Neelarun Mukherjee

Department of Earth and Planetary Sciences, Jackson School of Geosciences
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Curriculum Vitae as of July 2024

Education

- **The University of Texas at Austin** 2021 – 2026 (expected)
  Ph.D. in Hydrology GPA 3.96/4.0
  Advisors: Dr. M Bayani Cardenas & Dr. Jingyi Ann Chen
  Dissertation 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: Numerical modeling of seawater intrusion considering diurnal head changes of seawater and matrix compression and rebound doi:10.13140/RG.2.2.15345.25443.
  Thesis Advisors: Dr. Abhijit Mukherjee & Dr. Aditya Bandopadhyay

Awards, Fellowships, and Scholarships

- **Travel Grant for PFLOTRAN Reactive Transport Workshop** Nov, 2023
  CUAHSI Richland, Washington

- **Summer Off-Campus Research Grant** May, 2023
  The University of Texas at Austin Austin, TX

- **Dean's List, International Student Affairs** Jul, 2021
  Indian Institute of Technology, Kharagpur West Bengal, India

- **Prof. Supriya Mohan Sengupta Memorial Award** Dec, 2021
  Indian Institute of Technology, Kharagpur West Bengal, India

- **Best Undergraduate Project Award** Dec, 2021
  Indian Institute of Technology, Kharagpur West Bengal, India

- **University of Alberta Research Experience (UARE)** Jan, 2020
  Department of Mechanical Engineering, University of Alberta Edmonton, Canada

- **CNRS Research Scholarship** May, 2019
  Geosciences Rennes Rennes, France

- **Inspire Scholarship** Mar, 2019 – May, 2021
  Department of Science and Technology (DST), Govt. of India West Bengal, India

Research 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.
  - Developing a statistical model to estimate water and organic carbon fluxes in a permafrost watershed across hydrologic states

- **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

Publications

- **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. (in review)
- Virappane, S., **Mukherjee, N.**, Azadi, R., Tsai, P.A., Three-dimensional Simulations of Two-phase Plug Flow in a Microfluidic Channel. (in review)

Conference Presentations (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.

Teaching/Mentoring Experience

- **University of Texas at Austin** Aug. 2023 – May. 2023
  Teaching Assistant Texas, U.S.
  - **Summer 2024** Instructed a field class of 21 students (GEO376L: Hydro Field Camp) where we spent a three week spanning Texas and Yucatan Peninsula, Mexico.
  - **Fall 2023** Instructed graduate class sessions in groundwater hydrology during the absence of lead instructor Dr. M Bayani Cardenas.
  - **Spring 2023:** Instructed laboratory sections (60 freshmen across various disciplines) for GEO 401: Introduction to Geology: Over 150 hours of teaching experience
  - **Fall 2022:** Instructed laboratory sections and class (90 freshmen across various disciplines) for COE 301: Introduction to Computer Programming: Over 150 hours of teaching experience.
- **University of Texas at Austin** Aug. 2022 – Aug. 2023
  Mentorship Austin, TX
  - Sydney R Villaruel, undergraduate student mentee
  - Chengwei Zhang, grad-student mentee