

Saubhagya Singh Rathore

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Professional Employment

2021 – present Associate Staff Scientist, Environmental Sciences Division, Oak Ridge National Lab
2020 – 2021 Post Doctoral Researcher, Environmental Sciences Division, Oak Ridge National Lab
2019 – 2020 Instructor of Record, College of Engineering, Georgia Institute of Technology

Education

2020 Ph.D., Civil Engineering, Georgia Institute of Technology
Development of seawater-freshwater interface in heterogeneous coastal aquifers
Ph.D. Dissertation advisor: Jian Luo and Aris Georgakakos
2017 M.S., Civil Engineering, Georgia Institute of Technology
Concentration: Environmental Fluid Mechanics and Water Resources Engineering
2015 B.Tech., Civil Engineering (Honors), Indian Institute of Technology Bombay
B.Tech. Dissertation advisor: T.I. Eldho

Awards and Honors

- Honorable Mention (2nd place), UCOWR Ph.D. Dissertation Award (2021)
- Outstanding Graduate Student Instructor for Civil and Environmental Engineering (2019)
- Best Resident Advisor of the Year, Department of Housing, Georgia Tech (2019)
- NAFSA Advocate - nominated by Georgia Tech, Capitol Hill, Washington D.C. (2018)
- Undergraduate Research Award, IIT Bombay (2013)

Publications

Peer-reviewed Journal Articles

1. Rathore, S.S., Svyatskii, D.S., Coon E. T., Son, K., and Painter, S.L. (2024, *in review*), “Modeling the effects of artificial drainage on agriculture-dominated watersheds using a fully distributed integrated hydrology model.” *Submitted to Water Resources Research*.
2. Rathore, S.S., Coon E. T., and Painter, S.L. (2024, *in review*), “A Stream-aligned Mixed Polyhedral Meshing Strategy for Integrated Surface- Subsurface Hydrological Models”. *Submitted to Computers and Geosciences*.
3. Rathore, S.S., Ward, A.S. and Painter, S.L., (2023) “Numerical evaluation of photosensitive tracers as a strategy for separating surface and subsurface transient storage in streams” *Journal of Hydrology*, 624, p.129931. <https://doi.org/10.1016/j.jhydrol.2023.129931>
4. Le, P.V., Rathore, S.S. and Painter, S.L., (2023) “A multiscale model for solute transport in stream corridors with unsteady flow” *Journal of Hydrology*, 622, p.129670. <https://doi.org/10.1016/j.jhydrol.2023.129670>
5. Rathore, S.S., Schwartz, G.E., Brooks, S.C. and Painter, S. L., (2022) “Joint estimation of biogeochemical model parameters from multiple experiments: A Bayesian approach applied to

- mercury methylation” *Environmental Modelling & Software*, 155, p.105453.
<https://doi.org/10.1016/j.envsoft.2022.105453>
6. Schwartz, G.E., Muller, K.A., Rathore, S.S., Wilpiseski, R.L., Carrell, A.A., Cregger, M.A., Elias, D.A., Podar, M., Painter, S.L., Brooks, S.C., (2022) “Incorporating Variable Sediment Microbial Activity into Methylmercury Production Kinetics Modeling” *Environmental Science: Processes & Impacts*. <https://doi.org/10.1039/D1EM00287B>
 7. Rathore, S. S., Jan, A., Coon, E., Painter S. L. (2021), “On the Reliability of Parameter Inferences in a Multiscale Model for Transport in Stream Corridors” *Water Resources Research*, 57, <https://doi:10.1029/2020WR028908>
 8. Rathore, S. S., Lu, C., & Luo, J. (2020). “A semi-analytical method to fast delineate seawater-freshwater interface in two-dimensional heterogeneous coastal aquifers” *Water Resources Research*, 56, e2020WR027197. <https://doi.org/10.1029/2020WR027197>
 9. Rathore, S. S., Tang, Y., Lu, C., & Luo, J. (2020) “A Simplified Equation of Approximate Interface Profile in Stratified Coastal Aquifers” *Journal of Hydrology*, 124249. <https://doi.org/10.1016/j.jhydrol.2019.124249>
 10. Tang, Y., Rathore, S. S., Lu, C., & Luo, J. (2020) “Development of groundwater lens for transient recharge in strip islands” *Journal of Hydrology*, 590, 125209. <https://doi.org/10.1016/j.jhydrol.2020.125209>
 11. Lu, C., Cao, H., Ma, J., Shi, W., Rathore, S. S., Wu, J., & Luo, J. (2019) “A proof-of-concept study of using a less permeable slice along the shoreline to increase fresh groundwater storage of oceanic islands: Analytical and experimental validation” *Water Resources Research*, 55, 6450–6463. <https://doi.org/10.1029/2018WR024529>
 12. Rathore, S. S., Zhao, Y., Lu, C., & Luo, J. (2018). “Defining the effect of stratification in coastal aquifers using a new parameter”. *Water Resources Research*, 54(9). <https://doi.org/doi:10.1029/2018WR023114>
 13. Rathore, S. S., Zhao, Y., Lu, C., & Luo, J. (2018). “Analytical analysis of the temporal asymmetry between seawater intrusion and retreat”. *Advances in Water Resources*, 111, 121-131. <https://doi.org/10.1016/j.advwatres.2017.11.001>
 14. Zhao, Y., Rathore, S. S., Liu, M., & Luo, J. (2018). “Joint Bayesian Inversion for Analyzing Conservative and Reactive Breakthrough Curves” *Journal of Hydrology*, 567, 446-456. <https://doi.org/10.1016/j.jhydrol.2018.10.029>
 15. Lu, C., Wang, Z., Zhao, Y., Rathore, S. S., Huo, J., Tang, Y., et al. (2018). “A mobile-mobile transport model for simulating reactive transport in connected heterogeneous fields”. *Journal of Hydrology*, 560, 97-108. <https://doi.org/10.1016/j.jhydrol.2018.02.073>

Codes and Software Products/Releases

1. Watershed Workflow 1.4.0: Capability of stream-aligned mixed-polyhedral meshing strategy. <https://github.com/environmental-modeling-workflows/watershed-workflow/releases/tag/watershed-workflow-1.4.0>
2. Python workflow for Bayesian inverse modeling with ATS transport model.

Research Project Affiliations

- 2022-2025 WaDE: Watershed Dynamics And Evolution Science Focus Area
<https://wade.ornl.gov>
PI: Eric Pierce (ORNL)
Funding Agency: Department of Energy - Environmental System Science Program
- 2022-2027 Southeast Texas Urban Integrated Field Laboratory
<https://setx-uifl.org/about/>
PI: Paola Passalacqua (UT Austin)
Funding Agency: Department of Energy - Environmental System Science Program
- 2022-2025 COMPASS – Great Lakes Modeling
<https://compass.pnnl.gov/GLM/COMPASSGLM>
PI: Rober Hetland (PNNL)
Funding Agency: Department of Energy – Earth and Environmental Systems Modeling
- 2022-2025 IDEAS – Watersheds
<https://ideas-watersheds.github.io/>
PI: David Moulton (LANL)
Funding Agency: Department of Energy - Environmental System Science Program

Presentations

Invited Seminars

- 2023 North Carolina A&T State University, “Waterways and Ways of Life: Exploring the Interactions between Human and Hydrological Systems”
- 2021 Critical Interfaces Network (CInet), “Status and Plans for Modeling Agricultural Watersheds in the COMPASS-GLM Project”
- 2021 North Carolina A&T State University, "Groundwater-Surface Water Interaction: From Stream Corridors to Coast"
- 2019 Hohai University (Nanjing, China), “A new approach to understand the effects of heterogeneity in coastal aquifers”
- 2018 Hohai University (Nanjing, China), “Analytical tools for better understanding of coastal groundwater flow dynamics”

Conference Presentations

- 2023 Rathore, S., Svaystkii, D., Coon, E., Painter, S. (2023) Analyzing event-scale hydrological response of agricultural watersheds with artificial drainage using a fully distributed integrated hydrology model. *AGU Fall Meeting*, San Francisco, CA. eLightning Talk.
- Rathore, S., Svaystkii, D., Coon, E., Painter, S. (2023) Understanding the impacts of artificial surface and subsurface drainage on agricultural watersheds using fully distributed watershed scale hydrology models. *Gordon Research Conference*, Andover, NH. Poster.
- Rathore, S., Gomez Velez, J., Le, P., Painter, S., Model-data integration strategies for stream metabolism studies. *DOE Environmental System Science PI meeting*, Bethesda, MD. Poster.
- 2022 Rathore, S., Svaystkii, D., Coon, E., Painter, S. (2022) Improved Representation of Surface and Subsurface Drainage Networks in Integrated Hydrology Models for Managed Watersheds. *AGU Fall Meeting*, Chicago, IL. Oral.

- 2021 Rathore, S., Painter, S. (2021) Improving the Representation of the Hydro-biogeochemical Function of Stream Corridors Using Observation-informed Multiscale Modeling, *AGU Fall Meeting*. Invited Oral
- Rathore, S., Lu, C., Luo, J. (2021) A New Framework to Analyze Heterogeneity Effects on Seawater Intrusion. *UCOWR/NIWR Annual Water Resources Conference*, Invited Oral
- Rathore, S., Coon, E., Painter, S. (2021) Improving Representation of Surface Drainage Networks in Managed Watersheds. *MODFLOW and More*, Princeton University
- 2020 Rathore, S., Jan, A., Coon, E., Painter, S. (2020) Improving Parameter Inferences in a Multiscale Model for Transport in Stream Corridors. *AGU Fall Meeting*, Virtual. eLightning
- 2018 Rathore, S., Zhao, Y., Lu, C., Luo, J. (2018) Using a new parameter to account for the effect of stratification in coastal aquifers. *AGU Fall Meeting*, Washington, D.C. Poster.
- 2017 Rathore, S., Zhao, Y., Lu, C., Luo, J. (2017) Analytical analysis of the temporal asymmetry between seawater intrusion and retreat. *AGU Fall Meeting*, New Orleans, LA. Oral.
- 2016 Rathore, S., Zhao, Y., Lu, C., Luo, J. (2016) Timescale analysis of saltwater intrusion and retreat. *AGU Fall Meeting*, San Francisco, CA. Poster
- 2013 Rathore, S., Gupta, M., Eldho, T. I. (2013) Aquifer decontamination studies using MODFLOW and MT3D. *Annual Convention – Indian Water Works Association*, Pune, India. Oral

Teaching and Mentoring

Instructor of Record, College of Engineering, Georgia Institute of Technology

- COE 2001 – Statics: Fall 2019 (54 students), Spring 2019 (19 Students)

Teaching Assistant, Civil and Environmental Engineering, Georgia Institute of Technology

- CEE 2040 – Dynamics: Spring 2018
- CEE 4200 – Hydraulic Engineering: Fall 2016
- CEE 3040 – Fluid Mechanics: Spring 2016

Professional Development

- Tech to Teaching” Certificate, Georgia Tech, 2019
- CIRTL Associate Level Certificate, 2019
- CEE Future Faculty Fellowship (\$3,000), Georgia Tech, 2018

Service Activities

Professional Service

Manuscript Reviewer

Nature Scientific Reports, Geophysical Research Letters, Water Resources Research, Journal of Hydrology, Journal of Contaminant Hydrology, Environmental Modeling and Software

Proposal Reviewer

- DOE-ESS Panel Reviewer (two separate panels; 2023)

Professional Society Service

- Session convener: Advances in Coastal Hydrology: Processes and Impacts, AGU Fall Meeting, 2019
- Session convener: Groundwater-Surface Water Interactions: Integrating Physical, Biological, and Chemical Patterns and Processes Across Systems and Scales, AGU Fall Meeting, 2022

Georgia Institute of Technology

- Student Advisor: Honor Advisory Council, Office of Student Integrity, 2015-2019
- Graduate Teaching Fellow: Center for Teaching and Learning, 2019

Indian Institute of Technology Bombay

- Head: Department Academic Mentorship Program, 2013-2014
- Lead: Hostel and Department Affairs, Student Alumni Relations Cell, 2012-2013

Science Communication and Educational Outreach

- Early Career Highlight at DOE-BER Annual Presentation at ORNL: “Photo-decaying tracers interpreted through a multiscale model for stream corridor transport can distinguish between hyporheic- and surface-zone transient storage”, 2023
- Panelist: Break Out Session: Coastal and Terrestrial Aquatic Interfaces, including lightning talk – “Watersheds to Coast: Resolving TAI Processes”, ESS-PI Meeting, 2023
- Guest Speaker: “Timescale analysis of saltwater intrusion and retreat in coastal aquifers”, Georgia Tech & Geosyntec Open Day, Geosyntec office, 2016

Workshops and Other Activities

- ATS Short Course: Reactive Transport Module, ORNL, 2021
- Watershed Workflow Hands-on Training: Stream-aligned meshing, IDEAS Watershed, 2021
- Groundwater Modeling Workshop: Training for Maharashtra Government Civil Engineers, 2012

Professional affiliations (*current*)

American Geophysical Union