

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

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

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

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| 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

2. 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, Arvind P. Ravikumar. Tracking U.S. liquefied natural gas supply chain greenhouse gas emissions intensity through direct measurements. *Submitted*, (2025).
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

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| 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 Review | Climate Change AI Innovation Grants Harvey Undergraduate Scholarship Program | 2024 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) AGU Annual Meeting (GC51T, GC53L, and GC54D) <i>New Technologies and Frameworks to Detect and Analyze Methane Emissions from the Oil and Gas Supply Chain: Methods, Data, and Insights</i> | 2022 - present 2024 |
| Volunteer | OSPA Liason, AGU Annual Meeting OSPA Reviewer, AGU Annual Meeting Volunteer, International Indian Statistical Association (IISA) Conference Student Presentation Judge, Mines Undergraduate Research Symposium | 2024 2023-2024 2023 2022-2025 |
| Member | American Statistical Association (ASA) American Geophysical Union (AGU) Society for Industrial and Applied Mathematics (SIAM) American Physical Society (APS) Tau Beta Pi Engineering Honor Society | 2024 - present 2019 - present 2019 - 2021 2018 - 2019 2018 - 2019 |