SAM D. FAULSTICH

Oakland, CA | 775.386.0666 | sdfaulstich@gmail.com | LinkedIn

Professional Summary

PhD candidate in Chemical Engineering with expertise in atmospheric transport modeling, wildfire smoke exposure analysis, and interdisciplinary research. Proven track record of publishing peer-reviewed articles, presenting at conferences, and collaborating across disciplines. Proven ability to build robust, scalable modeling systems across domains—including atmospheric transport and probabilistic inference. Skilled in advanced computational methods, high-performance computing, and Bayesian statistics.

Education

PhD Chemical Engineering | expected June 2025

University of Utah

Advisor: Dr. Heather A. Holmes

Dissertation: "Advanced Modeling of Fire-Specific Smoke PM2.5 Concentrations for Health-Relevant Exposure Assessment"

MS Atmospheric Science | August 2021

University of Nevada, Reno

Advisor: Dr. Heather A. Holmes

Thesis: "Evaluating Fire Emissions Inventories to Model Smoke Exposure in the Western United States"

BS Physics, BS Atmospheric Science | December 2018

University of Nevada, Reno

Minored in Mathematics

Advisors: Dr. W. Patrick Arnott + Dr. Michael Kaplan

Relevant coursework: Advanced Physics, Atmospheric Dynamics, Applied Mathematics

Publications

- Riss, C.S., **Faulstich, S.D.**, Reuther, P.S., Metcalf, W.J., Darrow, L.A., Holmes, H.A., Strickland, M.J. "Influence of fire characteristics on the associations between smoke PM2.5 exposure and acute cardiorespiratory health events". Environment International. July 2025. https://doi.org/10.1016/j.envint.2025.109577

- **Faulstich, S.D.**, Strickland, M.J., Liu, Y., et al. "Modeling Daily Plume Specific Smoke Exposure with Estimates of Fire Size, Plume Age, and Fuel Type." Environmental Science & Technology, Air. In Review, March 2025.
- **Faulstich, S.D.**, Strickland, M.J., Holmes, H.A. "Enhancing Fire Emissions Inventories for Acute Health Effects Studies: Integrating High Spatial and Temporal Resolution Data." International Journal of Wildland Fire, 34(2), February 2025. https://doi.org/10.1071/wf24040
- Anna M. Murveit, Sonia Delphin, Carlie Domingues, Shawn D. Bourque, **Sam D. Faulstich**, Gregg M. Garfin, Nancy Huntly, Alison M. Meadow, Vikki Preston. 2023. Stories as Data: Indigenous Research Sovereignty and the "Intentional Fire" Podcast. *Environment and Planning F — Indigenous Research Sovereignty special issue*. https://doi.org/10.1177/26349825221142293
- **Faulstich, S.D.**, Schissler, A.G., Strickland, M.J., Holmes, H.A. "Statistical Comparison and Assessment of Four Fire Emissions Inventories for 2013 and a Large Wildfire in the Western United States." Fire, 5(1): 27, February 2022. https://doi.org/10.3390/fire5010027

Experience

Nuclear National Security Agency Graduate Fellowship Program — Lawrence Livermore National Laboratory, Livermore, CA (2024 - 2025)

Conducted research on atmospheric transport at the National Atmospheric Release Advisory Center.

Improved modeling techniques for atmospheric dispersion of hazardous materials.

Graduate Research Assistant — University of Utah, Salt Lake City, UT (2021 - 2024)

Developed advanced smoke exposure models for interdisciplinary health studies, enabling the first study to investigate how fire characteristics impact health outcomes.

Published peer-reviewed articles on fire emissions inventories and atmospheric transport.

Developed time-series models for daily plume-specific $PM_{2.5}$ forecasting; applied Bayesian inference and model diagnostics to quantify uncertainty across spatial and temporal scales.

Teaching Assistant — University of Utah, Salt Lake City, UT (2023)

Led applied atmospheric modeling lab for graduate and undergraduate students.

Designed course materials and provided individualized support to students.

Graduate Research Assistant — University of Nevada, Reno, NV (2019 - 2021)

Conducted interdisciplinary research on wildfire smoke exposure. Focused on Bayesian statistical analysis to understand differences in models of wildfire emissions. Designed and implemented statistical models for inference on noisy, high-dimensional environmental data.

Collaborated with Indigenous communities to integrate Traditional Ecological Knowledge into research for a fellowship project.

Research Projects

Atmospheric Transport and Dispersion Modeling (2024 - 2025)

Worked with NARAC at Lawrence Livermore National Laboratory to research atmospheric transport and dispersion modeling for national security and emergency response. Used high-performance computing to predict hazardous material spread and verified models with historical test data to improve accuracy and reliability. Because the historical data is often unreliable, this work involves assessment of model performance with questionable data.

Epidemiological Study (2019 - 2025)

Interdisciplinary NIH project assessing acute human health effects from wildfire smoke. Focused on improving wildfire smoke exposure estimates with currently available data. Required work with large datasets, long time frames, combining data in new ways, and creating evaluation frameworks. Focused on Bayesian inference for modeling uncertainty in environmental systems; skilled in specifying priors, computing posterior distributions, and interpreting results under uncertainty.

Landscape Scale Disturbances (2020 - 2021)

Studied ecosystem recovery after fires, integrating Traditional Ecological Knowledge and Indigenous storytelling ethically. This project went through the IRB process as well as a review from the Indigenous Tribe we worked with.

Technical Skills

Programming & Software

Python, R, Linux, bash shell scripting, C++, Matlab, LaTeX, HYSPLIT, WRF, Bayesian statistics (MCMC, hierarchical models, posterior diagnostics)

Statistics

Bayesian modeling and probabilistic inference, MCMC, hierarchical models, posterior diagnostics

Supercomputing

High-performance computing for atmospheric modeling

Other Skills

Managing interdisciplinary research projects, IRB process, meteorological forecasting

Independent Studies

Ethics and value alignment frameworks, virtue ethics, experimentation with finding the limits of current open-source large language models (GPT-4), exploring the implications of emerging technologies (AI, dual-use systems) for global security

Presentations

- "High-Fidelity Cloud Rise Modeling: Insights from My NNSA Fellowship Experience at LLNL". Lawrence Livermore National Laboratory. June 2025. Seminar
- "Improved Smoke Exposure Modeling for an Acute Cardiorespiratory Health Study in Reno, Nevada." American Geophysical Union Conference, December 2024. Poster.
- "A Multilayer Model for Fuel Consumption in WRF-SFIRE; Impacts on Fire Intensity and Emissions." WUI-Fire Symposium, Los Alamos National Laboratory, November 2024. Presentation.
- "Combining High Spatial Resolution Fire Information with Daily Fire Activity Data to Improve a Fire Emissions Inventory" Meteorology and Climate Modeling for Air Quality Conference, August 2023. Poster, lightning talk.
- "Integrating Fire Emissions Inventories and Atmospheric Dispersion Models to Improve Smoke Exposure Estimates." Air Quality: Science for Solutions Conference, April 2023. Poster.

Awards and Acknowledgements

Aspiring Leader Certificate, Nuclear National Security Agency Graduate Fellowship Program, 2025.

Second place, Wilkes Climate Summit Student Research Poster Competition, May 2023.

E.B. Christiansen Endowed Fellowship, University of Utah College of Engineering, Fall 2021.

Fellowship, Southwest Climate Adaptation Science Center Natural Resources Workforce Development, 2020 - 2021.