpur** 2017 – 2021
  Team Head, Team Mentor West Bengal, India
  - Played a key role in developing and designing Vehicle Dynamics for Formula SAE car K4. The car competed in Formula Bharat 2019, showcasing expertise in optimizing performance.
  - Led as the Engineer and Mentor for Formula SAE car K5, securing a commendable 10th place in Formula Bharat 2020. Demonstrated effective leadership and mentorship in competitive motorsports.