

William S. Daniels

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Appointments

Johns Hopkins University

Jul 2025 -

Postdoctoral Fellow, Department of Environmental Health and Engineering

Member, NASA Orbiting Carbon Observatory Science Team

Mentor: Scot Miller

Colorado School of Mines

Jan 2025 - Jun 2025

Research Scientist, Department of Applied Mathematics and Statistics

Mentor: Dorit Hammerling

Education

Ph.D., Statistics, Colorado School of Mines

Jun 2021 - Dec 2024

Research Associate, Payne Institute for Public Policy

Student Researcher, Energy Emissions Modeling and Data Lab

Advisor: Dorit Hammerling

M.S., Statistics, Colorado School of Mines

Jun 2019 - May 2021

Advisor: Dorit Hammerling

B.S., Physics, Colorado School of Mines

Aug 2015 - May 2019

Summa cum laude

Advisor: Lawrence Wiencke

Awards and Fellowships

Awards	Rath Research Award, <i>Colorado School of Mines</i>	2024
	· Top recognition at Mines for excellence in doctoral research.	
	Physics Faculty Distinguished Graduate Award, <i>Mines Physics Department</i>	2019
	General Chemistry Student of the Year, <i>Mines Chemistry Department</i>	2016
Fellowships	Johns Hopkins Postdoctoral Research Fellowship	2025
	Colorado Environmental Management Society Scholarship	2024
	Harvey Graduate Fellowship	2019 - 2021
	Harvey Undergraduate Scholarship	2015 - 2019
	Mines Undergraduate Research Fellowship	2017 - 2018
Presentation	Best talk in Energy session, <i>Mines Graduate Research Symposium</i>	2024
Recognition	Poster competition finalist, <i>IISA Conference</i>	2023
	Highly commended poster, <i>IGAC Conference</i>	2021
	Best talk in Environmental Science session, <i>Mines Graduate Research Symposium</i>	2020
	Outstanding oral presentation award, <i>APS April Meeting</i>	2019
	Poster competition winner, <i>Mines Physics Research Symposium</i>	2019

Refereed Papers

- *11. **William S. Daniels** and Dorit M. Hammerling. Sampling variability under extreme skewness: sample size guidance for future methane measurement campaigns. Submitted, *Communications Earth & Environment*, (2026).
- *10. Yuanrui Zhu, Gregory B. Ross, Jenna Brown, Olga Khaliukova, **William S. Daniels**, Jiayang (Lyra) Wang, Selina A. Roman-White, Fiji C. George, Daniel Zimmerle, Dorit M. Hammerling, and Arvind P. Ravikumar. Tracking U.S. liquefied natural gas supply chain greenhouse gas emissions intensity through direct measurements. In revision, *Environmental Science & Technology*, (2025).
- *9. **William S. Daniels**, Douglas W. Nychka, and Dorit M. Hammerling. A Bayesian hierarchical model for methane emission source apportionment. In revision, *Annals of Applied Statistics*, (2025).
- 8. Meng Jia[†], Ryker Fish[†], **William S. Daniels**, Brennan Sprinkle, and Dorit M. Hammerling. A fast and lightweight implementation of the Gaussian puff model for near-field atmospheric transport of trace gasses. *Scientific Reports*, 15, 18710 (2025).
- 7. Olga Khaliukova, Yuanrui Zhu, **William S. Daniels**, Arvind P. Ravikumar, Gregory B. Ross, Selina A. Roman-White, Fiji C. George, and Dorit M. Hammerling. Investigating aerial data preanalysis schemes and site-level methane emission aggregation methods at liquefied natural gas facilities. *ACS ES&T Air*, 2(6), 1009-1019 (2025).
- 6. **William S. Daniels**[†], Spencer G. Kidd[†], Shuting (Lydia) Yang, Shannon Stokes, Arvind P. Ravikumar, and Dorit M. Hammerling. Intercomparison of three continuous monitoring systems on operating oil and gas sites. *ACS ES&T Air*, 2(4), 564-577 (2025).
- 5. **William S. Daniels**, Meng Jia, and Dorit M. Hammerling. Estimating methane emission durations using continuous monitoring systems. *Environmental Science & Technology Letters*, 11(11), 1187-1192 (2024).
- 4. **William S. Daniels**, Meng Jia, and Dorit M. Hammerling. Detection, localization, and quantification of single-source methane emissions on oil and gas production sites using point-in-space continuous monitoring systems. *Elementa: Science of the Anthropocene*, 12(1), 00110 (2024).
- 3. **William S. Daniels**, Jiayang (Lyra) Wang, Arvind P. Ravikumar, Matthew Harrison, Selina A. Roman-White, Fiji C. George, and Dorit M. Hammerling. Toward multiscale measurement-informed methane inventories: reconciling bottom-up site-level inventories with top-down measurements using continuous monitoring systems. *Environmental Science & Technology*, 57(32), 11823-11833 (2023).
- 2. Jiayang (Lyra) Wang, **William S. Daniels**, Dorit M. Hammerling, Matthew Harrison, Kaylyn Burmaster, Fiji C. George, and Arvind P. Ravikumar. Multi-scale methane measurements at oil and gas facilities reveal necessary framework for improved emissions accounting. *Environmental Science & Technology*, 56(20), 14743-14752 (2022).
- 1. **William S. Daniels**, Rebecca R. Buchholz, Helen M. Worden, Fatimah Ahamad, and Dorit M. Hammerling. Interpretable models capture the complex relationship between climate indices and fire season intensity in Maritime Southeast Asia. *Journal of Geophysical Research: Atmospheres*, 127, e2022JD036774 (2022).

Non-Refereed Papers and Policy Documents

8. Jenna A. Brown, Michael Moy, Arthur Santos, Ethan Rimelman, Winrose Mollel, Olga Khaliukova, Callan Okenberg, **William S. Daniels**, Dorit M. Hammerling, Daniel Zimmerle, and Anna L. Hodshire. [Colorado Ongoing Basin Emissions \(COBE\) Final Report](#). *Submitted to the Colorado Department of Public Health and Environment*, (2025).
7. **William S. Daniels**, Philip Waggoner, and Dorit M. Hammerling. [Comment on EPA Docket No. EPA-HQ-OAR-2024-0350](#). *Submitted to the United States Environmental Protection Agency*, (2024).
6. [Kellis Ward](#), **William S. Daniels**, and Dorit M. Hammerling. [Comparison of co-located laser and metal oxide continuous monitoring systems](#). *Payne Institute Commentary Series: Research*, (2024).
5. **William S. Daniels**, Dorit M. Hammerling, and Morgan D. Bazilian. [New method for tracking down methane emissions on oil and gas sites](#). *Payne Institute Commentary Series: Commentary*, (2024).
4. Dorit M. Hammerling, **William S. Daniels**, Morgan D. Bazilian, and Brooke Bowser. [Improving satellite monitoring of methane emissions: data science is fundamental to better emissions tracking](#). *Payne Institute Commentary Series: Research*, (2021).
3. **William S. Daniels**, James Crompton, Dorit M. Hammerling, and Morgan D. Bazilian. [Initial findings from continuous monitoring of oil and gas operations](#). *Payne Institute Commentary Series: Research*, (2021).
2. [Meera Duggal](#), **William S. Daniels**, Rebecca R. Buchholz, and Dorit M. Hammerling. [Optimizing genetic algorithm parameters for atmospheric carbon monoxide modeling](#). *NCAR Technical Notes* (No. NCAR/TN-566+STR), (2021).
1. **William S. Daniels**, Dorit M. Hammerling, and Rebecca R. Buchholz. [regClimateChem: An R package for data driven variable selection applied to atmospheric carbon monoxide](#). *NCAR Technical Notes* (No. NCAR/TN-562+STR), (2020).

Software and Data

Software Packages

- MDLQ: Methane emission source apportionment using in-situ sensors. [[GitHub](#)]
- puff: Simulate and visualize the Gaussian puff atmospheric dispersion model. [[CRAN](#)]
- PDM: Probabilistic duration model for methane emissions on oil and gas sites. [[GitHub](#)]
- DLQ: Detection, localization, and quantification of methane emissions using in-situ sensors. [[GitHub](#)]

Data Sets

1. Rebecca R. Buchholz, Helen M. Worden, Fatimah Ahamad, **William S. Daniels**, and Dorit M. Hammerling. [Weekly carbon monoxide anomalies over Maritime Southeast Asia and weekly climate indices](#). *NCAR Geoscience Data Exchange*, (2021).

Presentations

Invited Talks

- 2025 University of Texas at Austin, Energy Emissions Modeling and Data Lab.
Developing fully transparent, site-level, measurement-based inventories using continuous monitoring data.

- 2025 Colorado State University, Energy Institute.
Implementing the Gaussian puff atmospheric dispersion model and using it to estimate methane emission rates.
- 2025 Colorado School of Mines, Payne Institute for Public Policy.
Characterizing methane emissions on oil and gas sites
- 2022 Stanford University, Methane Emissions Technology Alliance (META) Seminar.
Multi-scale methane measurements at oil and gas facilities reveal necessary framework for improved emissions accounting.
- 2022 Colorado School of Mines, Department of Applied Mathematics and Statistics.
Leveraging multiple continuous monitoring sensors for emission identification and localization on oil and gas facilities.
- 2022 University of Colorado Boulder, Quantitative Exploration and Discussion (QED) Supergroup.
Building intuition around common statistical learning techniques.
- 2021 International Global Atmospheric Chemistry (IGAC) Scientific Conference.
Using climate mode indices to forecast carbon monoxide variability in fire-prone Southern Hemisphere regions.

Conference Talks

- 2025 Energy Emissions Modeling and Data Lab (EEMDL) Annual Meeting. Austin, TX.
Estimating methane emission source and rate with continuous monitoring systems.
- 2025 Orbiting Carbon Observatory (OCO) Science Team Meeting. Fort Collins, CO.
Comparing the OCO-2 MIP inversion ensemble to the TRENDY dynamic vegetation models in the tropics and extratropics.
- 2024 American Chemical Society (ACS) Fall Meeting. Denver, CO.
Estimating methane emission durations using continuous monitoring systems.
- 2024 Joint Statistical Meetings (JSM). Portland, OR.
Bayesian hierarchical model for methane emission source apportionment.
- 2024 Mines Graduate Research and Discovery Symposium (GRADS). Golden, CO.
Estimating methane emission durations using continuous monitoring systems.
· **Received best presentation award in Energy session.**
- 2023 American Geophysical Union (AGU) Annual Meeting. San Francisco, CA.
Reconciling bottom-up inventories and top-down measurements on individual oil and gas sites using continuous monitoring systems.
- 2023 International Emissions Inventory Conference. Seattle, WA.
Developing methane emissions inventories for oil and gas production sites using point-in-space continuous monitors.
- 2022 International Association of Wildland Fire - Fire and Climate Conference. Pasadena, CA.
Interpretable model captures complex relationship between climate variability and fire season intensity in Maritime Southeast Asia.
- 2021 American Geophysical Union (AGU) Annual Meeting. New Orleans, LA.
Leveraging multiple continuous monitoring sensors for emissions alerting on oil and gas facilities.
- 2021 American Statistical Association CO/WY Fall Meeting. Online.
Predicting fire season intensity in Maritime Southeast Asia with interpretable models.
- 2021 Spatial and Temporal Statistics Symposium (STSS). Online.
Using atmospheric carbon monoxide models to predict fire season intensity.

- 2020 Mines Graduate Research and Discovery Symposium (GRADS). Golden, CO.
Using the climate to model atmospheric carbon monoxide.
 · **Received best presentation award in Environmental Science session.**
- 2019 American Physical Society (APS) April Meeting. Denver, CO.
What can elves tell us about very strong lightning?
 · **Received outstanding presentation award.**

Selected Posters

- 2025 American Geophysical Union (AGU) Annual Meeting. New Orleans, LA.
The role of continuous monitoring systems in methane emissions inventories: insights from 2 years of data on 35 production sites in the Appalachian Basin.
- 2025 American Geophysical Union (AGU) Annual Meeting. New Orleans, LA.
Estimating oil and gas methane emissions: why skewness is a challenge.
- 2024 American Geophysical Union (AGU) Annual Meeting. Washington, D.C.
A Bayesian hierarchical model for localizing and quantifying multi-source methane emissions on oil and gas sites using continuous monitoring systems.
- 2024 American Geophysical Union (AGU) Annual Meeting. Washington, D.C.
Estimating methane emission durations using continuous monitoring systems.
- 2024 American Chemical Society (ACS) Fall Meeting, Sci-Mix Invited Poster Session. Denver, CO.
Estimating methane emission durations using continuous monitoring systems.
- 2023 International Indian Statistical Association (IISA) Conference. Golden, CO.
Using continuous methane measurements for inventory development on oil and gas sites: three case studies.
 · **Finalist in student poster competition.**
- 2021 International Global Atmospheric Chemistry (IGAC) Scientific Conference. Online.
Using climate mode indices to forecast carbon monoxide variability in fire-prone Southern Hemisphere regions.
 · **Highly commended poster.**
- 2019 Mines Physics Undergraduate Research Symposium. Golden, CO.
What can elves tell us about very strong lightning?
 · **Winner of student poster competition.**

Teaching Experience

TEAM-UP Teaching Program

Fall 2017

Introduction to Field Based Experience

- Worked as a teaching assistant in a high school chemistry class.
- Gave lectures, assisted during labs, and participated in lesson planning.
- Took an accompanying education course on education psychology and modern STEM education.

Teaching Assistant Positions

- Statistics Practicum (MATH 482), *Colorado School of Mines* Spring 2022
- Statistics Practicum (MATH 482), *Colorado School of Mines* Spring 2021
- Statistics Practicum (MATH 482), *Colorado School of Mines* Spring 2020
- Modern Physics (PHGN 300), *Colorado School of Mines* Fall 2017
- Honors Chemistry, *Arvada West High School* Fall 2017

Guest Lectures

- Physics I - Mechanics (PHGN 100), *Colorado School of Mines* Spring 2025
- Future Energy Scholars Program (HN 398A), *Colorado School of Mines* Spring 2025
- Introduction to Key Statistical Learning Methods I (DSCI 560), *Colorado School of Mines* Spring 2020

Workshops Organized

- Advanced monitoring techniques for oil and gas methane emissions, *UT Austin* Fall 2025
- Implementing the Gaussian puff atmospheric dispersion model, *Colorado State University* Spring 2025

Mentoring (co-mentored students with Prof. Dorit Hammerling)

Graduate Students

- Troy Sorensen (PhD, Colorado School of Mines). Site-level methane emissions inventories. 2024-
- Callan Okenberg (PhD, Colorado School of Mines). State-level methane emissions inventories. 2024-2025
- Olga Khaliukova (PhD, Colorado School of Mines). Site-level aggregation methods. 2024-2025
- Spencer Kidd (MS, Colorado School of Mines). Intercomparison of in situ sensor solutions. 2024-2025
- Kellis Ward (MS, Colorado School of Mines). Metal oxide vs laser-based in situ sensors. 2023-2024

Undergraduate Students

- Michael Basanese (BS, Colorado School of Mines). Dispersion modeling at low wind speeds. 2024-2025
- Zi Li (BS, Colorado School of Mines). Modeling PM2.5 variability in Denver. 2021-2022
- Meera Duggal (BS, Colorado School of Mines). Genetic algorithms for carbon monoxide models. 2020-2021

Professional Service

Reviewer *Atmospheric Measurement Techniques, Elementa: Science of the Anthropocene, Environmental Science & Technology, Journal of Undergraduate Reports in Physics, Nature Communications, Remote Sensing of Environment, Science of the Total Environment*

Climate Change AI Innovation Grants 2024

Harvey Undergraduate Scholarship Program 2016 - 2019

International Conference on Learning Representations 2025

Workshop on Tackling Climate Change with Machine Learning

Convener Methane Emissions Technology Alliance (META) Seminar Series 2022 - present

Energy Emissions Modeling and Data Lab (EEMDL) Annual Meeting 2025

Technical Session: Advances in Space-Based Methane Emissions Monitoring

AGU Annual Meeting (GC51T, GC53L, and GC54D) 2024

New Technologies and Frameworks to Detect and Analyze Methane

Emissions from the Oil and Gas Supply Chain: Methods, Data, and Insights

Volunteer OSPA Liason, AGU Annual Meeting 2024

OSPA Reviewer, AGU Annual Meeting 2023-2024

Volunteer, International Indian Statistical Association (IISA) Conference 2023

Student Presentation Judge, Mines Undergraduate Research Symposium 2022-2025

Member	NASA Orbiting Carbon Observatory Science Team	2025 - present
	American Geophysical Union (AGU)	2019 - present
	American Statistical Association (ASA)	2024 - 2025
	Society for Industrial and Applied Mathematics (SIAM)	2019 - 2021
	American Physical Society (APS)	2018 - 2019
	Tau Beta Pi Engineering Honor Society	2018 - 2019