Laura Marie Dahler Heinlein

OBJECTIVE

Atmospheric chemist focused on characterizing the production of photooxidants in atmospheric particles to explore how photooxidants contribute to $PM_{2.5}$ formation. Research interests are motivated by understanding the fundamental physical and chemical processes leading to $PM_{2.5}$ formation.

EDUCATION

Ph.D. Candidate, Anastasio Group (GPA 3.922) 09/2021 – Present
University of California, Davis, CA

B.A. in Chemistry, *magna cum laude* (GPA 3.788) 09/2015 – 05/2019
Skidmore College, Saratoga Springs, NY

FELLOWSHIPS & AWARDS

Finalist, Best Early Career Poster, IGAC-iCACGP ECR Online Conference 09/2025
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
James & Rita Seiber International Graduate Student Support Award Fall 2024
Honorable Mention, NSF Graduate Research Fellowship Program Spring 2023
Jastro & Shields Research Award 2022-23, 2023-24, 2024-25
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 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 biomass burning particles in the atmosphere, incorporating previously neglected water-insoluble brown carbon as a source of photooxidants.

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 50% of the lectures for an undergraduate course in atmospheric chemistry

Guest Lecturer: Atmospheric Chemistry (ATM 260) 05/2024
University of California, Davis

- Developed and delivered a guest lecture discussing 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 model about local and global air quality for 8th graders using PurpleAir monitors.

Laboratory Assistant 01/2019 – 05/2019
Analytical Chemistry Laboratory, 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 associated analytical software.

Chemistry Peer Academic Coach (Captain) 09/2018 – 05/2019
Student Academic Services, Skidmore College, Saratoga Springs, NY

- Led a group of 5 student-tutors in providing content support and strengthening study skill development for students enrolled in all chemistry courses.

Organic Chemistry Writing Coach 09/2018 – 05/2019
Chemistry Department, Skidmore College, Saratoga Springs, NY

- Hosted a weekly tutoring session to support the development of research and science writing skills.

VOLUNTEER EXPERIENCE

Girls On The Run Coach 02/2025 – Present
Fred T. Korematsu Elementary, Davis, CA

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

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.

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 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.

PUBLICATIONS

- **Heinlein, L. M. D.,** Kuhn, J., Ijaz, A., Temime-Roussel, B., Cysneiros de Carvalo, K., Liebes, M., Moore, K., Williams, B., D'Anna, B., Stutz, J., Anastasio, C. "Unexpected Wintertime Multiphase Brown Carbon Photochemistry Drives Phenolic Secondary Organic Aerosol Formation." *ES&T. (in preparation)*
- 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." *PNAS. (in prep)*
- Gemmell, K., **Heinlein, L. M. D.,** Petersen-Sonn, E., Sardena, C., Guo, Z., George, C., Anastasio, C., Borduas-Dedekind, N. "Measuring singlet oxygen ($^1O_2$*) from atmospheric photosensitizers: intercomparison of techniques, irradiation setups, data analysis, and protocol recommendations." *ES&T. (in prep)*
- **Heinlein, L. M. D.**, He, J., Sunday, M. O., Guo, F., Campbell, J., Moon, A., Kapur, S., Fang, T., Edwards, K., Guo, F., 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., Anasatio, 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., Donateo, 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." *Envi. Sci. Tech. Air,* 2023. (*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.*, https://doi.org/10.5194/egusphere-2023-861, 2023. (*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." *Envi. Sci. Tech. Air,* 2023. (*November 2023)*

PRESENTATIONS

- "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.
- 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.
- 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.

TECHNICAL SKILLS

- *Computer:* MATLAB (PACT-1D Model), MS Office Suite (Word, Excel, Publisher, Sharepoint), Gaussian/GaussView, IgorPro, ChemDraw, Adobe Creative Suite: Photoshop
- *Analytical Instrumentation:* Chromatography (HPLC-DAD), Mercury-Xenon ARC Lamp Monochromatic Illumination System, Xenon ARC Lamp Solar Simulator Illumination System.
- *Laboratory:* Solid Phase Extraction, Liquid-Liquid Extraction, Reflux Synthesis, Titration, Rotary Evaporation, Water Sample Filtration, Soil & Water Sample Collection