Michael Vermeuel
Purdue University
Department of Earth, Atmospheric, and Planetary Sciences
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Academic Appointment

Assistant Professor Dept. of Earth, Atmospheric, and Planetary Sciences, Purdue University, 2024 – present

Education

Ph.D., University of Wisconsin – Madison, Chemistry, 2021
Dissertation Title: The Influence of Complex Meteorology and Surface Heterogeneity on Oxidation in the Troposphere
M.S., University of Wisconsin – Madison, Chemistry, 2017
B.S., The College of New Jersey, Chemistry, 2015

Research and Training

Postdoctoral Associate Dept. of Soil, Water, and Climate, University of Minnesota – Twin Cities, 2021 – 2024
Advisor: Professor Dylan B. Millet
Joint Advisor: Professor Delphine K. Farmer, Dept. of Chemistry, Colorado State University, 2023 – 2024
Graduate Researcher Dept. of Chemistry, University of Wisconsin – Madison, 2015 – 2021
Advisor: Professor Timothy H. Bertram
Summer Research Staff Dept. of Chemistry, University of Wisconsin – Madison, 2015
Advisor: Professor Randall H. Goldsmith
Undergraduate Research Dept. of Chemistry, The College of New Jersey, 2013 – 2015
Advisors: Professor Michelle R. Bunagan and Professor David McGee
Summer Research Experience for Undergraduates Dept. of Mat. Sci. & Eng., University of Wisconsin – Madison, 2014
Advisor: Professor Padma Gopalan

Teaching

Instructor, Purdue University, EAPS 52500, Boundary Layer Meteorology, Spring 2026
Instructor, Purdue University, EAPS 11700, Introduction to Atmospheric Sciences, Fall 2024, Fall 2025
Teaching Assistant, University of Wisconsin, CHEM 524, Chemical Instrumentation, Spring 2016, Spring 2018
Teaching Assistant, University of Wisconsin, CHEM 104, General Chemistry II, Fall 2015

Student Mentorship

Ph.D. Advisor
Carter Swenson (EAPS) — Fall 2024 – present
Nathan Rose (EAPS) — Spring 2025 – present
Undergraduate Research Advisor
Lauren Grose (Atmospheric Science/Meteorology) — Spring 2025 – present
Evelyn Girardi (Atmospheric Science/Meteorology & Chemistry) — Fall 2025 – present

Honors and Awards

Purdue EAPS Teaching Honor Roll (Fall 2025)
James R. Holton Award, American Geophysical Union, 2024
Outstanding Oral Presentation, 5th American Meteorological Society Biogeosciences Meeting, 2021
American Institute of Chemists Student Award, 2015

University and Professional Activities

Committee Member Purdue University Library Committee, 2025 –
Committee Member Purdue EAPS Field Committee, 2024 –
Early Career Advisory Board Member *ACS ES&T Air*, 2023 –
Primary Convener Terrestrial Biosphere-Atmosphere Interactions and Atmospheric Chemistry, AGU 2024 Meeting

Convener Biosphere-Atmosphere Interactions of Reactive Carbon, Oxidants, and Aerosols, AGU 2023 Meeting
Convener Biosphere-Atmosphere Exchange of Reactive Carbon, Oxidants, and Aerosols, AGU 2022 Meeting
Reviewer *Atmospheric Chemistry and Physics*, *Atmospheric Measurement Techniques*, *Journal of Geophysical Research: Atmospheres*, *Geophysical Research Letters*, *Earth System Science Data*, *ACS ES&T Air*, *Journal of Hazardous Materials*
Proposal Reviewer NSF, NASA
Member American Chemical Society 2024 –
Member American Meteorological Society 2020 –
Member American Geophysical Union 2018 –

Funding

10/2023 – 09/2026: *MRI Track 1: Acquisition of a Dual-Reagent Chemical Ion Mass Spectrometer for Direct and Detailed Measurements of Atmospheric Chemical Fluxes*, Dylan Millet (PI), Timothy Griffis (co-I), Christopher Hogan (co-I), Michael Vermeuel (co-I), Jannell Bazurto (co-I), NSF AGS 2320421, $1,161,665.00

Outreach

Guest Instructor, Indiana School for the Deaf program, Purdue University, 2026
Organizer, atmospheric chemistry program, University of Wisconsin, 2017
Volunteer, Chemistry Opportunities (CHOPS) program, University of Wisconsin, 2016–2018

Atmospheric Chemistry Field Research Studies

MOUSETRAP, cropland-atmosphere exchange of VOCs, CO_2, and H_2O, West Lafayette, IN, 2025
FROG-NY/AEROMMA, direct measurements of the emissions of urban pollutants, Mineola, NY, 2023-2024
Flux Closure Study (FluCS), detailed reactive carbon exchange over a pine forest, Manitou Forest, CO, 2021
PEcoRINO, observations of reactive carbon flux during the summer to autumn transition, Park Falls, WI, 2020
CHEESEHEAD19, terrestrial ozone and oxidized carbon forest-atmosphere exchange, Park Falls, WI, 2019
Center for Limnology, multiple reactive gas air-lake exchange studies, Madison, WI, 2016-2019
Scripps Institute of Oceanography Mem. Pier, ozone and marine sulfur air-sea exchange, San Diego, CA, 2018
LMOS 2017, ambient measurements of ozone precursors and oxidation products and impacts on air quality, Zion, IL, 2017

Publications

In Review

1. Richard, K.L., **Vermeuel, M.P.**, and 11 others, Multiphase and heterogeneous O_3 chemistry on aerosol and infrastructural surfaces drives Cl_2 sources in a coastal city, In Review
2. **Vermeuel, M.P.**, Millet, D.B., Commane, R., Griffis, T.J., Maddaleno, T.A., Franklin, E.B., Richard, K.L., Rossell, R.K., Peischl, J., Farmer, D.K., Surface temperatures drive strong seasonality in urban reactive carbon emissions, Submitted
3. Zhao, Y., Hallward-Driemeier, A., Schiferl, L., Millet, D. Farmer, D., **Vermeuel, M.**, Maddaleno, T., Commane, R., Inefficient Consumption of Natural Gas Drives Methane Emissions from a Megacity, In Review

Published

4. Riches, M., **Vermeuel, M. P.**, Alwe, H. D., Millet, D. B., & Farmer, D. K., Combined effects of humidity and temperature on biogenic volatile organic compound emissions and photosynthesis, *J. Geophys. Res. Atmos.*, https://doi.org/10.1029/2025JD044827, 2026
5. Franklin, E.B., Rossell, R., **Vermeuel, M.P.** and 12 others, Emerging Drivers of North American Urban Aerosol Increase Global Change Vulnerability, *npj Clim. Atmos. Sci.*, https://doi.org/10.1038/s41612-025-01202-w, 2025
6. **Vermeuel, M.P.**, Millet, D.B., Farmer, D.K., and 15 others, A Vertically Resolved Canopy Improves Chemical Transport Model Predictions of Ozone Deposition to North Temperate Forests, *J. Geophys. Res. Atmos.*, https://doi.org/10.1029/2024JD042092, 2024
7. Ratdke, J.A. and 13 others including **Vermeuel, M.P.**, Observing Low Altitude Features in Ozone Concentrations in a Shoreline Environment via Unmanned Aerial Systems, *Atmos. Meas. Tech.*, https://doi.org/10.5194/amt-2023-143, 2024
8. Link, M.F., Pothier, M.A., **Vermeuel, M.P.**, Riches, M., Millet, D.B., Farmer, D.K., In-Canopy Chemistry, Emissions, Deposition, and Surface Reactivity Compete to Drive Bi-Directional Forest-Atmosphere Exchange of VOC Oxidation Products, *Environ. Sci. Technol. Air*, https://doi.org/10.1021/acsestair.3c00074, 2024

9. Riches, M., Berg, T.C., **Vermeuel, M.P.**, Millet, D.B., Farmer, D.K., Wildfire Smoke Directly Changes Biogenic Volatile Organic Emissions and Photosynthesis of Ponderosa Pines, *Geophys. Res. Lett,* https://doi.org/10.1029/2023GL106667, 2024
10. **Vermeuel, M.P.**, Millet, D.B., Farmer, D.K., Link, M.F., Pothier, M.A., Riches, M., Williams, S., Garofalo, L.A., Closing the reactive carbon flux budget: Observations from dual mass spectrometers over a coniferous forest, *J. Geophys. Res. Atmos.*, https://doi.org/10.1029/2023JD038753, 2023
11. **Vermeuel, M.P.**, Novak, G.A., Kilgour, D.B., Claflin, M.S., Lerner, B.M, Thom, J., Cleary, P.A., Desai, A.R., Bertram, T.H., Observations of biogenic volatile organic compounds over a mixed temperate forest during the summer to autumn transition, *Atmos. Chem. Phys.*, https://doi.org/10.5194/acp-23-4123-2023, 2023
12. Novak, G. A., Kilgour, D. B., Jernigan, C. M., **Vermeuel, M. P.**, Bertram, T.H., Oceanic emissions of dimethyl sulfide and methanethiol and their contribution to sulfur dioxide production in the marine atmosphere, *Atmos. Chem. Phys.*, https://doi.org/10.5194/acp-22-6309-2022, 2022
13. Novak, G.A. and 34 others including **Vermeuel, M.P.**, Rapid cloud removal of dimethyl sulfide oxidation products limits SO_2 and cloud condensation nuclei production in the marine boundary layer, *Proc. Natl. Acad. Sci.*, https://doi.org/10.1073/pnas.2110472118, 2021
14. Stanier, C. and 30 others including **Vermeuel, M.P.**, Overview of the Lake Michigan Ozone Study (LMOS 2017), *Bull. Am. Meteorol. Soc.*, BAMS-D-20-0061, 2021
15. Doak, A.G. and 18 others including **Vermeuel, M.P.**, Characterization of ground-based atmospheric pollution and meteorology sampling stations during the Lake Michigan Ozone Study 2017, *J. Air Waste Manag. Assoc.*, https://doi.org/10.1080/10962247.2021.1900000, 2021
16. **Vermeuel, M.P.**, Cleary, P.A., Desai, A.R., Bertram, T.H., Simultaneous measurements of O_3 and HCOOH vertical fluxes indicate rapid in-canopy terpene chemistry enhances O_3 removal over mixed temperate forests, *Geophys. Res. Lett,* https://doi.org/10.1029/2020GL090996, 2021
17. Butterworth, B.J. and 44 others including **Vermeuel, M.P.**, Connecting Land-Atmosphere Interactions to Surface Heterogeneity in CHEESEHEAD19, *Bull. Am. Meteorol. Soc.*, 1-71, https://doi.org/10.1175/BAMS-D-19-0346.1, 2020
18. Hughes, D.D., Christiansen, M., Milani A., **Vermeuel, M.P.**, Novak, G. A., et al. $PM_{2.5}$ chemistry, organosulfates, and SOA formation during the 2017 Lake Michigan Ozone Study, *Atmos. Environ.*, https://doi.org/10.1016/j.atmosenv.2020.117939, 2020
19. **Vermeuel, M.P.**, Novak, G.A., Jernigan, C.J., Bertram, T.H., The Diel Profile of Hydroperoxymethyl Thioformate: Evidence for Surface Deposition and Multiphase Chemistry, *Environ. Sci. Technol.*, 54, 12521-12529, https://doi.org/10.1021/acs.est.0c04323, 2020
20. Leon, D., **Vermeuel, M.P.**, Gupta, P., Bunagan, M.R., The effect of salt and temperature on the conformational changes of P1LEA-22, a repeat unit of plant Late Embryogenesis Abundant proteins, *J Pep Sci.*, 26, http://dx.doi.org/10.1002/psc.3247, 2020
21. Novak, G. A., **Vermeuel, M. P.**, and Bertram, T. H., Simultaneous detection of ozone and nitrogen dioxide by oxygen anion chemical ionization mass spectrometry: a fast-time-response sensor suitable for eddy covariance measurements, *Atmos. Meas. Tech.*, 13, 1887–1907, https://doi.org/10.5194/amt-13-1887-2020, 2020
22. **Vermeuel, M. P.**, Novak, G.A., Alwe, H.D., Hughes, D.D., Kaleel, R., Dickens, A.F., et al. Sensitivity of Ozone Production to NO_x and VOC Along the Lake Michigan Coastline. *J. Geophys. Res. Atmos.*, 124, 10989-11006, https://doi.org/10.1029/2019JD030842, 2019
23. Lavi, A., **Vermeuel, M.P.**, Novak, G.A., and Bertram, T.H., The sensitivity of benzene cluster cation chemical ionization mass spectrometry to select biogenic terpenes, *Atmos. Meas. Tech.*, 11, 3251–3262, https://doi.org/10.5194/amt-11-3251-2018, 2018

Technical Reports

24. **Vermeuel, M.P.**, Bertram, T.H., Investigating the O_3-NO_x-VOC Sensitivity of Plumes Advecting over Lake Michigan during LMOS 2017, Final Memo for Lake Michigan Air Directors Consortium (LADCO), report link, 2020.=

Invited Talks

1. Surface Temperatures Drive Strong Seasonality in Urban VOC Emissions in Greater New York, AGES+ Seminar Series, NOAA CSL, Virtual, 2026
2. From Forest to City: What Drives the Surface-Atmosphere Exchange of Reactive Trace Gases?, Center for Satellite and Earth System Research (CSER) Seminar, George Mason University, Virtual, 2025
3. Quantifying sources and sinks of reactive trace gases using chemical ionization mass spectrometry, Department of Chemistry Analytical Chemistry Seminar, Purdue University, West Lafayette, IN, 2025

4. Unraveling the complexity of local VOC sources over an urban site in New York, American Chemical Society Spring Meeting, San Diego, CA, 2025
5. Surface-Atmosphere Exchange and Atmospheric Chemistry, Center for Aerosols and Cloud Chemistry (CACC), Aerodyne Inc, Billerica, MA, 2025
6. Combining Measurements and Models to Understand the Influence of Biosphere-Atmosphere Interactions on Atmospheric Chemistry, American Geophysical Union Fall Meeting, Washington D.C., 2024
7. Exploring the Role of Surface-Atmosphere Interactions in Atmospheric Chemistry with Direct Observations and Chemical Transport Modeling, Environmental Science Seminar Series, Indiana University, Bloomington, IN, 2024
8. Investigating the fate of reactive gases in the atmosphere through direct observations and chemical transport modeling, The College of New Jersey Department of Chemistry Seminar, 2024
9. Unraveling the fate of atmospheric chemicals through state-of-science observations and multidimensional modeling, Purdue University Earth, Atmospheric, and Planetary Sciences Department Seminar, West Lafayette, IN, 2023
10. Observations of the Biosphere-Atmosphere Exchange of Reactive Carbon over a Colorado Pine Forest, Augsburg University Department of Chemistry, Minneapolis, MN, 2021

Other First Author Presentations

1. Direct Urban Ozone Flux Measurements Reveal Significant Nonstomatal Loss, American Meteorological Society Annual Meeting, Houston, TX, 2026 (*Talk*)
2. Understanding Seasonal Variability in Urban VOC and O_3 Fluxes Using Tower-Based Eddy Covariance Measurements, Atmospheric Chemistry Gordon Research Conference, Newry, ME, 2025 (*Poster*)
3. VOC Source Apportionment in an Urban Environment Using Eddy Covariance Flux Measurements, American Geophysical Union Fall Meeting, Washington D.C., 2024 (*Talk*)
4. A vertically-resolved canopy improves chemical transport model predictions of ozone deposition to north temperate forests, 11th International GEOS-Chem Meeting, St. Louis, MO, 2024 (*Talk*)
5. VOC source apportionment in an urban environment using eddy covariance flux measurements, AGES+ Workshop, Boulder, CO 2024 (*Talk*)
6. Direct quantification of VOC flux over an urban footprint during the Fluxes of Reactive Organic Gases in New York (FROG-NY) project, American Geophysical Union Fall Meeting, San Francisco, CA, 2023, (*Poster*)
7. A vertically-resolved canopy significantly improves chemical transport model ozone predictions over north temperate forests, American Geophysical Union Fall Meeting, San Francisco, CA, 2023, (*Poster*)
8. Closing the ozone flux budget over a temperate coniferous forest using comprehensive observations and 1D vertical canopy modeling, American Meteorological Society Sixth Conference on Atmospheric Biogeosciences, Minneapolis, MN, 2023, (*Talk*)
9. Applying dual mass spectrometers to close the VOC budget over a coniferous ecosystem, American Geophysical Union Fall Meeting, Chicago, IL, 2022, (*Poster*)
10. The contribution of chemical sinks to ozone fluxes over a temperate coniferous forest, American Geophysical Union Fall Meeting, Chicago, IL, 2022, (*Poster*)
11. How well can we understand and model VOC fluxes over coniferous forests? New insights from dual mass spectrometers, 10th International GEOS-Chem Meeting (IGC10), St. Louis, MO, 2022, (*Talk*)
12. Comprehensive Observations of the Biosphere-Atmosphere Exchange of Reactive Carbon during the Flux Closure Study (FluCS), American Geophysical Union Fall Meeting, New Orleans, LA, 2021, (*Poster*)
13. Evidence of Enhanced Ozone Removal Over Mixed Temperate Forests due to In-Canopy Terpene Chemistry, American Meteorological Society Fifth Conference on Atmospheric Biogeosciences, Remote, 2021 (*Talk, **won award**)*
14. Forest-Atmosphere Exchange of Ozone and Reactive Carbon Over a Mixed Temperate Forest in Northern Wisconsin, Improving understanding of land-atmosphere interactions through integration of surface flux and atmospheric boundary layer measurements, Ameriflux Workshop, Remote, 2021 (*Poster)*
15. Eddy covariance measurements of O_3 and HCOOH indicate rapid in-canopy terpene chemistry drives O_3 deposition in mixed temperate forests, American Geophysical Union Fall Meeting, Remote, 2020 *(Poster)*
16. Summertime Observations of Forest-Atmosphere Exchange of Ozone and Formic Acid over a Mixed Temperate Forest in Northern Wisconsin, Spatial heterogeneity in land-atmosphere interactions and boundary-layer development: A CHEESEHEAD virtual mini-session, Remote, 2020 *(Talk)*
17. Observations of Ozone Deposition to a Temperate Forest, American Geophysical Union Fall Meeting, San Francisco, CA 2019 *(Poster)*
18. Measurements of O_3, HNO_3, and SO_2 over the ocean and a eutrophic freshwater lake, National Atmospheric Deposition Program Spring Meeting, Madison, WI 2019 (*Poster*).

19. and model-based constraints on ozone production along the Lake Michigan coastline: Insights from intensive field experiments and long-term monitoring data, American Geophysical Union Fall Meeting, Washington D.C., 2018 *(Poster)*
20. Theoretical Insight on Benzene Cluster Cation Chemistry and the Detection of Biogenic Terpenes, CIMS User Meeting, Seattle, WA, 2018 *(Talk)*
21. Measurements of H_2O_2 and HNO_3 at the Zion Field Site during LMOS, 2017, LMOS 2017 Data Workshop, Metcalfe Federal Building, Chicago, IL 2017 *(Talk)*
22. Studying the Folding Pathway of Truncated and Full-Length Human Serum Albumin via FCS, ACS Fall Meeting, San Francisco, 2014 (*Poster*)