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Libby H. Koolik

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EDUCATION

08/2021-05/2026 *(expected)* **Doctor of Philosophy in Environmental Engineering** Berkeley, CA
University of California, Berkeley
- GPA: 4.0/4.0
- Advisor: Dr. Joshua Apte
- Dissertation Committee: Drs. Joshua Apte, Robert Harley, Cesunica Ivey, Rachel Morello-Frosch

02/2018 **Master of Engineering in Civil and Environmental Engineering** Cambridge, MA
Massachusetts Institute of Technology
- GPA: 5.0/5.0
- Thesis: The phase separation inlet for droplets, ice residuals, and interstitial aerosols
- Advisor: Dr. Daniel J. Cziczo

02/2017 **Bachelor of Science in Earth, Atmospheric, and Planetary Sciences** Cambridge, MA
Massachusetts Institute of Technology
- Overall GPA: 4.7/5.0
- Minor: Atmospheric Chemistry
- Concentration: Music and Theater Arts
- Thesis: Characterization of a 3D printed pumped counterflow virtual impactor and an aerodynamic lens concentrator

PUBLICATIONS

In review **Koolik, L. H.**, Bullard, Robert D., Min, E., Morello-Frosch, R., Salgado, M., Patterson, R., Wedekind, N., Marshall, J. D., and Apte, J. S.: Eliminating systemic disparities in air pollution exposure requires more than emission reduction, *submitted for review*.

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, https://doi.org/10.1126/sciadv.adn8544, 2024.

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, https://doi.org/10.5194/amt-15-3213-2022, 2022.

AWARDS AND FELLOWSHIPS

2025 • Joan Daisey Air Quality Research Award
• Lau Graduate Fellowship in Climate Equity
2024 • American Geophysical Union Outstanding Student Presentation Award
2023 • Hearts to Humanity Eternal (H2H8) Graduate Research Fellowship
• Health Effects Institute Jane Warren Award
2021 • University of California, Berkeley Chancellor Fellowship
2019 • Ramboll Extraordinary Individual Contribution to the Business Unit Award
2016 • MIT Department of Earth, Atmospheric, and Planetary Science Achievement Award

MENTORSHIP AND ADVISING

Graduate Student Research Mentorship

- Simone Speizer (12/2024-present): "Strengths and Limitations of Population-Average Metrics for Air Pollution Exposure Disparity: A Case Study of California's Agricultural Sector." Work currently in preparation for submission to a peer-reviewed journal.
- Cassidy Barrientos (12/2024-present): "Historical Trends in Exposure Equity Associated with California's Cap and Trade Program." Work currently in progress.
- Lucas Rojas Mendoza (08/2023-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. Work currently in preparation for submission to a peer-reviewed journal.

Undergraduate Research Mentorship

- Meghana Raj (12/2024-present): "Comparing Methodologies for Air Pollution Health Impact Assessments in Open-Source Modeling for Equity in California."
- Benjamin Salop (12/2024-present): "Future-Proofing Open-Source, Accessible Air Pollution Modeling Pipelines for Increased Usability."
- Amy Yao (04/2024-09/2024): "Developing Automated Techniques for Processing Complex Population Data."
- Clara Rong (01/2023-06/2024): "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. Work currently in preparation for submission to a peer-reviewed journal.
- Thomas Le (09/2022-05/2023): "Increasing Accessibility for Modeling Point Source Emissions." Emissions processing pipeline developed is currently in use by state agencies.

Other Mentorship

- MIT Terrascope Alumni Mentor (09/2022-present): provide support and guidance for undergraduate program that challenges freshmen to develop engineering solutions to global environmental problems.
- Berkeley Graduate Women in Engineering x Society of Women Engineering Mentor (09/2022-present): provide research and career advice to undergraduate women and non-binary engineers.

Advisory Roles

- UCLA Environmental Science Senior Practicum (Spring 2024 and Spring 2025): provide introductory training resources and ongoing support for air pollution modeling efforts by undergraduate student research teams advised by Professor Pablo Saide.
- Community Health and Environmental Impacts Section of the California Office of Environmental Health Hazard Assessment (02/2022-present): provide ongoing technical support and code development for open-access model developed.

INVITED PRESENTATIONS

2024 **Koolik, L.**, Alvarado, Á., Budahn, A., Plummer, L., Marshall, J., and Apte, J. S.: "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." Featured presenter and panelist at American Geophysical Union GeoHealth Oustanding Student Presentation Award-Winning Research: Exploring Equity and Emission Impacts in GeoHealth. Virtual. July 19, 2024.

Koolik, L., Alvarado, Á., Budahn, A., Plummer, L., Marshall, J., and Apte, J. S.: "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 **Koolik, L.**: "Introduction to InMAP and Reduced Complexity Modeling Tools." EJ-AIR Workshop: Using Air Pollution Data and Models for Environmental Justice, Berkeley, CA. December 7-9, 2023.

Koolik, L., Alvarado, Á., Budahn, A., Plummer, L., Marshall, J. D., and Apte, J. S.: "Racial-Ethnic Disparities in Exposure to $PM_{2.5}$ from California's On-Road Mobile Sources Remain After Decades of Emissions Controls." Featured lightning talk in the Jane Warren Award Plenary at the Health Effects Institute Annual Conference, Boston, MA. April 28 - May 3, 2023.

Koolik, L.: "Introducing InMAP and Reduced Complexity Modeling Tools." PAVITRA Project Launch and Capacity Building Workshop, Bengaluru, India. March 2-6, 2023.

CONFERENCE PRESENTATIONS

2025 **Koolik, L.,** Manchanda, C., Unal, A., Turner, A., Marshall, J. D., Harley, R., and Apte, J. S.: "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 **Koolik, L.,** Bullard, R. D., Min, E., Morello-Frosch, R., Patterson, R., Salgado, M., Wedekind, N., Marshall, J. D., and Apte, J. S.: "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.

Koolik, L., Alvarado, Á., Budahn, A., Plummer, L., Marshall, J., and Apte, J. S.: "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.

Koolik, L., Marshall, J. D., and Apte, J. S.: "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 **Koolik, L.,** Alvarado, Á., Budahn, A., Plummer, L., Marshall, J., and Apte, J. S.: "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.***

Koolik, L., Alvarado, Á., Budahn, A., Plummer, L., Marshall, J. D., and Apte, J. S.: "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.***

RESEARCH EXPERIENCE

08/2021 - present **Apte Group Laboratory** Berkeley, CA

Graduate Research Assistant

- Developing and maintaining an open-source modeling tool to streamline exposure equity analyses in coordination with the California Office of Environmental Health Hazard Assessments.
- Coordinating training opportunities and workshops to increase user base for modeling tool.
- Investigating air pollution exposure equity impacts of climate mitigation policies.
- Building new open-access tools to reduce barriers of entry in air pollution modeling.

09/2015 – 01/2018 **Cziczo Group Laboratory** Cambridge, MA

Undergraduate Researcher and Graduate Research Fellow

- Developed and tested the first low-cost, 3D printed prototypes of an aerosol size-selecting device and a particle concentrator to enable more thorough investigation of cloud nucleating particle properties.
- Designed and constructed a first-of-its-kind comprehensive phase-separation inlet system for studying the aerosols that activate water droplet and ice crystal nucleation in mixed-phase clouds.
- Led a field campaign at the summit of Mt. Washington by measuring mixed-phase clouds using the inlet.

08/2014 – 12/2014 **Selin Group Laboratory** Cambridge, MA

Undergraduate Researcher

- Compared concentrations of ozone and particulate matter resulting from different climate mitigation policy scenarios with overall costs of implementation.
- Performed BenMAP simulations, contributing to results published in a paper entitled "U.S. Air Quality and Health Benefits from Avoided Climate Change under Greenhouse Gas Mitigation" (Garcia-Menendez 2015).

TEACHING EXPERIENCE

09/2022-12/2022
- Graduate Student Instructor for Berkeley School of Public Health graduate-level course on Exposure Assessments and Controls.

09/2017, 09/2018
- Teaching Assistant for MIT's Discover Earth, Atmospheric, and Planetary Sciences Extreme Weather Freshman Program.

06/2015-08/2015
- 7th grade chemistry instructor for MIT's Office of Engineering Outreach Program's middle school STEM program.

01/2015
- Volunteer and guest teacher as part of MIT and Teach for America's Four Weeks for America teaching program.

09/2014-12/2014
- Undergraduate Teaching Fellow for the Solving Complex Problems course through MIT's "Mission 2018" cohort of the Terrascope program.

PROFESSIONAL HISTORY

03/2018 – 06/2021 **Ramboll** San Francisco, CA

Senior Air Quality Consultant

- Conceived of and built a novel Python-based computational pipeline for automating complex air toxic health risk assessments, streamlining a previously time-inefficient processes.
- Estimated criteria air pollutant, greenhouse gas, and toxic air contaminant emission inventories and associated health risk impacts for large development projects in California.

06/2016 – 08/2016 **Ramboll** San Francisco, CA

Air Quality Intern

- Provided litigation support for a class action lawsuit over particulate pollution from a power plant.
- Performed an Air Resource Board Greenhouse Gas verification for a large company with four plants.
- Projected air quality-related health risks on residents near a prospective construction site by modeling emissions and exposure.

SERVICE AND OUTREACH

- **Academic Service:**
  - American Geophysical Union GeoHealth Early Career Committee
  - Peer Review for *Environmental Science & Technology* and *GeoHealth*
  - Spring 2023 Environmental Engineering Seminar Committee

- **Relevant Volunteering**:
  - Lead coordinator for series of wildfire smoke air filtration workshops for La Clinica de la Raza, Community Resources for Science, and Stockton Unified School District (09/2023-present).

- **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/