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EDUCATION

2026 *(expected)* — **Doctor of Philosophy in Environmental Engineering** — Berkeley, CA
University of California, Berkeley
Advisor: Dr. Joshua Apte
Dissertation Committee: Drs. Joshua Apte, Robert Harley, Cesunica Ivey, Rachel Morello-Frosch

2018 — **Master of Engineering in Civil and Environmental Engineering** — Cambridge, MA
Massachusetts Institute of Technology
Thesis: The Phase Separation Inlet for Droplets, Ice Residuals, and Interstitial Aerosols
Advisor: Dr. Daniel J. Cziczo

2017 — **Bachelor of Science in Earth, Atmospheric, and Planetary Sciences** — Cambridge, MA
Massachusetts Institute of Technology
Thesis: Characterization of a 3D Printed Pumped Counterflow Virtual Impactor and an Aerodynamic Lens Concentrator
Minor: Atmospheric Chemistry
Concentration: Music and Theater Arts

PUBLICATIONS AND PATENTS

Peer-Reviewed

In press — **Koolik, L. H.**, Bullard, R. D., Min, E., Morello-Frosch, R., Salgado, M., Patterson, R., Wedekind, N., Marshall, J. D., and Apte, J. S.: Eliminating Air Pollution Disparities Requires More than Emission Reduction. *Proc. Natl. Acad. Sci*., in press. Future DOI: 10.1073/pnas.2505888122. Preprint: https://doi.org/10.26434/chemrxiv-2025-793ps-v2.

In press — Marshall, J. D., **Koolik, L. H.**, Ünal, A., Morello-Frosch, R., and Apte, J. S.: Advancing Methods and Models that Promote Equity in Air Quality, *Annu. Rev. Publ. Health*, in press.

2024 — **Koolik, L. H.**, Alvarado, Á., Budahn, A., Plummer, L., Marshall, J. D., and Apte, J. S.: $PM_{2.5}$ Exposure Disparities Persist Despite Strict Vehicle Emissions Controls in California, *Sci. Adv.*, **10**, eadn8544, 2024. Available at: https://doi.org/10.1126/sciadv.adn8544.
Press Coverage: [1], [2], [3], [4], [5]

2022 — **Koolik, L.**, Roesch, M., Dameto de Espana, C., Rapp, C. N., Franco Deloya, L. J., Shen, C., Hallar, A. G., McCubbin, I. B., and Cziczo, D. J.: A Phase Separation Inlet for Droplets, Ice Residuals, and Interstitial Aerosol Particles, *Atmos. Meas. Tech.*, **15**, 3213–3222, 2022. Available at: https://doi.org/10.5194/amt-15-3213-2022.

Undergoing Peer Review

In review — **Koolik, L. H.**, Speizer, S., Rong, C., Chambliss, S., Marshall, J. D., Morello-Frosch, R., Tessum, C., and Apte, J. S.: Methodological Design Choices Can Affect Air Pollution Exposure Disparity Estimates: A Case Study on California's Agricultural Sector. Responding to minor revisions at *Env. Sci. Technol.* Available at: https://doi.org/10.26434/chemrxiv-2025-jcdnz-v2.

In review Bekbulat, B., Sharma, S., Apte, J. S., Bullard, R. D., **Koolik, L. H.**, Min, E., Morello-Frosch, R., Pastor, M., Patterson, R., Robinson, A. L., Salgado, M., Unal, A., Wedekind, N., Marshall, J. D.: $PM_{2.5}$ Air Pollution Inequities in the U.S. by Sector and State: Past Trajectories and Future Directions. Submitted for review.

Working Papers

In prep. **Koolik, L. H.** & Manchanda, C. (co-first), Ünal, A., Fung, I., Marshall, J. D., Morello-Frosch, R., Turner, A. J., Harley, R. A., and Apte, J. S.: Modeling Optimal Pathways to a Triple Win in Air Quality, Climate, and Equity. *Working paper.* Available at: https://doi.org/10.26434/chemrxiv-2025-c6sn4.

Patents

2025 Apte, J. S., Harley, R. A., Manchanda, C., **Koolik, L. H.**, and Marshall, J. D.: *Systems, Methods, and Program Products for Reducing Air Pollution for One or More Pollutants in a Locality.* U.S. Provisional Patent Application No. 63/877—812, filed September 8, 2025.

AWARDS AND FELLOWSHIPS

2025
- Philomathia Graduate Student Fellowship in the Environmental Sciences (link)
- Joan Daisey Air Quality Research Award
- Lau Graduate Fellowship in Climate Equity
- Selected for NextProf Nexus 2025

2024
- American Geophysical Union Outstanding Student Presentation Award (link)

2023
- Hearts to Humanity Eternal (H2H8) Graduate Research Fellowship (link)
- Health Effects Institute Jane Warren Award (link)

2021
- University of California, Berkeley Chancellor's Fellowship for Graduate Study

2019
- Ramboll Extraordinary Individual Contribution to the Business Unit Award

2016
- MIT Department of Earth, Atmospheric, and Planetary Science Achievement Award

PROFESSIONAL HISTORY

2021-26 **Graduate Student Researcher**, University of California, Berkeley — Berkeley, CA
- Development of open-source modeling tools for estimating air pollution exposure, health outcomes, and disparities arising from California's climate mitigation policies (Advisor: Prof. Joshua Apte).
- Evaluation of air quality and emissions trends in California's overburdened communities during the first phase of the Community Air Protection Program (Advisor: Prof. Rachel Morello-Frosch).

2018-21 **Air Quality Consultant & Senior Air Quality Consultant**, Ramboll — San Francisco, CA
Area of expertise: emissions inventory development and health risk analysis.

2015-18 **Undergraduate & Graduate Research Fellow**, MIT — Cambridge, MA
Design and validation of lower-cost sampling instruments for investigating the physical and chemical properties of mixed-phase cloud nucleating particles (Advisor: Prof. Daniel Cziczo).

2014 **Undergraduate Research Fellow**, MIT Cambridge, MA
Simulation of the health co-benefits arising from greenhouse gas mitigation policies (Advisor: Prof. Noelle Selin).

MENTORSHIP AND ADVISING

Graduate Student Research Collaboration

- Simone Speizer (2024–present): "Methodological Design Choices Can Affect Air Pollution Exposure Disparity Estimates: A Case Study on California's Agricultural Sector." ***Manuscript revised and resubmitted***.

- Cassidy Barrientos (2024–present): "Historical Trends in Exposure Equity Associated with California's Cap and Trade Program." ***Manuscript in preparation***.

- Lucas Rojas Mendoza (2023–present): "Analyzing Sources and Scales of Air Pollution Disparities in the US and California: Examining Urban-Rural Emission Interactions in disadvantaged communities." Poster presented at the American Geophysical Union Fall Meeting 2023, San Francisco, CA. December 11-15, 2023. ***Manuscript in preparation***.

Undergraduate Student Research Mentorship

- Meghana Raj (2024–present): "Comparing Methodologies for Air Pollution Health Impact Assessments in Open-Source Modeling for Equity in California." Direct contributions to the modeling pipeline currently in use by California state agencies.

- Benjamin Salop (2024–2025): "Future-Proofing Open-Source, Accessible Air Pollution Modeling Pipelines for Increased Usability." Direct contributions to the modeling pipeline currently in use by California state agencies.

- Amy Yao (2024): "Developing Automated Techniques for Processing Complex Population Data." Direct contributions to the modeling pipeline currently in use by California state agencies.

- Clara Rong (2023–2024): "Decomposing California's Agricultural Sector for Insights Towards Equitable Air Quality." Poster presented at the American Geophysical Union Fall Meeting 2023, San Francisco, CA. December 11–15, 2023. ***Manuscript revised and resubmitted***.

- Thomas Le (2022–2023): "Increasing Accessibility for Modeling Point Source Emissions." Emissions processing pipeline developed is currently in use by state agencies.

Other Mentorship

- MIT Terrascope Alumni Mentor (2022–present): provide technical support for undergraduate program that challenges freshmen to develop socio-politically informed engineering solutions to global environmental problems.

- Berkeley Graduate Women in Engineering & Society of Women Engineering Mentor (2022–present): provide research and career advice to undergraduate women and non-binary engineers.

Advisory Roles

- UCLA Environmental Science Senior Practicum (2024 & 2025): provide introductory training resources and ongoing support for air pollution modeling efforts by undergraduate student research teams advised by Prof. Pablo Saide.

- Community Health and Environmental Impacts Section of the California Office of Environmental Health Hazard Assessment (2022–present): provide ongoing technical support and code development for open-access model developed.

INVITED PRESENTATIONS

2024
- Featured presenter and panelist at American Geophysical Union GeoHealth Outstanding Student Presentation Award-Winning Research: Exploring Equity and Emission Impacts in GeoHealth. Virtual. July 19, 2024.
- "For Exposure to $PM_{2.5}$ from California's On-Road Mobile Sources, Relative Disparities by Race-Ethnicity Remain Even After Decades of Emissions Controls." Oral presentation at the 2024 Joint American Geophysical Union/American Meteorological Society Showcase. Virtual. April 3, 2024.

2023
- EJ-AIR Workshop: Using Air Pollution Data and Models for Environmental Justice, Berkeley, CA. December 7–9, 2023.
- "Racial-Ethnic Disparities in Exposure to $PM_{2.5}$ from California's On-Road Mobile Sources Remain After Decades of Emissions Controls." Featured talk in the Jane Warren Award Plenary at the Health Effects Institute Annual Conference, Boston, MA. April 28–May 3, 2023.
- PAVITRA Project Launch and Capacity Building Workshop, Bengaluru, India. March 2–6, 2023.

CONFERENCE PRESENTATIONS

2025
- "Inverting Environmental Policy: A Bayesian Framework for Achieving Triple Wins in Air Quality, Climate, and Equity." Poster presentation at the Health Effects Institute Annual Conference, Austin, TX. May 4–6, 2025.

2024
- "A Conceptual Framework Towards Equity-Oriented Decision-Making in Air Pollution." Poster presentation at American Geophysical Union Fall Meeting, Washington D.C. December 9–13, 2024.
- "For Exposure to $PM_{2.5}$ from California's On-Road Mobile Sources, Relative Disparities by Race-Ethnicity Remain Even After Decades of Emissions Controls." Oral presentation at International Society for Environmental Epidemiology Annual Conference, Santiago, Chile. August 25–28, 2024.
- "A Conceptual Framework Towards Equity-Oriented Decision-Making in Air Pollution." Poster presentation at Health Effects Institute Annual Conference, Philadelphia, PA. April 28–30, 2024.

2023
- "For Exposure to $PM_{2.5}$ from California's On-Road Mobile Sources, Relative Disparities by Race-Ethnicity Remain Even After Decades of Emissions Controls." Oral presentation at American Geophysical Union Fall Meeting, San Francisco, CA. December 11–15, 2024. ***Winner of the 2023 Outstanding Student Presentation Award*** *(link)***.**
- "Racial-Ethnic Disparities in Exposure to $PM_{2.5}$ from California's On-Road Mobile Sources Remain After Decades of Emissions Controls." Poster presentation at the Health Effects Institute Annual Conference, Boston, MA. April 28–May 3, 2023. ***Winner of the 2023 Jane Warren Award*** *(link)***.**

TEACHING EXPERIENCE

2025
- Discipline Cluster Leader for UC Berkeley Fall Teaching Conference for First-Time Student Instructors.

2022
- Graduate Student Instructor for Berkeley School of Public Health graduate-level course on Exposure Assessments and Controls (PBHLTH 270A).

2017, 2018
- Teaching Assistant for MIT's Discover Earth, Atmospheric, and Planetary Sciences Extreme Weather freshman program.

2015
- 7th grade Chemistry Instructor for MIT's Office of Engineering Outreach Program's middle school STEM program.
- Volunteer and guest teacher as part of MIT and Teach for America's Four Weeks for America teaching program.

2014
- Undergraduate Teaching Fellow for the Solving Complex Problems course through MIT's "Mission 2018" cohort of the Terrascope program.

SERVICE AND OUTREACH

Academic and Professional Service

- American Geophysical Union GeoHealth Early Career Committee.
- Early career convener for session on "Innovative Models and Tools to Precisely Quantify and Identify Solutions for Air Pollution Exposure Inequality" at the American Geophysical Union Fall 2024 meeting.
- Peer review for *Environmental Science & Technology* and *GeoHealth.*
- 2023 Environmental Engineering Seminar Organization Committee.

Community Service and Outreach

- Lead coordinator for a series of air filtration workshops for La Clinica de la Raza, Community Resources for Science, and Stockton Unified School District (2023–present).
- Panelist for the NSF-funded CARE panel to share my career pathway to underrepresented students in the Chicago area (April 7, 2022).

Open-Source Software and Resource Development

- **E**stimating **C**oncentrations and **H**ealth **O**utcomes: **A**utomated **I**SRM **R**esource (ECHO-AIR): Lead engineer of a fully open-source model designed to increase accessibility in high-resolution air pollution modeling.
  See more at: https://echo-air-model.github.io/
- Collection of research graphics and slide templates available on my personal website: https://lkoolik.github.io/