

# Saubhagya Singh Rathore

Associate R&D Staff, Environmental Sciences Division, Oak Ridge National Laboratory  
email: [rathoress@ornl.gov](mailto:rathoress@ornl.gov), [saubhagya.rathore@outlook.com](mailto:saubhagya.rathore@outlook.com); phone: (470) 263-1189  
web: <https://www.ornl.gov/staff-profile/saubhagya-s-rathore>

## Professional Employment

2024 – present	R&D Staff, Environmental Sciences Division, Oak Ridge National Lab
2021 – 2024	Associate R&D Staff, 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 <i>Development of seawater-freshwater interface in heterogeneous coastal aquifers</i> 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
2014	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) “Modeling the effects of artificial drainage on agriculture-dominated watersheds using a fully distributed integrated hydrology model.” *Water Resources Research*, 60, e2023WR035993, <https://doi.org/10.1029/2023WR035993>
2. Rathore, S.S., Coon E. T., and Painter, S.L. (2024) “A Stream-aligned Mixed Polyhedral Meshing Strategy for Integrated Surface- Subsurface Hydrological Models” *Computers & Geosciences*, July 2024, 105617, <https://doi.org/10.1016/j.cageo.2024.105617>
3. Perez, G., Coon, E.T., Rathore, S.S., Le, P.V.V. (2024), “Advancing process-based flood frequency analysis for assessing flood hazard and population flood exposure”. *Journal of Hydrology*, 639: 131620, <https://doi.org/10.1016/j.jhydrol.2024.131620>
4. Le, P. V. V., Rathore, S. S., Coon, E. T., Ward, A., Haggerty, R., and Painter, S. L. (2024) “Hydrologic connectivity and dynamics of solute transport in a mountain stream: Insights from a long-term tracer test and multiscale transport modeling informed by machine learning”. *Journal of Hydrology*, 639, 131562. <https://doi.org/10.1016/j.jhydrol.2024.131562>

5. 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>
6. 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>
7. 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>
8. 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>
9. 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>
10. 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>
11. 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>
12. 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>
13. 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>
14. 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>
15. 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>
16. 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>
17. 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 <a href="https://wade.ornl.gov">https://wade.ornl.gov</a> PI: Eric Pierce (ORNL) Funding Agency: Department of Energy - Environmental System Science Program
2022-2027	Southeast Texas Urban Integrated Field Laboratory <a href="https://setx-uifl.org/about/">https://setx-uifl.org/about/</a> PI: Paola Passalacqua (UT Austin) Funding Agency: Department of Energy - Environmental System Science Program
2022-2025	COMPASS – Great Lakes Modeling <a href="https://compass.pnnl.gov/GLM/COMPASSGLM">https://compass.pnnl.gov/GLM/COMPASSGLM</a> PI: Robert Hetland (PNNL) Funding Agency: Department of Energy – Earth and Environmental Systems Modeling
2022-2025	IDEAS – Watersheds <a href="https://ideas-watersheds.github.io/">https://ideas-watersheds.github.io/</a> 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**

- 2024 Rathore, S., Gomez Velez, J., Painter, S. (2024), Exploring the water boundaries: Insights into Stream Network Expansion and Contraction from High-resolution Integrated Hydrologic Modeling. *MODFLOW and More*, Princeton University, MD. Oral.

- 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, Advances in Water Resources

#### *Proposal Reviewer*

- DOE-ESS Panel Reviewer (2023 - two separate panels; 2024)

#### *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**

- Media Contributor: Featured in a TV report on WBIR Channel 10, discussing Integrated Flood Modeling with a meteorologist, August 2024
- 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**

- Watershed Workflow Hands-on Training: Stream-aligned meshing, IDEAS Watershed, 2023
- ATS Short Course: Reactive Transport Module, ORNL, 2021
- Groundwater Modeling Workshop: Training for Maharashtra Government Civil Engineers, 2012

### **Professional affiliations (current)**

American Geophysical Union