

Yu Yao

Cornell University
email: yu.yao@cornell.edu
[Research website](#)

Research interest

Atmospheric chemistry and short-lived climate forcing; aerosol–climate interactions (radiation and clouds); aerosol–methane coupling

Research experience

- 2024.09 - Now **Postdoc associate**, Dept of Earth and Atmospheric Sciences, Cornell University, NY, USA
2022.1-2024.09 **Postdoc associate**, Pacific Northwest National Lab, WA, USA
2016.08-2021.12 **Research assistant**, Dept. of Atmos. Sci., University of Illinois Urbana-Champaign, IL, USA
2013.09-2016.07 **Research assistant**, Dept of Earth System Science, Tsinghua University, Beijing, China

Education

- Ph.D. Atmospheric Science, University of Illinois Urbana-Champaign, IL, USA, 12/2021 Advised by *Nicole Riemer*
M.S. Atmospheric Science, Tsinghua University, Beijing, China, 06/2016 Advised by *Yuxuan Wang*
B.E. Hydraulic Engineering, Northwest A&F University, Shannxi, China, 06/2013

Publications

- *Forthcoming peer-reviewed*

1. **Yu Yao**, Natalie M. Mahowald, Peter Hess, John E. Mak, B Gaubert, Process-Based CO isotope constraints on iron-catalyzed chlorine contributions to the methane sink, in preparation.
2. **Yu Yao**, Natalie M. Mahowald, Peter Hess, Daphne Meidan, John E. Mak, Global assessment of iron-catalyzed chlorine production and its impact on atmospheric methane budget, to be submitted for *Journal of Geophysical Research: Atmospheres*
3. **Yu Yao**, Jeffrey H. Curtis, and Nicole Riemer, Quantifying the Effects of Cloud Processing on Aerosol Optical Properties Using a Particle-Resolved Model, in preparation for *Atmos. Chem. Phys.*
4. Xiaotian Xu, **Yu Yao**, Yicen Liu, Jeffrey H. Curtis, Matthew West, Nicole Riemer, Quantifying the Impact of Surfactants on Cloud Condensation Nuclei Activity Using a Particle-Resolved Model, in revision for *Aerosol Sci. Technol.*

- *Published peer-reviewed*

1. Huang, M., Ma, P. L., Varble, A. C., Fast, J. D., Hassan, T., Li, J., ... **Yao, Y.** (2025). Evaluation of E3SM simulated aerosols and aerosol-cloud interactions across GCM and convection-permitting scales. *Journal of Advances in Modeling Earth Systems*, 17(12), e2025MS005288.
2. Yuanyuan Wang, Zhonghua Zheng, Yuan Sun, **Yu Yao**, Po-Lun Ma, Aoxing Zhang, Shupeng Zhu, Zexuan Zhang, Xiyao Chen, Yun'er Pang, Qiyuan Wang, Huizheng Che, Joseph Ching, Weijun Li, Improved representation of black carbon mixing structures suggests stronger direct radiative heating, *One Earth* 8, no.5(2025).
3. Yicen Liu, **Yu Yao**, Jeffrey H. Curtis, Matthew West, and Nicole Riemer (2025), The Impacts of Aerosol Mixing State on Heterogeneous N₂O₅ Hydrolysis, *Aerosol Science and Technology*, 59(4), 402-423.
4. **Yao, Y.**, Ma, P.-L., Qin, Y., Christensen, M. W., Wan, H., Zhang, K., Singh, B., Huang, M., and Ovchinnikov, M.: Representing the effects of giant aerosol in droplet nucleation in E3SMv2, EGUsphere [preprint], <https://doi.org/10.5194/egusphere-2024-523>, 2024.
5. Fierce L.M., **Y. Yao**, R.C. Easter, P. Ma, J. Sun, H. Wan, and K. Zhang (2024). "Quantifying structural errors in cloud condensation nuclei activity from reduced representation of aerosol size distributions." *Journal of Aerosol Science*: 106388.

6. Dall'erba, S., Riemer, N., Xu, Y., Xu, R., & **Yao, Y.** (2024). Identifying the key atmospheric and economic drivers of global carbon monoxide emission transfers. *Economic Systems Research*, 1-18.
7. **Yao, Y.**, Curtis, J. H., Ching, J., Zheng, Z., and Riemer, N. (2022). Quantifying the effects of mixing state on aerosol optical properties, *Atmos. Chem. Phys.*, 22, 9265–9282, doi:10.5194/acp-22-9265-2022.
8. **Yao, Y.**, Dawson, M. L., Dabdub, D., & Riemer, N. (2021). Evaluating the impacts of cloud processing on resuspended aerosol particles after cloud evaporation using a particle-resolved model. *Journal of Geophysical Research: Atmospheres*, 126, e2021JD034992, doi:10.1029/2021JD034992.
9. Lucy Nandy, **Yu Yao**, Zhonghua Zheng & Nicole Riemer (2021). Water uptake and optical properties of mixed organic-inorganic particles, *Aerosol Science and Technology*, 55:12, 1398-1413, doi: 10.1080/02786826.2021.1966378.
10. Zheng, Z., Curtis, J. H., **Yao, Y.**, Gasparik, J. T., Anantharaj, V. G., Zhao, L., Riemer, N. (2020). Estimating Submicron Aerosol Mixing State at the Global Scale with Machine Learning and Earth System Modeling, *Earth and space science*, 8, e2020EA001500, doi:10.1029/2020EA001500
11. Xu, G., Q. Zang, **Y. Yao**, and X. Zhang (2020). Changes in PM_{2.5} sensitivity to NO_x and NH₃ emissions due to a large decrease in SO₂ emissions from 2013 to 2018, *Atmospheric and Oceanic Science Letters*, 13(3): 210-215, doi:10.1080/16742834.2020.1738009
12. Zhonghua Zheng, Joseph Ching, Jeffrey H Curtis, **Yu Yao**, Peng Xu, Matthew West, Nicole Riemer, Unsupervised regionalization of particle-resolved aerosol mixing state indices on the global scale, arXiv preprint arXiv:2012.03365 (2020)
13. Q. Q. Zhang, Y. Wang, Q. Ma, **Y. Yao**, Y. Xie and K. He (2015). Regional differences in Chinese SO₂ emission control efficiency and policy implications, *Atmos. Chem. Phys.* (15): 6521–6533, doi:10.5194/acp-15-6521-2015.
14. B. Jia, Y. Wang, **Y. Yao**, and Y. Xie (2015). A new indicator on the impact of large-scale circulation on wintertime particulate matter pollution over China, *Atmos. Chem. Phys.* (15): 11919–11929, doi:10.5194/acp-15-11919-2015.

Selected presentations

Invited seminars

- 2026 American Meteorological Society annual conference, “Aerosol-Radiation Interactions” Session, Houston, Texas (in-person)
- 2024 Environment Research institute, Shandong University, Qingdao, China (in-person)
- 2023 Department of Atmospheric Sciences, Zhejiang University, China (virtual)
- 2022 Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Switzerland(virtual)
- 2021 Atmospheric Sciences & Global Change Division, Pacific Northwest National Lab, USA (virtual)

Meetings and conferences

- 2025 AGU annual meeting, “Global assessment of iron-catalyzed chlorine production and its impact on atmospheric methane budget”, New Orleans, LA (poster).
- 2025 Gordon Research Conference: Atmospheric Chemistry, “Global assessment of iron-catalyzed chlorine production and its impact on atmospheric methane budget”, Newry, ME (poster).
- 2023 AGU annual meeting, “Assessing the effects of giant aerosol particles in E3SM”, San Francisco, CA (poster).
- 2023 AMS annual meeting, “Assessing the effects of giant aerosols on cloud and precipitation characteristics in E3SM”, Denver, CO (oral).
- 2022 PNNL Postgraduate Research Symposium (PoGO), “Quantify the climate effects of giant aerosol using E3SM”, virtual (poster).
- 2020 38th AAAR annual meeting, “Quantifying the effects of mixing state on aerosol optical properties”, virtual (oral)
- 2019 37th AAAR annual meeting, “Evaluating the Impacts of In-Cloud Chemistry on Resuspended Aerosol Particles after Cloud Evaporation using a Particle-Resolved Model”, Portland, OR (oral).
- 2018 10th International Aerosol Conference, “Sensitivity of Sulfate In-cloud Chemistry and CCN Activation to pH Variability and Mixing State Using a Particle Resolved Model”, St. Louis, MO (poster).
- 2015 7th International GEOS-Chem Meeting, “Summer particulate matter simulation in China with high-resolution nested GEOS-Chem model”, Boston, MA (poster).

Teaching experience

ATMS 305: Computing and data analysis, University of Illinois Urbana Champaign, Spring & Fall 2020

Selected awards

- 2019 37th AAAR Travel Grant
- 2012 Provincial second prize in Advanced Mathematics Competition
- 2012 University Second Prize Scholarship
- 2011 University First Prize Scholarship
- 2010 Provincial second prize in Mathematical Contest in Modeling

Service

Peer review: Science Advance, Geoscientific Model Development, Atmospheric Chemistry and Physics, JGR-Atmospheres, The Journal of Applied Meteorology and Climatology, Atmosphere

Conference convener: AGU23 A017 - Atmospheric Aerosol Processes and Impacts Across Scales: Insights into Properties, Multiphase Processes, Air Quality, Climate, and Health

K-12 outreach: 2014 Beijing Xiagezhuang elementary school