NEELARUN MUKHERJEE

neelarun@utexas.edu +1 (737) 733-1803 neelarunmukherjee.github.io /neelarunmukherjee

Curriculum Vitae as of September 2025

RESEARCH INTERESTS

My research focuses on flow and reactive transport in subsurface hydrological and biogeochemical systems. I use numerical models, remote sensing, as well as field data and lab experiments to study flow, heat, solute as well as reactive transport in porous media.

EDUCATION

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

Indian Institute of Technology (IIT), Kharagpur 2016 – 2021
Integrated M.S. and B.S. in Exploration Geophysics GPA 8.46/10.0
Specialization in Fluid Mechanics and Microfluidics
Thesis: Numerical modeling of seawater intrusion considering diurnal head changes of seawater and matrix compression and rebound. http://dx.doi.org/10.13140/rg.2.2.15345.25443.
Advisors: Dr. Abhijit Mukherjee & Dr. Aditya Bandopadhyay

GRANTS

Cold-regions Hydro-biogeochemical Processes Amount: $1M (3y)
Environmental System Science Program (ESS), Department of Energy (DOE)
Team: M. B. Cardenas (PI, UT Austin), B. T. Neilson (CoI, Utah State Univ.), P. Shuai (CoI, Utah State Univ.), R. M. Cory (CoI, Univ. of Michigan), G. W. Kling (CoI, Univ. of Michigan), E. T. Coon (CoI, Oak Ridge Nat. Lab.), N. Mukherjee (Grad, UT Austin), D. Hill (Grad, Utah State Univ.)

Future Investigators in NASA Earth and Space Science and Technology Amount: $135,000 (3y)
National Aeronautics and Space Administration (NASA)
Team: J. Chen (PI), M. B. Cardenas (CoI), Y. Wu (FI), N. Mukherjee (FI), UT Austin

AWARDS AND SCHOLASTIC ACHIEVEMENTS

Future Investigators in NASA Earth and Space Science and Technology (FINESST) Fellowship	2025
Outstanding Student Presentation Award (OSPA), AGU Fall Meeting	2024
Travel Grant, Earth System Science (ESS) PI Meeting, Dept. of Energy	2024, 2025
First Place, Geoscience Hackathon on computational reproducibility, UT Austin	2024
Travel Grant, Reactive Transport Workshop using PFLOTRAN, CUAHSI	2023
Jackson School Off-Campus Research Grant, UT Austin	2023
Dean's List, IIT Kharagpur	2021
Prof. Supriya Mohan Sengupta Memorial Award for Best Masters' Thesis, IIT Kharagpur	2021
Best Undergraduate Project Award, IIT Kharagpur	2021
University of Alberta Research Experience (UARE) Award	2020
Indo-French Summer Research Scholarship, CNRS	2019
Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship, DST – Govt. of India	2016

PEER-REVIEWED PUBLICATIONS

4. Mukherjee, N., Gao, B., Shuai, P., Coon, E. T., Hill, D., Chen, J., Neilson, B. T., Kling, G. W., and Cardenas, M. B. *The effects of extreme weather variability on supra-permafrost hydrology.* (manuscript under preparation)

3. Mukherjee, N., Gao, B., Shuai, P., Coon, E. T., Hill, D., Chen, J., Neilson, B. T., Kling, G. W., and Cardenas, M. B. *The effects of 40 years of recent warming on supra-permafrost hydrology.* (manuscript under preparation)

2. Mukherjee, N., Chen, J., Neilson, B. T., Kling, G. W., and Cardenas, M. B. (2024). *Water and carbon fluxes from a supra-permafrost aquifer to a stream across hydrologic states.* Journal of Hydrology, 645, 132285. https://doi.org/10.1016/j.jhydrol.2024.132285

1. Virappane, S., Azadi, R., Mukherjee, N., and Tsai, P. A. (2024). *Three-dimensional simulations of two-phase plug flow in a microfluidic channel.* Physics of Fluids, 36(10). *Editors' Choice*. https://doi.org/10.1063/5.0220101

CONFERENCE PROCEEDINGS

14. Mukherjee, N.*, Gao, B., Shuai, P., Coon, E., Hill, D., Neilson, B. T., Cory, R. M., Kling, G. W., and Cardenas, M. B. (2025). *Using a fully calibrated and validated model can unravel hidden unfrozen layers inside a frozen ground due to warming winters.* [Invited Talk]. ATS Short Course, Knoxville, Tenessae

13. Mukherjee, N.†, Gao, B., Shuai, P., Coon, E., Hill, D., Neilson, B. T., Cory, R. M., Kling, G. W., and Cardenas, M. B. (2025). *Impacts of changing hydrologic conditions on groundwater flow and reactive solute transport in supra-permafrost aquifers* Department of Energy: Earth System Sciences PI Meeting, Reston, Virginia.

12. Hill, D.†, Mukherjee, N., Neilson, B. T., Shuai, P., Cory, R. M., Kling, G. W., Gao, B., Coon, E., and Cardenas, M. B. (2025). *Hydrologic Observations Across the Hillslope-to-River Corridor of an Arctic Tundra Watershed* Department of Energy: Earth System Sciences PI Meeting, Reston, Virginia.

11. Cardenas, M. B., Mukherjee, N.†, Hill, D.†, Neilson, B. T.†, Shuai, P., Cory, R. M., Kling, G. W.†, Gao, B., Coon, E. (2025). *Advancing Understanding of Flow and Reactive Transport Processes Across the Hillslope-to-River Corridor of Arctic Watersheds* Department of Energy: Earth System Sciences PI Meeting, Reston, Virginia.

10. Mukherjee, N.*, Shuai, P., Gao, B., Coon, E., Chen, J., Hill, D., Neilson, B., Kling, G.W., and Cardenas, M. B. (2024). *Impacts of climate conditions on groundwater flow and reactive solute transport in supra-permafrost aquifers.* AGU Fall Meeting, Washington DC.

9. Villaruel, S.†, Mukherjee, N., Hill, D., Cardenas, M., Shuai, P., Gao, B., Coon, E., Chen, J., Neilson, B., Kling, G.W., and Cardenas, M. B. (2024). *Hydro-stratigraphy of the active layer in riparian valley bottoms of an arctic watershed.* AGU Fall Meeting, Washington DC.

8. Clark, Z.†, Chiu, C. Y., deFabry, C. M., Mukherjee, N., Nachimuthu, S., Herrera, R. G., Gonzalez, R. M., Bennett, P. C., Shanahan, T. M., and Cardenas, M. B. (2024). *Characteristics of the Coastal Groundwater of Celestún, Mexico on the West Coast of the Yucatan Peninsula for Extreme Conditions During the Dry Season.* AGU Fall Meeting, Washington DC.

7. Mukherjee, N.*, Chen, J., Neilson, B., Kling, G. W., and Cardenas, M. B. (2024). *Groundwater dominates fluxes of water and organic carbon in a permafrost watershed across hydrologic states.* Department of Energy: Earth System Sciences PI Meeting, Reston, Virginia.

6. Cardenas, M. B.†, Neilson, B. T., Shuai, P., Cory, R. M., Kling, G. W., Mukherjee, N., Gao, B., and Coon, E. (2024). *Dynamics of interconnected surface-subsurface flow and reactive transport processes across the hillslope-riparian zone river corridor continuum of cold, high-latitude watersheds.* Department of Energy: Earth System Sciences PI Meeting, Reston, Virginia.

5. Mukherjee, N.†, Shuai, P., Gao, B., Coon, E., Chen, J., Hill, D., Neilson, B., Kling, G.W., and Cardenas, M. B. (2023). *Investigating Groundwater Flow and Thermal Transport in Arctic Supra-Permafrost Aquifers Using Field Observation Driven Integrated Hydrologic Models.* AGU Fall Meeting, San Francisco, California.

4. 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.

3. Keith, D. G.†, Mukherjee, N., deFabry, C. M., 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.

2. 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.

1. Mukherjee, N., Dhar, J.†, 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 CO_2.* AGU Fall Meeting, San Francisco, California.

Talks* & Posters†

RESEARCH EXPERIENCE

Oak Ridge National Laboratory PI: Dr. Scott Painter | Sep 2025
Flow and Reactive Transport in Supra-permafrost Aquifers Visiting Graduate Student
Modeling thermal hydrological dynamics and coupled iron redox cycling impact on C-emmisions

Indian Institute of Technology, Kharagpur PI: Dr. Saibal Gupta | Jul, 2018 – Aug, 2019
Thermal Transport in Connected Aquifers Undergraduate Research Assistant
Modeling mineral mixing rates from transport of a radiogenic heat source using a coupled groundwater flow and heat transport model

University of Alberta PI: Dr. Peichun Amy Tsai | Nov, 2020 – Apr, 2021
3D Flow Fields for Low-Capillary-Number Microfluidic Emulsions Intern
Investigated low-Capillary-number Taylor flows of CO_2 emulsions in microchannels using high-resolution pore scale simulations, revealing 3D vortex dynamics critical for flow stabilization and transport

CNRS, UMR7619 METIS, Sorbonne Université PI: Dr. Damien Jougnot | Apr, 2020 – Jul, 2020
Rayleigh Taylor Instabilities in porous media with geoelectrics Intern
Developed a coupled flow, transport and geoelectric solver in OpenFOAM for Rayleigh-Taylor instabilities

CNRS, UMR6118, Université de Rennes1 PI: Dr. Yves Meheust | May, 2019 – Jul, 2019
Numerical simulations and Experimental study of CO_2 sequestration in deep aquifers Intern
Developed a solver in OpenFOAM for designing Rayleigh Taylor instability of miscible fluids in porous media

TeamKART Motorsports, Formula SAE Team, IIT Kharagpur PI: Dr. Surjya Kanta Pal | 2016 – 2020
Design of Vehicle Dynamics for Formula SAE Suspension and Brakes Team Lead
Suspension and aero design for FSAE cars K4 (2019) and K5 (2020), securing P6 and P10, Formula Bharat

TECHNICAL SKILLS

Languages (Skill level: 1–5): Python (5), MATLAB (5), Julia (4), C++ (4), C (4), Shell (3), LaTeX (5)
Open-source Numerical Codes: Amanzi-ATS, PFLOTRAN, OpenFOAM, Basilisk (Gerris), FEniCS
Other Software: COMSOL, SolidWorks, Fluent, ArcGIS, ParaView, VisIt, FreeCAD, Affinity Designer
Lab/Field Equipment: Levelloggers, Total Stations, Benchtop KSAT, Hyprop, Chemetrics, ABEM Terrameter

FIELD EXPERIENCES

Imnavait Creek, North Slope, Alaska, USA: (10 weeks), 2022-2024
Investigated groundwater flow and reactive transport in supra-permafrost aquifers

Austin, Texas, USA: May, 2023, 2024
Understanding tidal response of a river to groundwater flows in Lower Colorado river

Celestun, Mexico: June, 2024
Groundwater survey to understand seawater-freshwater mixing along a beach
Anillo de Cenotes, Mexico: June, 2024
Groundwater survey to understand Karst geochemistry and hydrodynamics of seawater groundwater mixing
Purulia, West Bengal, India: Dec, 2019
2-D electrical Resistivity tomography to understand confined groundwater aquifer hydrologic stratification
Kharagpur , West Bengal, India: Dec, 2018
Geophysical interpretation via 12 channel seismic data acquisition
Balasore and Chandipore beach, Orissa, India: Oct, 2017
Coastal hydrogeology basics

TEACHING

GEO376L: Hydro Field Camp | Teaching Assistant | UT Austin Summer 2024
Instructed a field class of 21 students where we spent three week spanning Texas and Yucatan, Mexico

GEO 382S: Physical Hydrology | Substitute Instructor | UT Austin Fall 2023, 2024
Led graduate sessions in groundwater hydrology

GEO 401: Introduction to Geology | Teaching Assistant | UT Austin Spring 2023
Instructed over 150 hours of lab sessions (100 freshmen across various disciplines)

COE 301: Introduction to Computer Programming | Teaching Assistant | UT Austin Fall 2022
Instructed over 150 hours of lab and in-class sessions (90 freshmen across various disciplines)

SERVICE AND LEADERSHIP

Mentoring Students: *Sydney R Villaruel* (now MS @ Univ. of South Carolina), C*hengwei Zhang* (PhD Student @ UT Austin), *Santhosh Virappane* (now Scientest-Engineer @ RWDI)
Peer-Reviewer: Geological Society of America (GSA) Connects, American Geophysical Union (AGU) Fall Meeting, Journal of Hydrology, Catena.

OUTREACH

Kiker Elementary School, Austin, TX May, 2022
Created engaging and interactive modules to introduce elementary school students to basic hydrogeology

National Service Scheme, Government of India 2016-2017
Taught maths to youth in rural areas, repaired roads and organized health awareness camps in 5 villages