

Zongrun Li

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Education

Georgia Institute of Technology	Aug. 2019 – Dec. 2025
Major: Ph.D. in Environmental Engineering (Atmospheric and Fire Modeling)	GPA:4.0/4.0
Minor: Physics Informed Artificial Intelligence	GPA:4.0/4.0
Major: M.S. in Computational Science and Engineering	GPA:4.0/4.0
Major: M.S. in Environmental Engineering	GPA:4.0/4.0
Nankai University	Sep. 2015 – Jun. 2019
Major: B.S. in Environmental Science	GPA:86.1/100
Major: B.S. in Mathematics and Applied Mathematics	GPA:81.5/100

Working Experience

Research Scientist I, Mechanical Engineering Department, Colorado State University (PI: Dr. John Volckens)	Oct. 2025 - present
• Developed an AI-driven fire and smoke forecasting system by integrating numerical simulations with multi-satellite observations and ground-based measurements.	
Graduate Research Assistant (Advisors: Dr. Armistead G. Russell & Dr. M. Talat Odman)	Jan 2021- Oct. 2025
• Developed algorithms to couple a fire-behavior model (WRF-SFIRE) with a chemical transport model (CMAQ), enabling estimation of prescribed fire air quality impacts under different ignition patterns.	
• Estimated Southeastern U.S. prescribed fire emissions using remote sensing datasets and prescribed fire permits.	
• Quantitatively estimated biased wind simulation impacts on smoke concentration simulations in WRF-SFIRE.	
• Assessed air quality and health impacts tradeoffs between wildfires and prescribed fires, and provided suggestions for future prescribed burning regulations.	
• Implemented a user-friendly data fusion software that fuses observations with mainstream chemical transport models (CTMs) to reduce uncertainties in CTM and provide concentration fields for epidemiological studies.	
• Built a deep learning-driven prescribed fire forecast system using remote sensing datasets and weather forecasts.	
Consultant Internship (Ramboll)	Aug 2024 – Dec 2024
• Built Ensemble-GPT Portal, integrating multiple large language models to enable real-time analysis of 400+ NEPA and offshore renewable energy documents, replacing lengthy manual reviews for clients.	
• Developed the Annotation AI Assistant, leveraging large language models to automate analyses of annotations in client and team documents, streamlining reviews, and enhancing team efficiency.	
Consultant Internship (Ramboll)	Oct 2023 – Jan 2024
• Engineered a LLAMA-based chatbot designed for local deployment on personal computers, ensuring secure, confidential document reading and client query responses.	
• Developed Python scripts to process satellite leaf area index images, automating data correction and reducing manual effort from 1 week to 2 hours, enhancing accuracy for global environmental modeling.	
Research Assistant (US Forest Service Pacific Northwest Research Station)	Jul 2023- Sep 2023
• Developed <u>software</u> to generate the 3D fire emission NetCDF file for chemical transport modeling. The software can be integrated with the USFS (United States Forest Service) BlueSky framework for fire research.	
• Simulated a wildfire in Joint Base Lewis-McChord by applying WRF-SFIRE and HYSPLIT models.	

Skills

- **Programming:** Java, Python, JavaScript, HTML, CSS, C++, C, MATLAB
- **Numerical Modeling:** BlueSky Framework, CMAQ, WRF, WRF-SFIRE, WRF-Chem, HYSPLIT, ADMS, F0AM
- **Others:** Linux, Hadoop, d3.js, MapReduce, MPI, PyTorch, AWS, Docker, MySQL, SQLite, Engineer-in-Training

Awards

- AMS Travel Allowance Award from Fire Weather, Technology, and Risk Session (\$250).
- ORISE Research Fellowship, US Forest Service, 2023 (\$4000).
- Georgia Power Fellowship, 2024 (\$2000).

Publications

In Preparation

1. **Li, Z.**, Hu, Y., O'Neill, S., El Asmar, R., Huey, L. G., . . . Odman, M. T. Integrating Fire Behavior Models and Chemical Transport Models: A case study of Coupling WRF-SFIRE with CMAQ.
2. **Li, Z.**, Qian, Y., Hu, Y., Vasilakos, P., Odman, M. T., . . . Russell, A. G. Comparison of Chemical Transport Model and Observation Derived Ozone–NO_x–VOC Isopleths for the South Coast Air Basin of California.
3. Stowell, J. D., Maji, K. J., **Li, Z.**, Hu, Y., Milando, C., . . . Wellenius, G. A. Risk of emergency department visits associated with O₃ attributable to prescribed burning differs from total O₃ exposures in the Southeastern US.
4. Maji, K. J., **Li, Z.**, Hu, Y., Stowell, J. D., Vaidyanathan, A., . . . Odman, M. T. O₃ Increment from Prescribed Burns: Implications for Air Quality and Public Health in the Southeastern United States.

Under Review

1. Maji, K. J., Li, Z., Hu, Y., Stowell, J., Milando, C., Vaidyanathan, A., Wellenius, G., Kinney, P., Russell, A. G., & Odman, M. T. (2025). Impact of prescribed fire emissions on ambient PM_{2.5} and its components in the Southeastern US (submitted to ACS Environmental Au).
2. Zhou, Y., He, X., Skipper, T. N., **Li, Z.**, Gao, Z., Russell, A. G., & Kaiser, J. (2025). Can electric vehicles reduce air pollution inequalities in Metro Atlanta? A high-resolution analysis (submitted to GeoHealth).
3. **Li, Z.**, Lawal, A. S., Zhang, B., Hu, Y., Russell, A. G., & Odman, M. T. A Generalized User-Friendly Implementation for Fusing Observational Data and Chemical Transport Model (Gen-Friberg Version 1.0) (submitted to Environmental Modelling & Software; GitHub: <https://github.com/zli867/DataFusion>).

Published

1. **Li, Z.**, El Asmar, R., O'Neill, S., Hu, Y., Yu, H., Li, Y., Tanner, D. J., Huey, L. G., Weber, R. J., Russell, A. G., Odman, M. T., Comparisons of High Spatiotemporal Resolution Air Quality Modeling Frameworks for Prescribed Burning Simulations at a Military Base in the Southeastern United States. *Journal of Geophysical Research: Atmospheres* 2025, 130 (22), e2025JD044677.
2. **Li, Z.**, O'Neill, S. M., Asmar, R. E., Hu, Y., Kochanski, A. K., Farguell, A., Mandel, J., Tanner, D. J., Huey, L. G., Russell, A. G., Weber, R. J., and Odman, M. T.: An investigation of corrective approaches for uncertain winds and analysis of impacts on smoke model performance, *Agricultural and Forest Meteorology*, 376, 110885, <https://doi.org/10.1016/j.agrformet.2025.110885>, 2026.
3. **Li, Z.**, Vaidyanathan, A., Maji, K. J., Hu, Y., O'Neill, S. M., Russell, A. G., Odman, M. T., The Trade-offs between Wildfires and Prescribed Fires: A Case Study for 2016 Gatlinburg Wildfires. *ACS ES&T Air* 2025. DOI: 10.1021/acsestair.4c00233 (**Cover Publication**)
4. **Li, Z.**, Maji, K. J., Hu, Y., Vaidyanathan, A., O'Neill, S. M., Odman, M. T., & Russell, A. G. (2023). An Analysis of Prescribed Fire Activities and Emissions in the Southeastern United States from 2013 to 2020. *Remote Sensing*, 15(11), 2725. Retrieved from <https://www.mdpi.com/2072-4292/15/11/2725>
5. Stowell, J. D., Maji, K. J., **Li, Z.**, Hu, Y., Vaidyanathan, A., Milando, C., Russell, A. G., Kinney, P. L., Odman, M. T., and Wellenius, G. A.: Associations between PM2.5 from prescribed burning and emergency department visits in 11 Southeastern US states, *Environment International*, 203, 109770, <https://doi.org/10.1016/j.envint.2025.109770>, 2025.
6. El Asmar, R., **Li, Z.**, Yu, H., O'Neill, S., Tanner, D. J., Huey, L. G., . . . Weber, R. J. (2025). Formation of Ozone and PM2.5 in Smoke from Prescribed Burning in the Southeastern United States. *ACS ES&T Air*. doi:10.1021/acsestair.4c00231
7. Maji, K. J., **Li, Z.**, Vaidyanathan, A., Hu, Y., Stowell, J. D., Milando, C., . . . Odman, M. T. (2024). Estimated Impacts of Prescribed Fires on Air Quality and Premature Deaths in Georgia and Surrounding Areas in the US, 2015–2020. *Environmental science & technology*. doi:10.1021/acs.est.4c00890
8. El Asmar, R., **Li, Z.**, Tanner, D. J., Hu, Y., O'Neill, S., Huey, L. G., . . . Weber, R. J. (2024). A multi-site passive approach to studying the emissions and evolution of smoke from prescribed fires. *Atmos. Chem. Phys.*, 24(22), 12749-12773. doi:10.5194/acp-24-12749-2024
9. Maji, K. J., Ford, B., **Li, Z.**, Hu, Y., Hu, L., Langer, C. E., . . . Russell, A. G. (2024). Impact of the 2022 New Mexico, US wildfires on air quality and health. *Science of The Total Environment*, 174197. doi:<https://doi.org/10.1016/j.scitotenv.2024.174197>
10. Maji, K. J., **Li, Z.**, Hu, Y., Vaidyanathan, A., Stowell, J. D., Milando, C., . . . Talat Odman, M. (2024). Prescribed burn related increases of population exposure to PM2.5 and O₃ pollution in the southeastern US over 2013–2020. *Environment international*, 109101. doi:<https://doi.org/10.1016/j.envint.2024.109101>

11. Gao, Z., Do, K., **Li, Z.**, Jiang, X., Maji, K. J., Ivey, C. E., & Russell, A. G. (2024). Predicting PM2.5 levels and exceedance days using machine learning methods. *Atmospheric Environment*, 323, 120396. doi:<https://doi.org/10.1016/j.atmosenv.2024.120396>
12. Huang, R., **Li, Z.**, Ivey, C. E., Zhai, X., Shi, G., Mulholland, J. A., . . . Russell, A. G. (2022). Application of an improved gas-constrained source apportionment method using data fused fields: A case study in North Carolina, USA. *Atmospheric Environment*, 276, 119031. doi:<https://doi.org/10.1016/j.atmosenv.2022.119031>

Conference Presentations

1. **Li, Z.**; Hu, Y.; Russell, A.G; Odman, M.T. The Integrating Fire Behavior Models and Chemical Transport Models: A Case Study of Coupling WRF-SFIRE with CMAQ. American Geophysical Union 2023 Annual Meeting, 2024.
2. Odman, M.T.; **Li, Z.**; Maji, K.J.; Hu, Y.; Vaidyanathan, A.; Russell, A.G. The Tradeoffs Between Wildfires and Prescribed Fires: A Case Study of 2016 Gatlinburg Fires. Community Modeling and Analysis System Conference, Chapel Hill, NC, 2024.
3. **Li, Z.**; Odman, M.T.; Hu, Y.; Russell, A.G. An Analysis of Uncertain Wind Impacts in Coupled Fire-Atmosphere Model WRF-SFIRE. Community Modeling and Analysis System Conference, Chapel Hill, NC, 2024.
4. **Li, Z.**; Odman, M.T.; Hu, Y.; O'Neill, S.; El Asmar, R.; Huey, L.G.; Tanner, D.; Weber, R.J.; Russell, A.G. Comparisons of High-Spatiotemporal Resolution Air Quality Modeling Systems for Simulating Prescribed Burning at Military Bases in the Southeastern United States. American Meteorological Society 104th Annual Meeting, Baltimore, MD, 2024.
5. Odman, M.T.; Maji, K.J.; **Li, Z.**; Hu, Y.; Russell, A.G.; Vaidyanathan, A. Impact of Prescribed Fire on Particulate Matter Levels in the Southeastern US from 2015 to 2020. American Geophysical Union 2023 Annual Meeting, 2023.
6. Odman, M.T.; Maji, K.J.; **Li, Z.**; Hu, Y.; Russell, A.G.; Stowell, J.; Milano, C.; Kinney, P.L.; Wellenius, G.; Vaidyanathan, A. Impact of Prescribed Fire on Air Quality in Southeastern US during 2015–2020. Health Effects Institute Annual Conference 2023, 2023.
7. **Li, Z.**; Odman, M.T.; Hu, Y.; Russell, A.G. Integrating Fire Behavior Models and Chemical Transport Models: A case study of Coupling WRF-SFIRE with CMAQ. Community Modeling and Analysis System Conference, Chapel Hill, NC, 2023.
8. **Li, Z.**; Hu, Y.; Odman, M.T.; Russell, A.G. Modeling the Regional Air Quality Impacts of Prescribed Burning at a Military Base in Southeastern United States. American Meteorological Society 103rd Annual Meeting, Denver, CO, 2023.
9. El Asmar, R.; **Li, Z.**; Tanner, D.J.; Hu, Y.; O'Neill, S.; Huey, L.G.; Odman, M.T.; Weber, R.J. Studying the Emissions and Evolution of Smoke from Prescribed Fires Using Multiple Fixed Sites. American Geophysical Union 2023 Annual Meeting, 2023.
10. Odman, M.T.; Maji, K.J.; **Li, Z.**; Hu, Y.; Russell, A.G.; Stowell, J.; Milano, C.; Kinney, P.L.; Wellenius, G.; Vaidyanathan, A. Uncertainties in Prescribed Fire Emissions and Related PM 2.5 Estimates in Southeastern United States. American Geophysical Union 2022 Annual Meeting, 2022.
11. Maji, K.J.; **Li, Z.**; Vaidyanathan, A.; Hu, Y.; Stowell, J.D.; Milano, C.; Wellenius, G.; Kinney, P.L.; Russell, A.G.; Odman, M.T. Prescribed Fire Emissions and their Impacts on PM2.5 in Southeastern United States. Community Modeling and Analysis System Conference, Chapel Hill, NC, 2022.
12. **Li, Z.**; Odman, M.T.; Hu, Y.; Russell, A.G. Comparisons of Air Quality Models for Prescribed Burning Simulations at a Military Base in Southeastern United States. Community Modeling and Analysis System Conference, Chapel Hill, NC, 2022.
13. Qian, Y.; Hu, Y.; Vasilakos, P.; **Li, Z.**; Russell, A.G. Development of Ozone-NOx-VOC Emissions Isopleth using CMAQ-HDDM and Inverse Distance Weighted Method for Southern California and the Comparison with Empirically-based Method. Community Modeling and Analysis System Conference, Chapel Hill, NC, 2021.

Professional Service

- Reviewer of International Journal of Wildland Fire (2024), ACS ES&T Air (2024, 2025), Journal of Environmental Management (2024, 2025), AGU Advances (2025), Journal of the Air & Waste Management Association (2025), Scientific Reports (2025).
- Member of American Meteorological Society (2022–present), American Geophysical Union (2024–present).