Alexander B. Thames

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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 numerical models and climate change impact analyses on natural-human systems like agriculture. Expertise in large ensemble exploratory modeling in the context of robust decision-making, stochastic generators, high-performance computing, data science/analytics, and statistical techniques.

Education

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

- *Dissertation*: Exploring Epistemic, Aleatoric, and Deep Uncertainties Across the Earth Sciences through Large Ensemble Modeling (working title)
- *Advisors*: Dr. Bradford Foley, Dr. Antonia Hadjimichael

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

Experience

PhD Dissertation and Research — 2019 - 2025

- Developed a stochastic weather generator in Python for synthesizing novel realizations of downscaled CMIP6 projections of precipitation and temperature
- Integrated the weather generator into a regional hydrologic/agricultural consumptive use model to investigate impacts on agricultural water requirements due to climate change in the Upper Colorado River Basin
- Ran agricultural impacts experiment across 10,000s of realizations in a Linux/Unix high-performance computing environment to explore plausible climate risks and hazards to agriculture
- 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

Atmospheric Chemistry Researcher — 2015 - 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 created software for over 600+ flight-research hours across all seven continents

Skills

Multi-disciplinary investigation of natural-human systems, statistical data analysis, model creation and validation, data visualization, high-performance computing, geophysical datasets, technical writing and communication	Expertise
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

In Prep

Thames, A.B. and Foley, B.: Impacts of a Variable Regassing Efficiency on Coupled Thermal-Water Evolution Models. (to be submitted to *Geophysical Research Letters*) — Jul 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. (to be submitted to *Water Resources Research*) — Aug 2025

Peer-Reviewed Journal Articles

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. 10.1073/pnas.2209735120 — 2023

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. 10.1175/BAMS-D-20-0315.1 — 2022

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. 10.1016/j.atmosenv.2021.118854 — 2022

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. 10.1039/D0FD00081G — 2021

Kupc, A., Williamson, C.J., Hodshire, A.L., Kazil, J., Ray, E., Bui, T.P., Dollner, M., Froyd, 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 — 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. 10.1029/2020JD032553 2020

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. 10.5194/acp-20-7753-2020 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. 10.5194/acp-20-4013-2020 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. 10.1073/pnas.1919344117 2020

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. 10.1029/2019JD031685 2020

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. 10.1073/pnas.1821661116 2019

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

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

Presentations and Conferences

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; 2nd Place. — 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
Attendee — 2024

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

Grants, Awards, and Certificates

Alley Family Graduate Scholarship — 2024
The Pennsylvania State University

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

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

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