Yicen Liu

PhD Candidate

Department of Civil & Environmental Engineering

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RESEARCH EMPHASES

Atmospheric Chemistry | Aerosol Science | Climate and Air Quality Modeling

Specific research interests include investigating heterogeneous reactions between gas and particle phases; bridging experimental observations and computational modeling to advance understanding of aerosol formation and growth; developing and applying particle-resolved model to regional climate studies; assessing the influence of aerosol composition on cloud formation and atmospheric processes.

EDUCATION

Ph.D. **Environmental Engineering**
May 2026 (Concentration in **Computer Science & Engineering**)
(expected) University of Illinois Urbana-Champaign
Advisor: Nicole Riemer
Dissertation: *Quantifying the impacts of aerosol mixing state on heterogeneous and multiphase chemistry*

M.S. **Environmental Engineering**
2021 University of Illinois Urbana-Champaign

B.S. **Environmental Science**
2020 Tongji University

AWARDS & HONORS

2023 Fall 2023 Schlesinger Travel Grant
2022 40th Annual Aerosol Conference Student Travel Grant
2021 Fall 2021 Conference Presentation Awards
2021 Outstanding Talk in Air Connect 3-min talk (3MT)
2018 The Third Prize Scholarship
2018 Ke Lan Scholarship for Academic Excellence
2017 Scholarship for Social Practice

RESEARCH EXPERIENCE

Ph.D. Research
2021-2026
(expected)

Project: Quantifying the Impact of Aerosol Mixing State on Heterogeneous and Multiphase Chemistry (PI: Nicole Riemer)

Description: This research has two main objectives: (1) to investigate the evolution of ambient aerosols by implementing detailed chemical mechanisms using a particle-resolved model and conducting scenario analyses, and (2) to assess modeling errors that arise from representing aerosols with bulk composition instead of accounting for the chemical diversity of individual particles within the population.

CEE REU Program
2019-2020

Project: Spatiotemporal Variability of Inorganic Composition in Ambient Fine Particulate Matter in Midwestern United States (PI: Vishal Verma)

Description: The objective of this project was to analyze the inorganic composition of ambient fine particulate matter in the Midwestern United States using the spectrophotometer and to investigate the correlation between particle composition and cellular oxidative potential across different sites in the Midwestern United States.

Shanghai Undergraduate Innovation Program
2018-2019

Project: The Exploration of Hormesis of Commercial Personal Care Products on *Vibrio qinghaiensis* sp.-Q67 (PI: Shu-Shen Liu)

Description: This objective of this project was to evaluate the toxicity of 23 commercial personal care products, including toner, skin water and makeup water, on aquatic microorganisms.

TEACHING & MENTORING EXPERIENCE

Teaching Assistant

Course: Data Science for the Geosciences (ATMS 517) — Fall 2025
University of Illinois Urbana-Champaign (Instructor: Alicia Klees)

Course: Radiative Transfer-Remote Sens (ATMS 304) — Spring 2022
University of Illinois Urbana-Champaign (Instructor: Nicole Riemer)
Listed among ***'Teachers Ranked as Excellent by Their Students'***

Graduate Advising
2023-2024

Research Advisor: Mentored an M.S. student in developing a computational algorithm to infer the aerosol mixing state index (χ) from H-TDMA measurements. Provided guidance on data analysis, algorithm implementation, and code debugging.

PUBLICATIONS

Liu, Y., Yao, Y., Curtis, J. H., West, M., Riemer, N. (2025). The impacts of aerosol mixing state on heterogeneous N_2O_5 hydrolysis. *Aerosol Science and Technology,* 1-22. https://doi.org/10.1080/02786826.2024.2443587

Wang, Y., Puthussery, J. V., Yu, H., **Liu, Y.**, Salana, S., and Verma, V. (2022). Sources of cellular oxidative potential of water-soluble fine ambient particulate matter in the Midwestern United States. Journal of Hazardous Materials, 425, 127777. https://doi.org/10.1016/j.jhazmat.2021.127777

Xu, X., Curtis, J. H., Yao, Y., **Liu, Y.**, West, M., Riemer, N. Quantifying the Impact of Surfactants on Cloud Condensation Nuclei Activity Using a Particle-Resolved Model. *Submitted to Aerosol Science and Technology*.

Liu, Y., Wang, J., West, M., Riemer, N. From κ to χ: Evaluating Hygroscopicity-Based Mixing State Estimates with a Particle-Resolved Model. *In preparation.*

Liu, Y., Curtis, J. H., Dawson, M. L., Higgins, D. N., Johnston, M. V., Riemer, N. Modeling the seed-dependent particle growth via multiphase reactions with the particle-resolved model PartMC-CAMP. *In preparation*.

CONFERENCE PRESENTATIONS & POSTERS

Liu, Y., Curtis, J. H., Dawson, M. L., Higgins, D. N., Johnston, M. V., Riemer, N. Modeling the seed-dependent particle growth via multiphase reactions with the particle-resolved model PartMC-CAMP (Oral). *International Aerosol Modeling Algorithms Conference*. Davis, CA, United States, December 6-8, 2023

Liu, Y., Yao, Y., Curtis, J. H., West, M., Riemer, N. Quantifying the impacts of aerosol mixing state on heterogeneous N_2O_5 uptake coefficients with the particle-resolved model PartMC-MOSAIC (Oral). *28th Environmental Engineering and Science Symposium*. Urbana, IL, United States, April 14, 2023.

Liu, Y., Yao, Y., Curtis, J. H., West, M., Riemer, N. Quantifying the impacts of aerosol mixing state on heterogeneous N_2O_5 uptake coefficients with the particle-resolved model PartMC-MOSAIC (Poster). *40th American Association for Aerosol Research Conference*. Raleigh, NC, United States, October 3-7, 2022.

Liu, Y., Yao, Y., Curtis, J. H., West, M., Riemer, N. The impacts of aerosol mixing state on N_2O_5 reaction probability (Poster), *School of Earth, Society and Environment Research Review*. Urbana, IL, United States, February 18, 2022.

Liu, Y., Yao, Y., Curtis, J. H., West, M., Riemer, N. The impact of aerosol mixing state on N_2O_5 uptake coefficient (Poster), *39th American Association for Aerosol Research Conference*. Online, October 18-22, 2021.

UNIVERSITY SERVICE & ACTIVITIES

Student Chapter
Membership Director: AAAR at UIUC Student Chapter (2022-2023)
Vice President: AAAR at UIUC Student Chapter (2021-2022)
Liaison: Tongji-IESD Student Chapter (2017-2018)

Departmental Activities
Earth, Society, and Environment Camp for Girls (2024)
Engineering Open House – *"Care for Air"* (2023)
*Awarded **'2nd Place for Best Demonstration of a STEM Principle'** and **'Distinguished Environmental and Sustainability Efforts'***
Coordinator: Asia-Pacific Leadership on Environment for Sustainable Development (2018)
Organizer: International Student Conference on Environment and Sustainability (2017)