

Laura Marie Dahler Heinlein

OBJECTIVE

Atmospheric chemist specializing in brown carbon photochemistry, secondary organic aerosol formation, and multiphase kinetics. I integrate laboratory photochemistry, kinetic modeling, and field observations to uncover previously unrecognized photooxidant-driven reaction pathways in atmospheric particles. My research connects fundamental physical chemistry to air quality and climate-relevant processes.

EDUCATION

Ph.D. in Atmospheric Chemistry, Anastasio Group (GPA 3.922)

Lawrence Berkeley National Laboratory, Berkeley, CA

06/2026 – Present

University of California, Davis, CA

09/2021 – Present

B.A. in Chemistry, *magna cum laude* (GPA 3.788)

Skidmore College, Saratoga Springs, NY

09/2015 – 05/2019

HONORS, FELLOWSHIPS, & FUNDING

Department of Energy Science Graduate Research Program

06/2026 – Present

International Global Atmospheric Chemistry (IGAC) Early Career Travel Grant

09/2026

Certificate of Merit for Oral Presentation at the ACS Spring Conference

03/2026

Best Poster Award, Agricultural & Environmental Chemistry Graduate Group Colloquium

02/2026

Graduate Student Award in Environmental Chemistry from the American Chemical Society

02/2025

Best Student Presentation Award, American Association for Aerosol Research Conference

10/2024

Achievement Reward for College Scientists Foundation Award

2024-25

Donald G. Crosby Memorial Fellowship

2023-24, 2024-25

Jastro & Shields Research Award

2022-23, 2023-24, 2024-25

James & Rita Seiber International Graduate Student Support Award

Fall 2024

Honorable Mention, NSF Graduate Research Fellowship Program

Spring 2023

Agricultural & Environmental Chemistry Graduate Group: First-Year Fellowship

09/2021 – 03/2022

Skidmore College Student Opportunity Fund Grant

09/2018 – 05/2019

RESEARCH EXPERIENCE

Graduate Student Researcher

06/2026 – Present

Wilson Group, Lawrence Berkeley National Laboratory

- Investigated the kinetic drivers of accelerated reactions of photooxidants at the air-water interface using a quadrupole electrodynamic trap and open port sampling interface mass spectrometry to perform experiments on single ~10 μm droplets.

Graduate Student Researcher

09/2021 – Present

Anastasio Group, University of California, Davis, CA

- Quantified the role of brown carbon-mediated photochemistry in the production of secondary PM during severe winter pollution events in Fairbanks, Alaska as part of [ALPACA](#).
- Incorporated 564 additional kinetic processes to the Platform for Atmospheric Chemistry and Transport in One Dimension (PACT-1D) model to simulate photosensitized phenolic secondary organic aerosol formation during severe winter pollution events in Fairbanks, Alaska.
- Developed state-of-the-art kinetic models to predict photooxidant generation in wildfire smoke particles in the atmosphere, incorporating previously neglected water-insoluble brown carbon as a source of photooxidants.
- Coordinated laboratory safety compliance and inspections, maintained safety documentation, and served as a liaison between research group members and departmental ES&H personnel.

Academic Research Student

01/2018 – 05/2019

Biogeochemical Oceanography Laboratory, Skidmore College, NY

- Received the Student Opportunity Fund Grant to pursue a research project investigating the photodegradation of 2,4-Dichlorophenoxyacetic Acid (2,4-D), the toxic ingredient in Navigate™, an herbicide applied to treat the invasive species Curly Leaf Pondweed in a local lake.
- Developed an analytical method using solid phase extraction and LC-MS to quantify parts-per-billion changes in the concentration of 2,4-D in aqueous solution.

Summer Research Student

05/2017 – 07/2017

Biogeochemical Oceanography Laboratory, Skidmore College, NY

Performed mass flux and biogenic silica flux analysis on epipelagic sediment samples for a National Science Foundation grant funded project.

TEACHING EXPERIENCE**Co-instructor:** Introduction to Atmospheric Chemistry (ATM 160)

01/2026 – 04/2026

University of California, Davis

- Delivered 35% of the lectures for an undergraduate course in atmospheric chemistry for a class of 35 upper-level undergraduate and graduate students.

Guest Lecturer: Atmospheric Chemistry (ATM 260)

05/2024

University of California, Davis

- Developed and delivered a guest lecture about the role of particle-viscosity in atmospheric chemistry to graduate students.

Guest Lecturer: Introduction to Atmospheric Chemistry (ATM 160)

02/2024

University of California, Davis

- Delivered a guest lecture introducing fundamental ozone formation concepts to upper-level undergraduate students.

Visiting Instructor

04/2022

Davis Joint Unified School District, Davis, CA

- Developed and delivered a two-week module about local and global air quality for 8th graders using PurpleAir monitors.

Teaching & Academic Support

09/2016 – 05/2019

Department of Chemistry, Skidmore College, Saratoga Springs, NY

- Trained 16 students to use HPLC, LC-MS, GC, XRF, XRD and FTIR, and to analyze and extract data from the analytical software.
- Led a group of 5 student-tutors in providing content support and strengthening study skill development for students enrolled in all chemistry courses.
- Hosted a weekly tutoring session to support the development of research and science writing skills.

PUBLICATIONS**In Preparation**

- **Heinlein, L. M. D.**, Ma, S., Deng, K., Anastasio, C. “A Missing Pool of Photooxidants: Photochemistry of Methanol-Soluble Chromophores from Wildfire Smoke Particles.” *ES&T Air. (in preparation)*
- **Heinlein, L. M. D.**, Madhiyan, M., Ma, S., Deng, K., Moor, K., Anastasio, C. “Solvent-Dependent Photochemistry: Targeting Photooxidant Production from Methanol-soluble Brown Carbon.” *ES&T Air. (in preparation)*
- Sunday, M. O., **Heinlein, L. M. D.**, Chen, Y., Anastasio, C., “Photoformation of Hydrogen Peroxide by Water- and Organic-Soluble Chromophores in Ambient Particles.” *ES&T Air. (in preparation)*

Submitted

- **Heinlein, L. M. D.**, Kuhn, J., Ijaz, A., Temime-Roussel, B., Cysneiros de Carvalho, K., Liebes, M., Guo, F., Flynn III, J. H., Moor, K., Williams, B., D'Anna, B., Stutz, J., Anastasio, C. "Rapid Wintertime Formation of Phenolic Secondary Organic Aerosol from Brown Carbon Photochemistry." *ES&T*. (submitted)
- Kuhn, J., **Heinlein, L. M. D.**, Cesler-Maloney, M., Dibb, J. E., Thomas, J. L., Bartels-Rausch, T., Sunday, M. O., Simpson, W. R., Anastasio, C., Stutz, J. "Secondary aerosol production in heavily polluted cold-climate environments can be enhanced by precursor reduction." *ES&T*. (submitted)

Published

- Gemmell, K., **Heinlein, L. M. D.**, Petersen-Sonn, E., Sardena, C., Guo, Z., George, C., Anastasio, C., Borduas-Dedekind, N. "Measuring singlet oxygen ($^1\text{O}_2^*$) from atmospheric photosensitizers: intercomparison of techniques, irradiation setups, data analysis, and protocol recommendations." *Atmos. Chem. Phys.* (accepted)
- **Heinlein, L. M. D.**, He, J., Sunday, M. O., Guo, F., Campbell, J., Moon, A., Kapur, S., Fang, T., Edwards, K., Dibb, J., Flynn, J. H., Simpson, J., Alexander, B., Shiraiwa, M., Anastasio, C. "Surprisingly Robust Photochemistry in Subarctic Particles During Winter: Evidence from Photooxidants." *Atmos. Chem. Phys.* (August 2025)
- Kuhn, J., Stutz, J., Bartels-Rausch, T., Thomas, J. L., Cesler-Maloney, M., Simpson, W., Dibb, J., **Heinlein, L. M. D.**, Anastasio, C., Fahey, K., Flynn, J. H., Guo, F. "The Interplay between snow and urban air masses in cold urban environments." *Faraday Discussions*. (December 2024)
- Sunday, M. O., **Heinlein, L. M. D.**, He, J., Moon, A., Kapur, S., Fang, T., Edwards, K., Cesler-Maloney, M., Burns, A., Dibb, J., Simpson, J., Shiraiwa, M., Alexander, B., Mao, J., Flynn, J. H., Stutz, J., Anastasio, C. "Hydrogen Peroxide Photoformation and its Contribution to Sulfate Formation in Winter Particles from Fairbanks, Alaska." *Atmos. Chem. Phys.* (October 2024)
- Simpson, W., Mao, J., Fochesatto, J., Law, K., DeCarlo, P., Schmale, J., Pratt, K. A., Arnold, S. R., Stutz, J., Dibb, J., Creamean, J., Weber, J., Williams, B., Alexander, B., Hu, L., Yokelson, R., Shiraiwa, M., Decesari, S., Anastasio, C., D'Anna, B., Gilliam, R., St. Clair, J. M., Trost, B., Flynn, J. H., Savarino, J., Albertin, S., Baccarini, A., Barret, B., Bekki, S., Brado, T., Brett, N., Brus, D., Campbell, J., Cesler-Maloney, M., Cooperdock, S., Cysneiros de Carvalho, K., DeMott, P., Dieudonne, E., Dingilian, K., Donato, A., Edwards, K., Fahey, K., Fang, T., Guo, F., **Heinlein, L. M. D.**, Holen, A., Huff, D., Ijaz, A., Kapur, S., Ketcherside, D., Levin, E., Lill, E., Moon, A., Onishi, T., Pappaccogli, G., Perkins, R., Pohorsky, R., Raut, J., Ravetta, F., Roberts, T., Robinson, E., Scoto, F., Selimovic, V., Roussel, B. T., Tian, X., Wu, J., Yang, Y. "The Alaskan Layered Pollution and Chemical Analysis (ALPACA) Field Experiment." *ES&T Air*. (February 2024)
- Ma, L., Worland, R., **Heinlein, L. M. D.**, Guzman, C., Jiang, W., Niedek, C., Bein, K. J., Zhang, Q., Anastasio, C. "Seasonal Variations in Photooxidant Formation and Light Absorption in Aqueous Extracts of Ambient Particles." *Atmos. Chem. Phys.* (January 2024)
- Moon, A., Jongebloed, U., Dingilian, K., Schauer, A., Chan, Y. C., Cesler-Maloney, M., Simpson, W., Weber, R., Tsiang, L., Yazbeck, F., Zhai, S., Webum, A., Tuner, A., Albertin, S., Bekki, S., Savarino, J., Gribanov, K., Pratt, K., Costa, E., Anastasio, C., Sunday, M., **Heinlein, L. M. D.**, Mao, J., Alexander, B. "Primary Sulfate Is the Dominant Source of Particulate Sulfate During Winter in Fairbanks, Alaska." *ES&T Air*. (November 2023)

PRESENTATIONS

Academic

- "A Missing Pool of Photooxidants: Photochemistry of Methanol-Soluble Brown Carbon in Ambient Particles." Oral Presentation. International Global Atmospheric Chemistry Conference. Heraklion, Greece. September 2026.
- "Missing Pools of Particle Photooxidants: Photochemistry of Methanol-Soluble Chromophores from Wildfire Smoke Particles." Oral Presentation. American Chemical Society Spring Conference. Atlanta, Georgia. March 2026.

- “Robust Urban Wintertime Photochemistry: Brown Carbon Photooxidants Drive Rapid Phenolic Secondary Organic Aerosol Formation.” Poster Presentation. Agricultural & Environmental Chemistry Graduate Group, Winter Colloquium. Davis, CA. February 2026.
- “A Missing Pool of Particle Photooxidants: Photochemistry of Water-Insoluble Chromophores from Wildfire Smoke Particles.” Oral Presentation. American Association for Aerosol Research 43rd Annual Conference. Buffalo, New York. October 2025.
- “Robust Urban Wintertime Photochemistry: Brown Carbon Photooxidants Drive Rapid Phenolic Secondary Organic Aerosol Formation.” Poster Presentation. IGAC-iCACGP Early Career Online Conference. Virtual. September 2025.
- “Secondary Organic Aerosol is Formed by Unexpected Multiphase Brown Carbon Photochemistry During Winter.” Oral Presentation. Agricultural & Environmental Chemistry Graduate Group, Winter Colloquium. Davis, CA. February 2025.
- “Secondary Organic Aerosol is Formed by Unexpected Multiphase Brown Carbon Photochemistry During Winter.” Oral Presentation. American Association for Aerosol Research 42nd Annual Conference. Albuquerque, New Mexico. October 2024.
- “Contribution of Particle Photooxidants to Winter Secondary Organic Aerosol Formation in a Subarctic City.” Oral Presentation. Molecular-Level Understanding of Atmospheric Aerosols Meeting. Cargèse, France. April 2024.
- “Surprising Photochemistry in Subarctic Brown Carbon Particles During Winter Pollution Episodes.” Oral Presentation. American Geophysical Union, Fall Meeting. San Francisco, CA. December 2023.
- “Unexpectedly Robust Photochemistry in Subarctic Particles During Winter: Evidence from Photooxidants.” Oral Presentation. ALPACA Paper Writing Workshop. Online. September 2023.
- “Are Photooxidants Important During Severe Winter Pollution Events in Fairbanks, Alaska?” Oral Presentation. Agricultural & Environmental Chemistry Graduate Group, Winter Colloquium. Davis, CA. February 2023.
- “The Role of Triplet Excited States in Multiphase Sulfate Formation During Wintertime Pollution Events in Fairbanks, AK During ALPACA.” Poster Presentation. Chicago, IL. American Geophysical Union, Fall Meeting. December 2022.
- “Role of Triplet Excited States in Multiphase Sulfate Formation During ALPACA.” Oral Presentation. ALPACA Data Meeting. Baltimore, MD. August 2022.
- Heinlein, L.; Estapa, M.; “pH Dependence of the Photodegradation of 2,4-D: Investigating the Limitations of Herbicide Regulations,” Skidmore College Poster Presentations. Saratoga Springs, NY. May 2019.
- Estapa, M.; Baker, C. A.; Heinlein, L.; Walker, L.; Iversen, M.; Lampitt, R. “Are all sediment traps created equal? Preliminary results of an intercomparison study.” Ocean Sciences Meeting. Portland, Oregon. February 2018.
- Heinlein, L.; Estapa, M.; “Sinking Particle Flux in the Upper Ocean: A Trap Intercomparison.” Skidmore College Poster Presentations. Saratoga Springs, NY. July 2017.

Science Communication

- Panel Moderator, “What’s in Your Soil?” Portland, ME. September 2020.
- Maine Conservation Corps Representative, Roundtable with the Senator. Portland, ME. July 2020.
- [Got a Garden? Test Your Soil!](#), Interviewed on local radio (WCLZ 98.9). Portland, ME. July 2020.

VOLUNTEER EXPERIENCE

AgChem Executive Committee Student Representative

04/2024 – Present

Agricultural & Environmental Graduate Group, University of California, Davis, CA

- Represented the graduate student body on the executive committee of the AgChem graduate group.

Girls On The Run Coach

02/2025 – 05/2025

Fred T. Korematsu Elementary, Davis, CA

- Led a team of 3rd graders, teaching independence and resilience, in their journey to conquering a 5k!

STEM Squad Volunteer

04/2024 – 10/2024

Holy Rosary Catholic School, Woodland, CA

- Guided middle schoolers through after-school science programming, introducing students to exciting STEM concepts not typically covered in typical science classes.

Peer Mentor

02/2024 – 07/2024

Qualifying Exam Support Group, University of California, Davis, CA

- Supported and guided two fellow graduate students as they prepared to tackle their qualifying exam and advance to candidacy.

ALPACA Workshop Planning Committee Member

04/2023 – 06/2023

Alaskan Layered Pollution and Chemical Analysis Campaign, Online Meeting

- Planned a 2-day online conference for the ALPACA field campaign.

Recruitment Officer

02/2023

Agricultural & Environmental Graduate Group, University of California, Davis, CA

- Planned and led the 2-day recruitment event for 16 visiting students, involving coordinating interviews with professors, events with current students, and tours of several campus facilities.

PROFESSIONAL EXPERIENCE

Technical Manufacturing Chemist

12/2020 – 03/2021

Abbott Laboratories, Westbrook, ME

- Prepared critical bio-reagents for product and manufacturing processes related to Abbott Laboratory's COVID-19 antigen test.

Environmental Steward

01/2020 – 11/2020

Cumberland County Soil & Water Conservation District, Windham, ME

- Coordinated the Portland Soil Lead Awareness Project, an Environmental Protection Agency grant-funded initiative to raise awareness about the high risk of lead contamination in residential soils.
- Collected and processed over 100 soil samples from homes around Portland at no cost to participants.
- Planned and facilitated the virtual panel "What's in Your Soil?" with five of the region's top experts on soil lead contamination.

TECHNICAL SKILLS

- *Modeling & Data Analysis:* MATLAB (advanced), R (basic), Microsoft Office Suite.
- *Analytical Instrumentation:* Open Port Sampling Interface Mass Spectrometry (OPSI-MS), High Pressure Liquid Chromatography (HPLC-DAD).
- *Laboratory:* Quadrupole Electrodynamical Trap (single particle experiments), Mercury-Xenon ARC Lamp Monochromatic Illumination System, Xenon ARC Lamp Solar Simulator Illumination System, Ambient PM Sample Analysis.

MENTORSHIP

- Junwei Hei: undergraduate research assistant from 06/2022 – 09/2024, now a Chemistry PhD candidate at University of California, Davis
- Murat Onder: undergraduate research assistant from 06/2025 – 09/2025, now an Air Pollution Control Engineer with Placer County Air Pollution Control District
- Sydney Ma: undergraduate research assistant from 01/2025 – 06/2026, now a Health Effects Institute Summer Fellow at University of Southern California with Dr. Zhang
- Kelly Deng: undergraduate research assistant from 06/2025 – 06/2026, now an intern at the Palo Alto Regional Water Quality Control Plant