Zongrun Li

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# Education

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| **Georgia Institute of Technology** | | **Aug. 2019 – present** |
|  | **Major:** Ph.D. in Environmental Engineering (Atmospheric and Fire Modeling) | 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

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| Consultant Internship (Ramboll) | **Oct 2023- Jan 2024** |

* Ramboll-GPT: engineered a user-friendly and computationally efficient LLAMA-based chatbot tailored for document reading and interactive client query responses. Utilized Docker and quantization for the LLAMA model, significantly reducing memory, computational resource demands, and the complexity of deploying in different environments.
* LAI satellite-image processing: implemented Python scripts to batch process the satellite Leaf Area Index (LAI) images. Implemented and employed spatial-temporal interpolation techniques to replace questionable pixels, ensuring data accuracy. The processed satellite images were used to update a Global dataset for modeling usage.

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| ORISE Research Fellowship (USFS) | **Jul 2023- Sep 2023** |

* Developed a [software](https://github.com/zli867/BlueSkyCMAQEmission/tree/main) 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 utility.
* Simulated the JBLM wildfire by applying WRF-SFIRE and HYSPLIT models.

# Research Experience and Projects

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| [Assessing the Sensitivity of Numerical Models Using Deep Learning Techniques](https://github.com/zli867/CMAQ_Deep_Learning/blob/main/Project/CS_7643_Final_Report.pdf) | **2022** |

* Developed and trained a deep learning model based on PyTorch utilizing WRF meteorological data, SMOKE emission data, and CMAQ pollutant concentration data.
* Used auto-grad techniques in PyTorch to evaluate the impacts of emissions and meteorological conditions on pollutant concentration in California.

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| [Integrating Chemical Transport Model and Observational Data](https://github.com/zli867/DataFusion) | **2021** |

* Simulated temporal and spatial patterns of main pollutants using the CMAQ model with satellite-derived fire emission product.
* Designed and implemented a data fusion algorithm that combines the CMAQ model and sparse observational data. The data is delivered to CDC and HEI for epidemiological studies.

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| [Improving Non-negative Least Square Algorithm in Chemical Mass Balance (CMB) Model](https://github.com/zli867/CSE6643/blob/master/Numerical_Report.pdf) | **2020** |

* Used MATLAB to implement several least square algorithms such as Householder, Givens, Gram-Schmidt, etc. Combined least square algorithms with a non-negative least square algorithm to develop different non-negative least square algorithms.
* Built a simple CMB model based on different non-negative least square algorithms to analyze sources’ contributions of PM2.5.
* Compared the efficiency and accuracy of the new algorithm using PM2.5 data in North Carolina.

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| [Analyzing and Visualizing PM2.5 Source Contributions in North Carolina](https://zli867.github.io/figure/figures.html) | **2020** |

* Used the CMB model, which is written in MATLAB, to analyze the contributions of different sources to PM2.5 in North Carolina during 2002-2010.
* Built an interactive website based on HTML, CSS, and JavaScript. Visualized spatial and temporal variation for different PM2.5 sources by d3.js. Users can see figures and data by selecting different years and/or PM2.5 sources.

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| [Visualizing Restaurants and Providing Fairer Ratings in Atlanta](https://github.com/zli867/ATLRestaurantsRecommendation) | **2020** |

* Collected customers’ and restaurants’ information using a web crawler and Yelp API. Cleaned and sorted data to desired structures using Python.
* Used Random Forest to detect fake reviews based on customers’ information and the number of reviews in a designated time period. Evaluated the importance of different attributes for restaurants using the linear regression algorithm. Implemented PN-Poly algorithm to divide restaurants based on neighborhoods.
* Visualized restaurants in Atlanta using JavaScript, d3.js, and Google Map API and built an interactive website. The website can provide customers with fairer ratings and neighborhood-based choices.

# Skills

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

# Publications

# 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

# 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

# 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

# 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

# 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 for Studying the Emissions and Evolution of Smoke from Prescribed Fires. EGUsphere, 2024, 1-40. doi:10.5194/egusphere-2024-1485

# 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

# Conference Proceedings

1. Li, Z., Odman, M. T., Hu, Y., O’Neill, S., El Asmar, R., Huey, L. G., . . . Russell, A. G. (2024). *Comparisons of High-Spatiotemporal Resolution Air Quality Modeling Systems for Simulating Prescribed Burning at Military Bases in the Southeastern United States.* Paper presented at the American Meteorological Society 104th Annual Meeting, Baltimore, MD.

# El Asmar, R., Weber, R. J., Huey, L. G., Odman, T., Tanner, D., & Li, Z. (2023). Studying the Emissions and Evolution of Smoke from Prescribed Fires Using Multiple Fixed Sites. AGU23.

# Li, Z., Hu, Y., Odman, M. T., & Russell, A. G. (2023). Modeling the Regional Air Quality Impacts of Prescribed Burning at a Military Base in Southeastern United States. Paper presented at the American Meteorological Society 103rd Annual Meeting, Denver, CO.

# Odman, M. T., Maji, K. J., Li, Z., Hu, Y., Russell, A. G., & Vaidyanathan, A. (2023). Impact of Prescribed Fire on Particulate Matter Levels in the Southeastern US from 2015 to 2020. AGU23.

# Li, Z., Odman, M. T., Hu, Y., & Russell, A. G. (2022). Comparisons of Air Quality Models for Prescribed Burning Simulations at a Military Base in Southeastern United States. Paper presented at the Community Modeling and Analysis System Conference, Chapel Hill, NC.

# Maji, K. J., Li, Z., Hu, Y., Russell, A. G., Stowell, J., Milando, C., . . . Odman, M. T. (2022). Prescribed Fire Emissions and their Impacts on PM2.5 in Southeastern United States. Paper presented at the Community Modeling and Analysis System Conference, Chapel Hill, NC.

# Odman, M. T., Maji, K. J., Li, Z., Hu, Y., Russell, A. G., Stowell, J., . . . Vaidyanathan, A. (2022). Uncertainties in Prescribed Fire Emissions and Related PM 2.5 Estimates in Southeastern United States. Paper presented at the Fall Meeting 2022.

# Qian, Y., Hu, Y., Vasilakos, P., Li, Z., & Russell, A. G. (2021). 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. Paper presented at the Community Modeling and Analysis System Conference, Chapel Hill, NC.