Alexander B. Thames, PhD

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Summary

Geoscientist and climate scientist with doctoral experience in developing tools and methodologies to support assessments of deep uncertainty, particularly for geophysical models and climate change impact analyses on natural-human systems like agriculture. Expertise in large ensemble exploratory modeling in the context of understanding novel system interactions, informing decision-making and risk, high-performance computing, and data science/analytics.

Education

PhD The Pennsylvania State University, Geosciences w/ Climate Science Dual-Title — Aug 2019 – Dec 2025

- *Dissertation*: Exploratory Modeling: An Interdisciplinary Tool for Tackling Deep Uncertainty Across Earth System Science
- *Advisors*: Dr. Bradford Foley, Dr. Antonia Hadjimichael

BSc The Pennsylvania State University, Physics w/ Mathematics Minor — Aug 2011 – May 2015

Experience

PhD Research — Aug 2019 - Dec 2025

- Developed a stochastic weather generator in Python for statistically generating new realizations of precipitation and temperature from historical observations and regional CMIP6 downscaled projections
- Integrated weather generator into a regional hydrologic/agricultural consumptive use model to explore plausible agricultural risks and sensitivities of users and crops to climate in an institutionally complex river basin in the American west
- Constructed an exploratory geophysical model in MATLAB for investigating how Earth's internal and external water reservoirs affect its thermal history and confine the Earth's total water budget through the non-classical feedback of variable regassing efficiency
- Optimized and parallelized experiment design for high-dimensional climate models to improve and inform agricultural decision-making, and geophysical models to understand how new feedbacks in coupled mantle temperature-water models impact Earth's thermal evolution

Atmospheric Chemistry Researcher — Jun 2015 - Aug 2019

- Led fieldwork as primary operator of Airborne Tropospheric Hydrogen Oxides Sensor and OH reactivity instrument across one international intercomparison study (SAPHIR OHR Intercomparison) and two NASA-led airborne research campaigns (KORUS-AQ and ATom)
- Collected, processed, and analyzed *in situ* measurements using bespoke MATLAB software for over 600+ flight-research hours across all seven continents

Skills

Python, MATLAB, Linux/Unix, HPC (SLURM), GDScript, GLSL, C#	Programming
LaTeX, Git, Illustrator, Markdown, Microsoft Office Suite, Blender, QGIS	Software and Tools
English (fluent), Spanish (A2)	Languages

Publications

Active Manuscripts

Thames, A.B., Hadjimichael, A., and Quinn, J.D.: `swxg`: A Python Library for Generalized Multivariate, Multisite, Copula-Based Stochastic Weather Generation. *Journal of Open Research Software*. In Review. — Dec 2025

Thames, A.B. and Foley, B.: Reconciling Coupled Thermal-Water Evolution Models of Earth with Observations through Variable Regassing Efficiency. *Journal of Geophysical Research: Solid Earth*. Submitted. — Dec 2025

Thames, A.B., Hadjimichael, A., and Quinn, J.D.: Climate Sensitivity of Agricultural Water Demand Depends on Control Over Growing Season: Implications for Producers in the Upper Colorado River Basin. *Water Resources Research*. Submitted. — Dec 2025

Published Manuscripts

Baublitz, C.B., Fiore, A.M., Ludwig, S.M., Nicely, J.M., Wolfe, G.M., Murray, L.T., Commane, R., Prather, M.J., Anderson, D.C., Correa, G., Duncan, B.N., Follette-Cook, M., Westervelt, D.M., Bourgeois, I., Brune, W.H., Bui, T.P., DiGangi, J.P., Diskin, G.S., Hall, S.R., McKain, K., Miller, D.O., Peischl, J., **Thames, A.B.**, Thompson, C.R., Ullmann, K., and Wofsy, S.C.: An observation-based, reduced-form model for oxidation in the remote marine troposphere. *Proceedings of the National Academy of Sciences*, 120(34), e2209735120. — 2023
10.1073/pnas.2209735120

Thompson, C.R., Wofsy, S.C., Prather, M.J., Newman, P.A., Hanisco, T.F., Ryerson, T.B., Fahey, D.W., Apel, E.C., Brock, C.A., Brune, W.H., Froyd, K., Katich, J.M., Nicely, J.M., Peischl, J., Ray, E., Veres, P.R., Wang, S., Allen, H.M., Asher, E., Bian, H., Blake, D., Bourgeois, I., Budney, J., Bui, T.P., Butler, A., Campuzano-Jost, P., Chang, C., Chin, M., Commane, R., Correa, G., Crounse, J.D., Daube, B., Dibb, J.E., DiGangi, J.P., Diskin, G.S., Dollner, M., Elkins, J.W., Fiore, A.M., Flynn, C.M., Guo, H., Hall, S.R., Hannun, R.A., Hills, A., Hintsa, E.J., Hodzic, A., Hornbrook, R.S., Huey, L.G., Jimenez, J.L., Keeling, R.F., Kim, M.J., Kupc, A., Lacey, F., Lait, L.R., Lamarque, J.-F., Liu, J., McKain, K., Meinardi, S., Miller, D.O., Montzka, S.A., Moore, F.L., Morgan, E.J., Murphy, D.M., Murray, L.T., Nault, B.A., Neuman, J.A., Nguyen, L., Gonzalez, Y., Rollins, A.W., Rosenlof, K., Sargent, M., Schill, G.P., Schwarz, J.P., St Clair, J.M., Steenrod, S.D., Stephens, B.B., Strahan, S.E., Strode, S.A., Sweeney, C., **Thames, A.B.**, Ullmann, K., Wagner, N., Weber, R., Weinzierl, B., Wennberg, P.O., Williamson, C.J., Wolfe, G.M., and Zeng, L.: The NASA Atmospheric Tomography (ATom) mission: Imaging the chemistry of the global atmosphere. *Bulletin of the American Meteorological Society*, 103(3), E761-E790. — 2022
10.1175/BAMS-D-20-0315.1

Brune, W.H., Miller, D.O., **Thames, A.B.**, Brosius, A.L., Barletta, B., Blake, D.R., Blake, N.J., Chen, G., Choi, Y., Crawford, J.H., DiGangi, J.P., Diskin, G., Fried, A., Hall, S.R., Hanisco, T.F., Huey, G.L., Hughes, S.C., Kim, M., Meinardi, S., Montzka, D.D., Pusede, S.E., Schroeder, J.R., Teng, A., Tanner, D.J., Ullmann, K., Walega, J., Weinheimer, A., Wisthaler, A., and Wennberg, P.O.: Observations of atmospheric oxidation and ozone production in South Korea. *Atmospheric Environment*, 269, 118854. — 2022
10.1016/j.atmosenv.2021.118854

Kim, S., Seco, R., Gu, D., Sanchez, D., Jeong, D., Guenther, A.B., Lee, Y., Mak, J.E., Su, L., Kim, D.B., Lee, Y., Ahn, J.-Y., Mcgee, T., Sullivan, J., Long, R., Brune, W.H., **Thames, A.B.**, Wisthaler, A., Müller, M., Mikoviny, T., Weinheimer, A., Yang, M., Woo, J.-H., Kim, S., and Park, H.: The role of a suburban forest in controlling vertical trace gas and OH reactivity distributions–a case study for the Seoul metropolitan area. *Faraday discussions*, 226, 537-550. — 2021
10.1039/D0FD00081G

Kupc, A., Williamson, C.J., Hodshire, A.L., Kazil, J., Ray, E., Bui, T.P., Dollner, M., Froyd, — 2020

K.D., McKain, K., Rollins, A., Schill, G.P., **Thames, A.B.**, Weinzierl, B.B., Pierce, J.R., and Brock, C.A.: The potential role of organics in new particle formation and initial growth in the remote tropical upper troposphere. *Atmospheric Chemistry and Physics*, 20(23), 15037-15060.
10.5194/acp-20-15037-2020

Wang, S., Apel, E.C., Schwantes, R.H., Bates, K.H., Jacob, D.J., Fischer, E.V., Hornbrook, R.S., Hills, A.J., Emmons, L.K., Pan, L.L., Honomichl, S., Tilmes, S., Lamarque, J.-F., Yang, M., Marandino, C.A., Saltzman, E.S., de Bruyn, W., Kameyama, S., Tanimoto, H., Omori, Y., Hall, S.R., Ullmann, K., Ryerson, T.B., Thompson, C.R., Peischl, J., Daube, B.C., Commane, R., McKain, K., Sweeney, C., **Thames, A.B.**, Miller, D.O., Brune, W.H., Diskin, G.S., DiGangi, J.P., and Wofsy, S.C.: Global atmospheric budget of acetone: Air-sea exchange and the contribution to hydroxyl radicals. *Journal of Geophysical Research: Atmospheres*, 125(15), e2020JD032553. 2020
10.1029/2020JD032553

Travis, K.R., Heald, C.L., Allen, H.M., Apel, E.C., Arnold, S.R., Blake, D.R., Brune, W.H., Chen, X., Commane, R., Crounse, J.D., Daube, B.C., Diskin, G.S., Elkins, J.W., Evans, M.J., Hall, S.R., Hintsa, E.J., Hornbrook, R.S., Kasibhatla, P.S., Kim, M.J., Luo, G., McKain, K., Millet, D.B., Moore, F.L., Peischl, J., Ryerson, T.B., Sherwen, T., **Thames, A.B.**, Ullmann, K., Wang, X., Wennberg, P.O., Wolfe, G.M., and Yu, F.: Constraining remote oxidation capacity with ATom observations. *Atmospheric Chemistry and Physics*, 20(13), 7753-7781. 2020
10.5194/acp-20-7753-2020

Thames, A.B., Brune, W.H., Miller, D.O., Allen, H.M., Apel, E.C., Blake, D.R., Bui, T.P., Commane, R., Crounse, J.D., Daube, B.C., Diskin, G.S., DiGangi, J.P., Elkins, J.W., Hall, S.R., Hanisco, T.F., Hannun, R.A., Hintsa, E., Hornbrook, R.S., Kim, M.J., McKain, K., Moore, F.L., Nicely, J.M., Peischl, J., Ryerson, T.B., St. Clair, J.M., Sweeney, C., Teng, A., Thompson, C.R., Ullmann, K., Wennberg, P.O., and Wolfe, G.M.: Missing OH reactivity in the global marine boundary layer. *Atmospheric Chemistry and Physics*, 20(6), 4013-4029. 2020
10.5194/acp-20-4013-2020

Veres, P.R., Neuman, J.A., Bertram, T.H., Assaf, E., Wolfe, G.M., Williamson, C.J., Weinzierl, B., Tilmes, S., Thompson, C.R., **Thames, A.B.**, Schroder, J.C., Saiz-Lopez, A., Rollins, A.W., Roberts, J.M., Price, D., Peischl, J., Nault, B.A., Møller, K.H., Miller, D.O., Meinardi, S., Li, Q., Lamarque, J.-F., Kupc, A., Kjaergaard, H.G., Kinnison, D., Jimenez, J.L., Jernigan, C.M., Hornbrook, R.S., Hills, A., Dollner, M., Day, D.A., Cuevas, C.A., Campuzano-Jost, P., Burkholder, J., Bui, T.P., Brune, W.H., Brown, S.S., Brock, C.A., Bourgeois, I., Blake, D.R., Apel, E.C., and Ryerson, T.B.: Global airborne sampling reveals a previously unobserved dimethyl sulfide oxidation mechanism in the marine atmosphere. *Proceedings of the National Academy of Sciences*, 117(9), 4505-4510. 2020
10.1073/pnas.1919344117

Brune, W.H., Miller, D.O., **Thames, A.B.**, Allen, H.M., Apel, E.C., Blake, D.R., Bui, T.P., Commane, R., Crounse, J.D., Daube, B.C., DiGangi, J.P., Diskin, G.S., Elkins, J.W., Hall, S.R., Hanisco, T.F., Hannun, R.A., Hintsa, E.J., Hornbrook, R.S., Kim, M.J., McKain, K., Moore, F.L., Neuman, J.A., Nicely, J.M., Peischl, J., Ryerson, T.B., St. Clair, J.M., Sweeney, C., Teng, A.P., Thompson, C., Ullmann, K., Veres, P.R., Wennberg, P.O., and Wolfe, G.M. Exploring oxidation in the remote free troposphere: Insights from Atmospheric Tomography (ATom). *Journal of Geophysical Research: Atmospheres*, 125(1), e2019JD031685. 2020
10.1029/2019JD031685

Wolfe, G.M., Abad, G.G., Brune, W.B., Bui, P., Chang, C., Crounse, J.D., Dean-Day, J., Diskin, G., Hall, S.R., Hanisco, T.F., Kim, M., Liao, J., McKain, K., Miller, D., Nicely, J.M., Oman, L.D., Peischl, J., Ryerson, T.B., Sweeney, C., St. Clair, J.M., **Thames, A.B**, Thompson, C.R., Ullmann, K., and Wennberg, P.O.: Mapping hydroxyl variability throughout the global remote troposphere via synthesis of airborne and satellite formaldehyde observations. *Proceedings of the National Academy of Sciences*, 116(23), 11171-11180. 2019
10.1073/pnas.1821661116

Romer P.S., Wooldridge P.J., Crounse J.D., Kim M.J., Wennberg P.O., Dibb J.E., Scheuer E., Blake D.R., Meinardi S., Brosius A.L., **Thames A.B.**, Miller D.O., Brune W.H., Hall S.R., Ryerson T.B., and Cohen R.C.: Constraints on Aerosol Nitrate Photolysis as a Potential Source of HONO and NO_x. *Environ Sci Technol*, 52(23):13738-13746. 10.1021/acs.est.8b03861 2018

Fuchs, H., Novelli, A., Rolletter, M., Hofzumahaus, A., Pfannerstill, E. Y., Kessel, S., Edtbauer, A., Williams, J., Michoud, V., Dusanter, S., Locoge, N., Zannoni, N., Gros, V., Truong, F., Sarda-Esteve, R., Cryer, D. R., Brumby, C. A., Whalley, L. K., Stone, D., Seakins, P. W., Heard, D. E., Schoemaecker, C., Blocquet, M., Coudert, S., Batut, S., Fittschen, C., **Thames, A. B.**, Brune, W. H., Ernest, C., Harder, H., Muller, J. B. A., Elste, T., Kubistin, D., Andres, S., Bohn, B., Hohaus, T., Holland, F., Li, X., Rohrer, F., Kiendler-Scharr, A., Tillmann, R., Wegener, R., Yu, Z., Zou, Q., and Wahner, A.: Comparison of OH reactivity measurements in the atmospheric simulation chamber SAPHIR. *Atmos. Meas. Tech.*, 10, 4023–4053. 10.5194/amt-10-4023-2017 2017

Datasets

Thames, A.B. Output Data for Thames et al. – Climate Sensitivity of Agricultural Water Demand (1.0.1) [Dataset]. Zenodo. 10.5281/zenodo.18148466 2026

Thames, A.B. Input Data for Thames et al. – Climate Sensitivity of Agricultural Water Demand (1.0.0) [Dataset]. Zenodo. 10.5281/zenodo.18071209 2025

Thames, A.B.. Output Data for Thames & Foley – Reconciling Coupled Thermal-Water Evolution Models (1.0.0) [Dataset]. Zenodo. 10.5281/zenodo.17903920 2025

Brune, W.H., Miller, D.O., and **Thames, A.B.**: ATom: L2 Measurements from Airborne Tropospheric Hydrogen Oxides Sensor (ATHOS). ORNL DAAC, Oak Ridge, Tennessee, USA. 10.3334/ORNLDAAC/1709 2019

Wolfe, G.M., Abad, G.G., Brune, W.H., Bui, T.P., Chang, C.S., Crounse, J.D., Dean-Day, J.M., Diskin, G.S., Hall, S.R., Hanisco, T.F., Kim, M.J., Liao, J., Mccain, K., Miller, D.O., Nicely, J.M., Oman, L., Peischl, J., Ryerson, T.B., Sweeney, C., St.Clair, J.M., **Thames, A.B.**, Ullmann, K., Wennberg, P.: ATom: Column-Integrated Densities of Hydroxyl and Formaldehyde in Remote Troposphere. ORNL DAAC, Oak Ridge, Tennessee, USA. 10.3334/ORNLDAAC/1669 2019

Wofsy, S.C., Afshar, S., Allen, H.M., Apel, E.C., Asher, E.C., Barletta, B., Bent, J., Bian, H., Biggs, B.C., Blake, D.R., Blake, N., Bourgeois, I., Brock, C.A., Brune, W.H., Budney, J.W., Bui, T.P., Butler, A., Campuzano-Jost, P., Chang, C.S., Chin, M., Commane, R., Correa, G., Crounse, J.D., Cullis, P.D., Daube, B.C., Day, D.A., Dean-Day, J.M., Dibb, J.E., DiGangi, J.P., Diskin, G.S., Dollner, M., Elkins, J.W., Erdesz, F., Fiore, A.M., Flynn, C.M., Froyd, K.D., Gesler, D.W., Hall, S.R., Hanisco, T.F., Hannun, R.A., Hills, A.J., Hintsa, E.J., Hoffman, A., Hornbrook, R.S., Huey, L.G., Hughes, S., Jimenez, J.L., Johnson, B.J., Katich, J.M., Keeling, R.F., Kim, M.J., Kupc, A., Lait, L.R., Lamarque, J.-F., Liu, J., McKain, K., Mclaughlin, R.J., Meinardi, S., Miller, D.O., Montzka, S.A., Moore, F.L., Morgan, E.J., Murphy, D.M., Murray, L.T., Nault, B.A., Neuman, J.A., Newman, P.A., Nicely, J.M., Pan, X., Paplawsky, W., Peischl, J., Prather, M.J., Price, D.J., Ray, E.A., Reeves, J.M., Richardson, M., Rollins, A.W., Rosenlof, K.H., Ryerson, T.B., Scheuer, E., Schill, G.P., Schroder, J.C., Schwarz, J.P., St.Clair, J.M., Steenrod, S.D., Stephens, B.B., Strode, S.A., Sweeney, C., Tanner, D., Teng, A.P., **Thames, A.B.**, Thompson, C.R., Ullmann, K., Veres, P.R., Vieznor, N., Wagner, N.L., Watt, A., Weber, R., Weinzierl, B., Wennberg, P.O., Williamson, C.J., Wilson, J.C., Wolfe, G.M., Woods, C.T., Zeng, L.H.: ATom: Merged Atmospheric Chemistry, Trace Gases, and Aerosols. ORNL DAAC, Oak Ridge, Tennessee, USA. 10.3334/ORNLDAAC/1581 2018

Software

Thames, A.B. swxg: A Python Library for Generalized Multivariate, Multisite, Copula-Based Stochastic Weather Generation (0.4.0). Zenodo. 10.5281/zenodo.17592197 — 2025

Grants, Awards, and Certificates

Paul D. Krynine Scholarship — 2020 - 2022, 2024 - 2025
The Pennsylvania State University

2nd Place, Oral Presentations — 2025
Penn State Interdisciplinary Environmental Research Symposium

Alley Family Graduate Scholarship — 2024
The Pennsylvania State University

NASA ARSET: Drought Monitoring, Prediction, and Projection — 2024
National Aeronautics and Space Administration

Pottorf Endowment for Graduate Excellence — 2024
The Pennsylvania State University

Michael Loudin Family Graduate Scholarship — 2023
The Pennsylvania State University

Earle S. Lenker Award — 2022 - 2023
The Pennsylvania State University

NASA Group Achievement Award | Atmospheric Tomography (ATom) — 2019
The Pennsylvania State University

NASA Group Achievement Award | Korea-US Air Quality Mission (KORUS-AQ) — 2016
The Pennsylvania State University

Presentations and Conferences

Thames, A.B., Hadjimichael, A., and Quinn, J.D.: Climate Sensitivity of Agricultural Water Demand Depends on Control Over Growing Season. *American Geophysical Union*, Poster Presentation. — New Orleans, LA 2025

Thames, A.B., Hadjimichael, A., and Quinn, J.D.: Assessing Compound Climate Impacts to Agriculture in the Upper Colorado River Basin Using a Multisite Weather Generator. *Penn State Climate Solutions Symposium*, Poster Presentation. — State College, PA 2025

Thames, A.B. and Hadjimichael, A.: Assessing Compound Climate Impacts on Agricultural Water Requirements in the Upper Colorado River Basin. *Penn State Department of Geosciences Graduate Colloquium*, Oral Presentation. — State College, PA 2025

Thames, A.B. and Hadjimichael, A.: Assessing Compound Climate Impacts on Agricultural Water Requirements in the Upper Colorado River Basin. *Penn State Interdisciplinary Environmental Research Symposium*, Oral Presentation. — State College, PA 2025

Thames, A.B. and Hadjimichael, A.: Assessing Compound Climate Impacts on Agricultural Water Requirements in the Upper Colorado River Basin. *Penn State Association of Water Students*, Oral Presentation. — State College, PA 2025

Thames, A.B., Hadjimichael, A., and Quinn J.D.: Understanding Compound Climate Impacts to Agriculture Using a Multisite Weather Generator in the Upper Colorado River Basin. *American Geophysical Union*, Poster Presentation. — Washington, D.C. 2024

Climate Intelligence Summer School — Lake Como, Italy 2024
Attendee

Thames, A.B., Hadjimichael, A., Kukal M.S., and Raj, C.: Assessing the Compound Impacts of Precipitation and Temperature on Agriculture in the Upper Colorado River Basin. *American Geophysical Union*, Poster Presentation.	San Francisco, CA 2023
Thames, A.B. and Foley, B.J.: Producing Feasible Water and Thermal Evolutions for Earth's Mantle Using Monte Carlo Analysis. *American Geophysical Union*, Poster Presentation.	Online 2021
Thames, A.B. and Foley, B.J.: Using Monte Carlo Analysis and Present-Day Constraints on Earth's Water Budget to Produce Feasible Water and Thermal Histories via Reverse-Time Integration. *American Geophysical Union*, Poster Presentation.	Online 2020
Thames, A.B., Brune, W.B., and Miller, D.O.: Global OH Reactivity in the Remote Marine Boundary Layer and the Potential of Missing Reactivity. *American Geophysical Union*, NASA ATom Science Team, Poster Presentation.	Washington, D.C. 2018
Thames, A.B., Brune, W.B., and Miller, D.O.: Research Update #2. *Atmospheric Tomography Mission Science Team Meeting II*, Oral Presentation.	Boulder, CO 2018
Thames, A.B., Brune, W.B., and Miller, D.O.: Research Update #2. *Korea-US Air Quality Mission Science Team Meeting II*, Oral Presentation.	Irvine, CA 2018
Thames, A.B., Brune, W.B., and Miller, D.O.: Measured OH Reactivity in ATom1 and ATom2. *American Meteorological Society*, Poster Presentation.	Austin, TX 2018
Thames, A.B., Brune, W.B., and Miller, D.O.: Research Update #1. *Atmospheric Tomography Mission Science Team Meeting I*, Poster Presentation.	Boulder, CO 2017
Thames, A.B., Brune, W.B., Miller, D.O., and Brosius, A.L.: Research Update #1. *Korea-US Air Quality Mission Science Team Meeting I*, Oral Presentation.	Jeju Island, South Korea 2017
Thames, A.B., Brune, W.B., Miller, D.O., and Brosius, A.L.: Research Update #1. *OH Reactivity Intercomparison Science Team Meeting*, Oral Presentation.	Jülich, Germany 2016