

William S. Daniels

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Appointments

Johns Hopkins University

Starting Jul 2025

Postdoctoral Fellow, Department of Environmental Health and Engineering

Member, NASA Orbiting Carbon Observatory Science Team

Advisor: Scot Miller

Colorado School of Mines

Jan 2025 - Jun 2025

Research Scientist, Department of Applied Mathematics and Statistics

Advisor: Dorit Hammerling

Education

Ph.D., Statistics, Colorado School of Mines

Aug 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

Aug 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

Submitted Papers

1. **William S. Daniels**, Douglas W. Nychka, Dorit M. Hammerling. A Bayesian hierarchical model for methane emission source apportionment. *Submitted*, (2025).

Refereed Papers

8. Meng Jia[†], Ryker Fish[†], **William S. Daniels**, Brennan Sprinkle, 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, 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, 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, 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, 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, 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, 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, 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, Articles, and Policy Documents

7. **William S. Daniels**, Philip Waggoner, 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**, 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, 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, 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, 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, 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, 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**, Dorit M. Hammerling. Weekly carbon monoxide anomalies over Maritime Southeast Asia and weekly climate indices. *NCAR Geoscience Data Exchange*, (2021).

Presentations (underline: mentored student)

Invited Talks (presenting author only)

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

Contributed Talks

19. Anna L. Hodshire, Jenna A. Brown, Arthur Santos, Daniel J. Zimmerle, Ethan Rimelman, Dorit M. Hammerling, Olga Khaliukova, Callan Okenberg, **William S. Daniels**. Measurement-informed inventories at scale: The Colorado Ongoing Basin Emissions project. *CanCH₄*. May 2025.
18. Kellis Ward, **William S. Daniels**, Dorit M. Hammerling. Comparison of co-located laser and metal oxide continuous monitoring systems. *Air Quality Measurement Methods and Technology Conference*. April 2025.
17. Michael Basanese, Troy Sorensen, **William S. Daniels**, Dorit M. Hammerling. Gaussian puff atmospheric dispersion model: an analysis at low wind speeds. *Mines Undergraduate Research Symposium*. April 2025.
16. Dorit M. Hammerling, **William S. Daniels**, Spencer G. Kidd. Comparing continuous methane monitoring technologies on operating oil and gas sites. *American Geophysical Union (AGU) Annual Meeting*. December 2024.
15. **William S. Daniels**, Meng Jia, Dorit M. Hammerling. Estimating methane emission durations using continuous monitoring systems. *American Chemical Society (ACS) Fall Meeting*. August 2024.
14. **William S. Daniels**, Douglas W. Nychka, Dorit M. Hammerling. Bayesian hierarchical model for methane emission source apportionment. *Joint Statistical Meetings (JSM)*. August 2024.
13. Michael Basanese, **William S. Daniels**, Dorit M. Hammerling. Comparing different sensor types for continuous monitoring of methane emissions at oil and gas sites. *Mines Undergraduate Research Symposium*. April 2024.
12. Meng Jia, Troy Sorensen, **William S. Daniels**, Dorit M. Hammerling. A data-driven algorithm to optimize the placement of continuous monitoring sensors on oil and gas sites. *Mines Graduate Research and Discovery Symposium (GRADS)*. April 2024.
11. **William S. Daniels**, Meng Jia, Dorit M. Hammerling. Estimating methane emission durations using continuous monitoring systems. *Mines Graduate Research and Discovery Symposium (GRADS)*. April 2024.
 - Received best presentation award in Energy session.
10. **William S. Daniels**, Meng Jia, Dorit M. Hammerling. Reconciling bottom-up inventories and top-down measurements on individual oil and gas sites using continuous monitoring systems. *American Geophysical Union (AGU) Annual Meeting*. December 2023.
9. Meng Jia, Troy Sorensen, **William S. Daniels**, Dorit M. Hammerling. A data-driven algorithm to optimize the placement of continuous monitoring sensors on oil and gas sites. *American Geophysical Union (AGU) Annual Meeting*. December 2023.
8. **William S. Daniels**, Lyra Wang, Arvind Ravikumar, Dorit M. Hammerling. Developing methane emissions inventories for oil and gas production sites using point-in-space continuous monitors. *International Emissions Inventory Conference*. September 2023.
7. **William S. Daniels**, Rebecca R. Buchholz, Helen M. Worden, Fatimah Ahamad, Dorit M. Hammerling. Interpretable model captures complex relationship between climate variability and fire season intensity in Maritime Southeast Asia. *International Association of Wildland Fire - Fire and Climate Conference*. May 2022.

6. **William S. Daniels**, Meng Jia, Dorit M. Hammerling, Shyla Kupis, Nasr Alkadi, Anna Scott. Leveraging multiple continuous monitoring sensors for emissions alerting on oil and gas facilities. *American Geophysical Union (AGU) Annual Meeting*. December 2021.
5. **William S. Daniels**, Rebecca R. Buchholz, Helen M. Worden, Fatimah Ahamad, Dorit M. Hammerling. Predicting fire season intensity in Maritime Southeast Asia with interpretable models. *American Statistical Association CO/WY Fall Meeting*. October 2021.
4. **William S. Daniels**, Fatimah Ahamad, Rebecca R. Buchholz, Dorit M. Hammerling, Helen M. Worden. Using atmospheric carbon monoxide models to predict fire season intensity. *Spatial and Temporal Statistics Symposium (STSS)*. February 2021.
3. Meera Duggal, **William S. Daniels**, Dorit M. Hammerling. Optimizing genetic algorithm parameters for atmospheric carbon monoxide modeling. *Electronic Undergraduate Statistics Research Conference (eUSR)*. November 2020.
2. **William S. Daniels**, Rebecca R. Buchholz, Dorit M. Hammerling. Using the climate to model atmospheric carbon monoxide. *Mines Graduate Research and Discovery Symposium (GRADS)*. April 2020.
 - **Received best presentation award in Environmental Science session.**
1. **William S. Daniels**, Kevin-Druis Merenda, Lawrence Wiencke. What can elves tell us about very strong lightning? *APS April Meeting*. April 2019.
 - **Received outstanding presentation award.**

Selected Posters

8. **William S. Daniels**, Meng Jia, Dorit M. Hammerling. A Bayesian hierarchical model for localizing and quantifying multi-source methane emissions on oil and gas sites using continuous monitoring systems. *American Geophysical Union (AGU) Annual Meeting*. December 2024.
7. **William S. Daniels**, Meng Jia, Dorit M. Hammerling. Estimating methane emission durations using continuous monitoring systems. *American Chemical Society (ACS) Fall Meeting, Sci-Mix Invited Poster Session*. August 2024.
6. **William S. Daniels**, Meng Jia, Dorit M. Hammerling. Using continuous methane measurements for inventory development on oil and gas sites: three case studies. *International Indian Statistical Association (IISA) Conference*. June 2023.
 - **Finalist in student poster competition.**
5. Meng Jia, **William S. Daniels**, Dorit M. Hammerling. Methane emission detection, localization, and quantification using continuous point-sensors on oil and gas facilities. *International Indian Statistical Association (IISA) Conference*. June 2023.
 - **Winner of student poster competition.**
4. Zi Li, **William S. Daniels**, Dorit M. Hammerling. Seasonal and hourly variability of particulate matter 2.5 in Denver. *Mines Undergraduate Research Symposium*. April 2022.
3. **William S. Daniels**, Dorit M. Hammerling, Rebecca R. Buchholz, Helen M. Worden, Fatimah Ahamad. Using climate mode indices to forecast carbon monoxide variability in fire-prone Southern Hemisphere regions. *International Global Atmospheric Chemistry (IGAC) Scientific Conference - Southern Hemispheres Session*. September 2021.
 - **Highly commended by Southern Hemisphere Working Group.**
2. Meera Duggal, **William S. Daniels**, Dorit M. Hammerling. Genetic algorithm optimization study for atmospheric carbon monoxide models. *Mines Undergraduate Research Symposium*. April 2020.

1. **William S. Daniels**, Kevin-Druis Merenda, Lawrence Wiencke. [What can elves tell us about very strong lightning?](#) *Mines Physics Undergraduate Research Symposium*. April 2019.
· **Winner of student poster competition.**

Media Coverage

3. Colorado School of Mines Newsroom. [Mathematics PhD wins Rath Award at Fall 2024 Graduate Commencement](#). December 2024.
2. Energy Transition Talk, a USC podcast. [How Can Capturing Carbon and Monitoring Methane Play a Role in the Energy Transition?](#) February 2024.
1. Bloomberg. [Ukraine War Gives U.S. LNG Chance to Shed Fracked-Gas Stigma](#). April 2022.

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

- Implementing the Gaussian puff atmospheric dispersion model, Colorado State University Spring 2025

Professional Service

Journal Review

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

Grant	Climate Change AI Innovation Grants	2024
Review	Harvey Undergraduate Scholarship Program	2015 - 2019
Conference Review	International Conference on Learning Representations (ICLR) <i>Workshop on Tackling Climate Change with Machine Learning</i>	2025
Convener	Methane Emissions Technology Alliance (META)	2022 - present
	AGU Annual Meeting (GC51T, GC53L, and GC54D)	2024
	<i>New Technologies and Frameworks to Detect and Analyze Methane Emissions from the Oil and Gas Supply Chain: Methods, Data, and Insights</i>	
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	American Statistical Association (ASA)	2024 - present
	American Geophysical Union (AGU)	2019 - present
	Society for Industrial and Applied Mathematics (SIAM)	2019 - 2021
	American Physical Society (APS)	2018 - 2019
	Tau Beta Pi Engineering Honor Society	2018 - 2019