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

Awards	Rath Research Award, *Colorado School of Mines*	2024
	· Top recognition at Mines for excellence in doctoral research.	
	Physics Faculty Distinguished Graduate Award, *Mines Physics Department*	2019
	General Chemistry Student of the Year, *Mines Chemistry Department*	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 Recognition	Best talk in Energy session, *Mines Graduate Research Symposium*	2024
	Poster competition finalist, *IISA Conference*	2023
	Highly commended poster, *IGAC Conference*	2021
	Best talk in Environmental Science session, *Mines Graduate Research Symposium*	2020
	Outstanding oral presentation award, *APS April Meeting*	2019
	Poster competition winner, *Mines Physics Research Symposium*	2019

Publications (underline: mentored student, †: equal contribution, Google Scholar)

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 Review	Climate Change AI Innovation Grants	2024
	Harvey Undergraduate Scholarship Program	2015 - 2019
Conference Review	International Conference on Learning Representations (ICLR)	2025
	Workshop on Tackling Climate Change with Machine Learning	
Convener	Methane Emissions Technology Alliance (META)	2022 - present
	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	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