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

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) Updated 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*, *Geoscientific Model Development*, *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 (METAA) 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