

Columbia University

Learning the Earth with Artificial Intelligence and Physics (LEAP) Center  
Department of Earth and Environmental Engineering  
Mudd Hall, New York, NY 10027

Website: <https://kdlamb.github.io>

RESEARCH INTERESTS

Atmospheric Chemistry and Physics    Aerosol and Cloud Physics  
Data-driven Cloud Parameterizations    Physics-Informed Machine Learning  
Wildfire Air Quality & Climate Impacts    *In situ* Atmospheric Observations

ACADEMIC APPOINTMENTS

Associate Research Scientist, Dept. of Earth and Env. Engineering  
Adjunct Assistant Professor, Climate School  
Columbia University

Mar. 2020 — current  
July 2025 — Aug. 2025  
New York, NY

Mentor: Pierre Gentine

Research Scientist II  
Research Scientist I

Jan 2019 — Feb. 2020  
Jan. 2016 — Jan. 2019  
Boulder, CO

Cooperative Institute for Research in the Environmental Sciences/NOAA Chemical Sciences Division

Mentor: Joshua P. Schwarz

EDUCATION & TRAINING

Ph.D., University of Chicago, Physics	2015
Advisor: Elisabeth J. Moyer	
Thesis: In Situ Isotopic Water as a Tracer of Cold Cloud Microphysics	
M.S., University of Chicago, Physics	2008
Advisor: Cheng Chin	
Topic: Atomic, Molecular, and Optical Physics	
B.S., University of Illinois Urbana-Champaign, Physics	2007
Summa Cum Laude, with highest distinction in the curriculum	

AWARDS & HONORS

NASA Group Achievement Award, ATOM Campaign	2019
Finalist, Flame Challenge, "What is Climate?", Alan Alda Center for Science Communication	2018
NASA Group Achievement Award, KORUS-AQ Campaign	2017
NOAA Earth System Research Laboratory Gold Star Award for Scientific Outreach	2016
Winstein Travel Award, University of Chicago, Department of Physics	2014
NSF Graduate Research Fellowship	2009
National Defense Science and Engineering Graduate (NDSEG) Fellowship	2009
Robert G. Sachs Summer Fellowship, University of Chicago, Department of Physics	2007
Maria Goeppert-Mayer Fellowship, University of Chicago, Department of Physics	2007
Outstanding Senior Award, UIUC Campus Honors Program	2007
Laura B. Eisenstein Award, UIUC Department of Physics	2007
Commonwealth Edison/Beryl Bristow Award, UIUC Department of Physics	2005

MANUSCRIPTS IN PREPARATION

[1] **K.D. Lamb**, J.Y. Harrington. Discovering How Ice Crystals Grow using Neural Ordinary Differential Equations and Symbolic Regression. In preparation for *Proceedings of the National Academies of Science*.

[2] O. Sturm, **K.D. Lamb**<sup>†</sup>, J. Ko, A. Ngyuen, P. Dicus, E. Ware, S. Silva, K.K. Chandrakar (<sup>†</sup>as mentor). A Golden Spiral of Thermodynamic Histories: Characterizing Trajectories of Ice Crystals in Cirrus Clouds as Modeled by Particle-based Microphysics in CM1. In preparation for *Atmospheric Chemistry and Physics*.

[3] J. Ko, J.Y. Harrington, K. Sulia, V. Przybylo, M. van Lier Walqui, **K.D. Lamb**<sup>†</sup> (<sup>†</sup>as mentor). Informing Depositional Ice Growth Models through 3-D Reconstruction of Ice Crystal Images using Machine Learning. In preparation for *Journal of Geophysical Research: Machine Learning and Computation*.

[4] J. Buch, **K.D. Lamb**<sup>†</sup>, C.E. Singer, P. Gentine. (<sup>†</sup>as mentor). Optimizing cloud seeding for rain enhancement with a denoising diffusion model. In preparation for *Atmospheric Chemistry and Physics*.

[5] M.H. Erfani, **K.D. Lamb**<sup>†</sup>, S.E. Bauer, K. Tsigaridis, M. van Lier Walqui, G. Schmidt (<sup>†</sup>as mentor). Spatio-Temporal Machine Learning Models for the Emulation of Aerosol Concentrations in Earth System Models. In preparation for *JGR: Machine Learning and Computation*.

- [1] **K.D. Lamb**, C. Singer, K. Loftus, H. Morrison, M. Powell, J. Ko, J. Buch, A. Hu, M. van Lier Walqui, P. Gentine. Perspectives on Systematic Cloud Microphysics Scheme Development with Machine Learning. Submitted, *Journal of Advances in Modeling Earth Systems*.
- [2] J. Nathaniel, C. Roesch, J. Buch, D. DeSantis, A. Rupe, **K.D. Lamb**, P. Gentine. Deep Koopman operator framework for causal discovery in nonlinear dynamical systems. Submitted, *Communications Physics*.
- [3] Aaryan Doshi, **K.D. Lamb**<sup>†</sup> (<sup>†</sup>as mentor). Classification of Absorbing Aerosols with the SP2 with Unsupervised Machine Learning. Submitted, *Atmospheric Measurement Techniques*.
- [4] J.J. Donohue, **K.D. Lamb**<sup>†</sup> (<sup>†</sup>as mentor). Structured Dataset of Reported Cloud Seeding Activities in the United States (2000 - 2025) using a Large Language Model. Under review, *Scientific Data*.

## PUBLICATIONS

- [1] K. Liao, J. Buch, **K.D. Lamb**<sup>†</sup>, P. Gentine (<sup>†</sup>as mentor). Simulating the Air Quality Impacts of Prescribed Fires Using a Graph Neural Network-Based PM2.5 Emissions Forecasting System. *Environmental Data Science*, 4:e11. doi:10.1017/eds.2025.4, 2025.
- [2] M. Liu, H. Matsui, D. Hamilton, S. Rathod, **K.D. Lamb**, N. Mahowald. Representation of iron aerosol size distribution is critical in evaluating atmospheric soluble iron input to the ocean. *Atmospheric Chemistry and Physics*, 24, 22, 13115-13127, 2024.
- [3] **K.D. Lamb**, M. van Lier Walqui, S. Santos, H. Morrison. Reduced order modeling for linearized representations of microphysical process rates. *Journal of Advances in Modeling Earth Systems*, 10.1029/2023MS003918, 2024.
- [4] **K.D. Lamb**, P. Gentine. Zero-Shot Learning of Aerosol Optical Properties Using Graph Neural Networks. *Scientific Reports*, 13, 18777, 2023.
- [5] S. Shamekh, **K.D. Lamb**, Y. Huang, P. Gentine. Implicit Learning of Convective Organization Explains Precipitation Stochasticity. *Proceedings of the National Academy of Sciences*, 120 (20) e2216158120, 2023.
- [6] J.M Katich, E. Apel, I. Bourgeois, C. Brock, T.P. Bui, P. Campuzano-Jost, R. Commane, B. Daube, M. Dollner, M. Fromm, K.D. Froyd, A.J. Hills, R.S. Hornbrook, J. Jimenez, A. Kupc, **K.D. Lamb**, K. McKain, F. Moore, D.M. Murphy, B.A. Nault, J. Peischl, D.A. Peterson, E.A. Ray, K.H. Rosenlof, T. Ryerson, G.P. Schill, J.C. Schroder, B. Weinzierl, C. Thompson, C.J. Williamson, S. Wofsy, P. Yu, J.P. Schwarz. Pyrocumulonimbus significantly impact average stratospheric aerosol composition. *Science*, 379, 6634, 2023.
- [7] **K.D. Lamb**, J. Harrington, B.W. Clouser, E.J. Moyer, L. Sarkozy, V. Ebert, O. Möhler, and H. Saathoff. Re-evaluating cloud chamber constraints on depositional ice growth in cirrus clouds– Part 1: Model description and sensitivity tests. *Atmos. Chem. Phys.*, 23, 6043-6064, 2023.
- [8] A. E. Perring, B. Mediavilla, D. Wilbanks, J. Churnside, R. Marchbanks, **K.D. Lamb**, R-S. Gao. Airborne Bioaerosol Observations Imply a Strong Terrestrial Source in the Summertime Arctic. *Journal of Geophysical Research: Atmospheres*, doi: 10.1029/2023JD039165, 2023.
- [9] M. Liu, H. Matsui, D.S. Hamilton, **K.D. Lamb**, S.D. Rathod, J.P. Schwarz, N.M. Mahowald. The under-appreciated role of anthropogenic sources in atmospheric soluble iron flux to the Southern Ocean. *npj Climate and Atmospheric Science*, 5, 28, 2022.
- [10] C.C. Womack, K.M. Manfred, N.L. Wagner, G. Adler, A. Franchin, **K.D. Lamb**, A.M. Middlebrook, J.P. Schwarz, C.A. Brock, S.S. Brown, R.A. Washenfelder. Complex refractive indices in the ultraviolet and visible spectral region for highly absorbing non-spherical biomass burning aerosol. *Atmospheric Chemistry and Physics*, 21, 7235-7252, 2021.
- [11] Y. Choi, Y.S. Ghim, M. Segal-Rozenhaimer, J. Redemann, S.E. LeBlanc, Y. Lee, T. Lee, T. Park, J.P. Schwarz, **K.D. Lamb**, C.J. Flynn, R.J. Johnson, and A.E. Perring. Temporal and spatial variations of aerosol optical properties over the Korean peninsula during KORUS-AQ. *Atmospheric Environment*, 118301, ISSN 1352-2310, 2021.
- [12] **K.D. Lamb**, H. Matsui, J. Katich, A.P. Perring, J.R. Spackman, B. Weinzierl, M. Dollner, and J.P. Schwarz. Global-scale constraints on light-absorbing anthropogenic iron oxide aerosols. *npj Climate and Atmospheric Science* 4, 15, 2021.
- [13] C. Cho, J.P. Schwarz, A.E. Perring, **K.D. Lamb**, Y. Kondo, J.U. Park, D.H. Park, K. Shim, J.S. Park, R.J. Park, M. Lee, C.K. Song, S.W. Kim. Light-absorption enhancement of black carbon in the Asian outflow: Airborne SP2 observations during KORUS-AQ. *Science of the Total Environment*, Jun 15, 2021.
- [14] C.E. Jordan, J.H. Crawford, A.J. Beyersdorf, T.F. Eck, H.S. Halliday, B.A. Nault, L.-S. Chang, R. Park, G. Lee, H. Kim, S. Cho, H.J. Shin, J.H. Lee, J. Jung, D.S. Kim, M. Lee, T. Lee, A. Whitehall, J. Szykman, M.K. Schueneman, P. Campuzano-Jost, J.L. Jimenez, J.P. DiGangi, G.S. Diskin, B.E. Anderson, R.H. Moore, L.D. Ziemba, M.A. Fenn, J.W. Hair, R.E. Kuehn, R.E. Holz, G. Chen, K. Travis, M. Shook, D.A. Peterson, **K.D. Lamb**, J.P. Schwarz. Investigation of Factors Controlling PM2.5 Variability across the South Korean peninsula during KORUS-AQ. *Elementa: Science of the Anthropocene* 8, 2020.
- [15] L. Sarkozy, B. Clouser, **K.D. Lamb**, E.J. Stutz, H. Saathoff, O. Möhler, S. Wagner, V. Ebert, B. Kühnreich, and E. Moyer. The Lab Chicago Water Isotope Spectrometer: a tunable diode laser spectrometer for chamber-based measurements of water vapor isotopic evolution during cirrus formation. *Review of Scientific Instruments*, 91, 4, 2020.
- [16] P.E. Saide, M. Gao, Z. Lu, D. Goldberg, D.G. Streets, J.-H. Woo, A. Beyersdorf, C. Corr, K.L. Thornhill, B. Anderson, J.W. Hair, A.R. Nehr, G.S. Diskin, J.L. Jimenez, B.A. Nault, P. Campuzano-Jost, J. Dibb, E. Heim, **K.D. Lamb**, J.P. Schwarz, A.E. Perring, J. Kim, M. Choi, B. Holben, G. Pfister, A. Hodzic, G.R. Carmichael, L. Emmons, J.H. Crawford. Understanding and improving model representation of aerosol optical properties for a Chinese haze event measured during KORUS-AQ. *Atmospheric Chemistry and Physics Discussion*, 20, 11, 6455-6478, 2020.
- [17] B. Clouser, **K.D. Lamb**, L. Sarkozy, A. Nisenoff, J. Habig, V. Ebert, H. Saathoff, O. Möhler, and E. Moyer. No anomalous supersaturation in ultracold cirrus laboratory experiments. *Atmospheric Chemistry and Physics*, 20, 1089-1103, 2020.
- [18] **K.D. Lamb**. Classification of iron oxide aerosols with a single particle soot photometer using supervised machine learning. *Atmospheric Measurement Techniques*, 12, 3885-3906, 2019.
- [19] G. Adler, N. Wagner, **K.D. Lamb**, K. Manfred, J. Schwarz, A. Franchin, A. Middlebrook, R. Washenfelder, C. Womak, R. Yokelson, and D. Murphy. Evidence in biomass burning smoke for light-absorbing aerosol with properties intermediate between black and brown carbon. *Aerosol Science and Technology*, p. 976-989, 2019.

- [20] H. Li, **K.D. Lamb**, J. Schwarz, V. Selimovic, R. Yokelson, G. McMeeking, and A. May. Inter-comparison of black carbon measurement methods for simulated open biomass burning emissions. *Atmospheric Environment*, Vol. 206, p.156-169, 2019.
- [21] B. Nault, P. Campuzano-Jost, D. Day, J. Schroder, B. Anderson, A. Beyersdorf, D. Blake, W. Brune, Y. Choi, C. Corr, J. de Gouw, J. Dibb, J. DiGangi, G. Diskin, A. Fried, L.G. Huey, M. Kim, C. Knote, **K.D. Lamb**, T. Lee, T. Park, S. Pusede, E. Scheuer, K. Thornhill, J.-H. Woo, and J. Jimenez. Secondary organic aerosol production from local emissions dominates the organic aerosol budget over Seoul, South Korea, during KORUS-AQ. *Atmospheric Chemistry and Physics*, 18(24):17769-17800, 2018.
- [22] **K.D. Lamb**, A. Perring, B. Samset, D. Peterson, S. Davis, B. Anderson, A. Beyersdorf, D. Blake, P. Campuzano-Jost, C. Corr, G. Diskin, Y. Kondo, N. Moteki, B. Nault, J. Oh, M. Park, S. Pusede, I. Simpson, K. Thornhill, A. Wisthaler, and J. Schwarz. Estimating Source Region Influences on Black Carbon Abundance, Microphysics, and Radiative Effect Observed Over South Korea. *Journal of Geophysical Research: Atmospheres*, 123(23): 13527-13548, 2018.
- [23] K.M. Manfred, R.A. Washenfelder, N.L. Wagner, G. Adler, F. Erdesz, C.C. Womack, **K.D. Lamb**, J.P. Schwarz, A. Franchin, and V. Selimovic. Investigating biomass burning aerosol morphology using a laser imaging nephelometer. *Atmospheric Chemistry and Physics*, 18(3):1879–1894, 2018.
- [24] **K.D. Lamb**, B.W. Clouser, M. Bolot, L. Sarkozy, V. Ebert, H. Saathoff, O. Möhler, and E.J. Moyer. Laboratory measurements of HDO/H<sub>2</sub>O isotopic fractionation during ice deposition in simulated cirrus clouds. *Proceedings of the National Academy of Sciences*, 114(22):5612–5617, 2017.
- [25] **K.D. Lamb**, C.C. Gerry, Q. Su, and R. Grobe. Unitary and nonunitary approaches in quantum field theory. *Physical Review A*, 75(1):013425, 2007.
- [26] **K.D. Lamb**, S. Menon, Q. Su, and R. Grobe. Non-perturbative retrieval of the scattering strength in one-dimensional media. *Physical Review E*, 74(6):061903, 2006.

## MACHINE LEARNING WORKSHOP PAPERS (PEER-REVIEWED)

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- [1] J. Nathaniel, C. Roesch, J. Buch, D. DeSantis, A. Rupe, **K.D. Lamb**, P. Gentine. Deep Koopman operator framework for causal discovery in non-linear dynamical systems. *International Conference on Machine Learning World Models Workshop*, 2025.
- [2] **K.D. Lamb**, J. Harrington. Discovering How Ice Crystals Grow Using Neural Ordinary Differential Equations and Symbolic Regression. *Machine Learning and the Physical Sciences Workshop*. 2024 Conference on Neural Information Processing Systems.
- [3] M. Erfani, **K.D. Lamb**<sup>†</sup>, S.E. Bauer, K. Tsigaridis, M. van Lier-Walqui, G. Schmidt (<sup>†</sup> as mentor). Spatio-Temporal Machine Learning Models for Emulation of Global Atmospheric Composition. *Tackling Climate Change with AI Workshop*. 2024 Conference on Neural Information Processing Systems.
- [4] K. Liao, J. Buch, **K.D. Lamb**<sup>†</sup>, P. Gentine (<sup>†</sup> as mentor). Simulating the Air Quality Impacts of Prescribed Fires Using a Graph Neural Network-Based PM<sub>2.5</sub> Forecasting System. Spotlight Talk, In *Tackling Climate Change with AI Workshop*. 2023 Conference on Neural Information Processing Systems.
- [5] J. Will, A. Jenney, **K.D. Lamb**, M.S. Pritchard, C. Kaul, P.-L. Ma, K. Pressel, J. Shpund, M van Lier Walqui, S. Mandt. Understanding and Visualizing Droplet Distributions in Simulations of Shallow Clouds with Variational Autoencoders. In *Machine Learning and the Physical Sciences Workshop* 2023 Conference on Neural Information Processing Systems.
- [6] E. Diaz Salas-Porras, K. Tazi, A. Braude, D. Okoh, **K.D. Lamb**<sup>†</sup>, D. Watson-Parris, P. Harder, N. Meinert (<sup>†</sup> as mentor). “Identifying the origins of Pyrocumulonimbus (PyroCb) events using an Invariance Causal Prediction framework.” In *Workshop on Causality for Real-world Impact*. 2022 Conference on Neural Information Processing Systems.
- [7] K. Tazi, E. Diaz Salas-Porras, A. Braude, D. Okoh, **K.D. Lamb**<sup>†</sup>, D. Watson-Parris, P. Harder, N. Meinert (<sup>†</sup> as mentor). “Pyrocast: a Machine Learning Pipeline to Forecast Pyrocumulonimbus (PyroCb) clouds.” In *Tackling Climate Change with AI Workshop*. 2022 Conference on Neural Information Processing Systems.
- [8] **K.D. Lamb**. “A deep learning approach for classifying black carbon aerosol morphology.” In *Tackling Climate Change with AI Workshop* 2019 Conference on Neural Information Processing Systems, Vancouver, BC, Dec. 2019.
- [9] **K.D. Lamb**<sup>\*</sup>, G. Malhotra<sup>\*</sup>, A. Vlontzos<sup>\*</sup>, E. Wagstaff<sup>\*</sup>, A.G. Baydin, A. Bhiwandiwalla, Y. Gal, A. Kalaitzis, A. Reina and A. Bhatt (<sup>\*</sup>equal contributions). “Prediction of GNSS Phase Scintillations: A Machine Learning Approach.” In *Machine Learning and the Physical Sciences Workshop* 2019 Conference on Neural Information Processing Systems, Vancouver, BC, Dec. 2019.
- [10] **K.D. Lamb**<sup>\*</sup>, G. Malhotra<sup>\*</sup>, A. Vlontzos<sup>\*</sup>, E. Wagstaff<sup>\*</sup>, A.G. Baydin, A. Bhiwandiwalla, Y. Gal, A. Kalaitzis, A. Reina and A. Bhatt (<sup>\*</sup>equal contributions) “Correlation of Auroral Dynamics and GNSS Scintillation with an Auto-encoder.” In *Machine Learning and the Physical Sciences Workshop* 2019 Conference on Neural Information Processing Systems, Vancouver, BC, Dec. 2019.

## SELECTED INVITED PRESENTATIONS AND SEMINARS

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- [1] Gordon Research Conference on Radiation and Climate. Lewiston, Maine, July, 2025.
- [2] Karlsruhe Institute of Technology, Meteorology Colloquium, Karlsruhe, Germany, April 2025.
- [3] Brookhaven National Laboratory Fall Seminar Series, Upton, NY, November, 2024.
- [4] ELIITT Focus Period Symposium “Machine Learning and Climate Science” University of Linköping, Sweden, October, 2024.
- [5] Columbia Climate School Faculty Seminar Series, Columbia University, New York, September 2024.
- [6] INCUS Science Team Meeting. Virtual, September 2024.
- [7] US Climate Variability and Predictability Program PSMI Panel, NOAA Geophysical Fluid Dynamics Lab, Princeton University, September 2024
- [8] Machine Learning for Earth System Modeling Workshop, ICML Conference 2024. Vienna, Austria, July 2024.

[9] Scientific Understanding through Data Science Seminar Series, NASA JPL, Virtual, July 2024.

[10] M2LINES (Multi-scale Machine Learning in Coupled Earth System Modeling) Collaboration Annual Meeting. Armonk, NY, June 2024.

[11] iMIRACLI Workshop on aerosol-cloud interactions and machine learning. University of Oxford, Oxford, UK, June 2024.

[12] Workshop on Ice Clouds, University of Vienna, Vienna, Austria, April 2024.

[13] EGU General Assembly 2024. Vienna, Austria, April 2024.

[14] Seminar, Korean Institute for Advanced Study, Virtual, March 2024.

[15] Colloquium, Dept. of Meteorology, Pennsylvania State University, State College, PA, January 2024.

[16] AGU Fall Meeting 2023. San Francisco, CA, December 2023.

[17] Seminar, NASA GISS, New York, NY, October 2023.

[18] Seminar, Clima Group, California Institute of Technology, Pasadena, CA, September 2023.

[19] Seminar, Atmospheric Science Department, University of Illinois Urbana Champaign, Champaign, IL, September 2023.

[20] Earth Science Colloquium, Lamont-Doherty Earth Observatory. Palisades, NY, April 2023.

[21] SIAM Mini-Symposium: Understanding cloud physics using stochastic, dynamical, and data-driven modeling. Amsterdam, NL, March 2023.

TEACHING EXPERIENCE

Adjunct Faculty	AI & ML for Climate and Env. Sustainability, Summer 2025	Columbia University
Instructor/Organizer	AMS AI Short Course, Winter 2024, 2025	American Meteorological Society
Guest Lecturer	Chemistry of Climate (UN3031), Fall 2023, 2024	Columbia University
Guest Lecturer	Intro to Atmospheric Chemistry (GU4924), Spring 2023	Columbia University
Guest Lecturer	Atmospheric Aerosols (CHEN E4600), Spring 2023	Columbia University
Teaching Assistant	Global Warming (PHSC 13400), Spring 2015	University of Chicago
Teaching Assistant	Electricity & Magnetism (PHYS 132), Winter 2014	University of Chicago
Teaching Assistant	Waves, Heat, & Optics (PHYS 133), Spring 2013	University of Chicago
Organizer	Physics Pedagogy Graduate Seminar, 2013 - 2014	University of Chicago
Teaching Assistant	Mechanics & Heat (PHYS 101), Spring 2006	University of Illinois Urbana-Champaign

STUDENTS AND POSTDOCS SUPERVISED

Mohammad Erfani, Postdoctoral researcher (Columbia University/NASA GISS, co-advised with Susanne Bauer), 2024 - present

Joseph Ko, Postdoctoral researcher (Columbia University), 2023 - present

Jatan Buch, Postdoctoral researcher (Columbia University, co-advised with Pierre Gentine), 2023 - present

Obin Sturm, LEAP Momentum Fellow (USC), 2024

Jared Donahue, DSI Scholar (Columbia University), 2025

Jonas Magdy Mikhaeil, Graduate researcher (Columbia University), 2023 - 2024

Matthew Beveridge, Graduate researcher (Columbia University/LEAP Momentum Fellow), 2023

Patrick Dicus, LEAP REU student (Hamilton College), 2024

Ashley Nguyen, LEAP REU student (UC Berkeley), 2024

Ryan Anselm, Undergraduate REU student (Columbia University), 2022

Melanie Thatcher, Intern (NOAA/STAR Fellows Program), 2017

Kyleen Liao, High school student (Saratoga High School, 2024 Regeneron top 300 Scholar, now at Stanford), 2022 - 2024

Aaryan Doshi, High school student (Monta Vista High School, 2025 Regeneron top 300 Scholar, now at Stanford), 2023 - present

GRANTS

Department of Energy, Atmospheric Systems Research Program (PI: Lamb, \$899,158) ..... Aug. 2022 - July 2025

NSF Center for Learning the Earth with Artificial Intelligence and Physics, Internal RFP, (PI: Lamb, \$220,000) ..... Jan. 2025 - Jan. 2027

NSF Center for Learning the Earth with Artificial Intelligence and Physics, Internal RFP, (PI: Lamb, \$220,000) ..... Jan. 2023 - Jan. 2025

Zegar Family Foundation Grant (Co-PI's: Lamb & Gentine, \$594,230) ..... Aug. 2023 - July 2026

NASA Digital Twins for Climate Science: Challenges and Potential Paths Forward (PI: Schmidt, \$2,146,596) ..... Sept. 2023 - Aug. 2026

COLLABORATIONS

NASA STG Quantitative Evaluation of Foundation Models (PI: Carroll, as named collaborator) ..... October 2024 - 2025

RESEARCH PROJECTS & FIELD CAMPAIGNS

Frontier Development Laboratory Europe	June 2022 — Aug. 2022
• Faculty (Aerosol Team), 8 week research sprint on applying AI/Causal methods to forecast pyroculonimbus.	
NASA Frontier Development Laboratory	June 2019 — Aug. 2019
• Researcher (GNSS Forecasting Team), 8 week research sprint to apply AI/ML to space and earth science research.	
NOAA FIREX Firelab Study	Oct. 2016 — Nov. 2016
• Laboratory study to characterize the optical properties of biomass burning aerosols at the USDA Fire Sciences Laboratory	
NASA/NIER Korean-United States Air Quality Study (KORUS-AQ)	May 2016 — June 2016
• 6 week air quality study sampling over the S. Korean peninsula. Operated instruments on NASA DC-8 aircraft during 20 research flights.	

## AQUAVIT-2 Campaign

April 2013

- Cloud chamber instrument inter-comparison campaign to compare field and aircraft instruments used to measure atmospheric water vapor.

## IsoCloud 1-4 Campaign

April 2012 — March 2013

- Cloud chamber study on isotopic fractionation of water vapor in cold cirrus clouds.

## PANEL DISCUSSIONS

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- [1] Panelist, “Foundations: Climate Scholarship, Teaching, and Practice.” Climate School Showcase, NY Climate Week, Columbia University, New York, NY September 2024
- [2] Panelist, “Cross-Sector Collaboration for AI in Weather/Climate.” AMS Washington Forum, Silver Creek, MD, May 2024
- [3] Panelist, “Climate Data Science: Multi-Disciplinary Perspectives on Research Convergence.” Learning the Earth with Artificial Intelligence and Physics (LEAP) NSF Science and Technology Center, Columbia University, New York, NY, March 2024

## SERVICE & OUTREACH

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<b>Session Chair</b>	Program Committee, Climate, Weather & Earth Sciences, PASC2025 Conference, Zurich, Switzerland, 2025 Co-Chair, AI for Statistical Parameterization of Unresolved Processes in ESM, AMS Annual Meeting, Baltimore, MD, 2024 Program Committee, Climate, Weather & Earth Sciences, PASC2024 Conference, Zurich, Switzerland, 2024 Convener, Data-driven parameterization development, DOE ARM/ASR PI meeting, Rockville, MD, 2023 Co-Convener, Cirrus in the Upper Troposphere/Lower Stratosphere, AGU Fall Meeting, Chicago, IL 2022 Co-Chair, AMS Conference on Atmospheric Radiation, Vancouver, BC, 2018
<b>Committees</b>	AMS Artificial Intelligence Applications to Environmental Science STAC Committee, 2023-2026 US CLIVAR Process Study and Model Improvement (PSMI) Panel, 2025-2029
<b>Organizer</b>	Monthly Atmospheric Composition/Chemistry Meetup, Columbia/LDEO, 2023-present Bi-weekly Climate-Machine Learning Journal Club, LEAP/Columbia, 2021-2023 Organizer, Cirrus Cloud Workshop, University of Chicago/LMD Paris, 2014
<b>Editorial</b>	Editor, <i>Atmospheric Chemistry and Physics</i> , 2025 - present Associate Editor, <i>Journal of Atmospheric Science</i> , 2023 - 2024
<b>Grant/Fellowship Reviewer</b>	L'Agence Nationale de la Recherche (ANR), 2025 Climate Change AI Innovation Grants Reviewer, 2021; Metareviewer, 2024 National Science Foundation Reviewer, 2018 - 2023 US Department of Energy Grant Reviewer, 2020 National Defense Science and Engineering Graduate Fellowship Evaluation Panel, Geosciences, 2017-2020 NASA Citizen Science Earth Systems Atmospheric Sciences Panel, Washington DC, 2016
<b>Peer Review (ML conf.)</b>	ICLR Climate Change AI Workshop, Neurips AI4Earth Workshop, ICLR AI for Earth and Space Science Workshop
<b>Peer Review (Journals)</b>	<i>Journal of Geophysical Research: Atmospheres</i> , <i>Environmental Science and Technology</i> , <i>Atmospheric Pollution Research</i> , <i>Atmospheric Environment</i> , <i>Atmospheric Chemistry and Physics</i> , <i>Journal of Advances in Modeling Earth Systems</i> , <i>Physical Review Letters</i> , <i>Environmental Data Science</i> , <i>Artificial Intelligence for the Earth Systems</i> , <i>Aerosol Science and Technology</i> , <i>Journal of Atmospheric Science</i> , <i>Science Advances</i>
<b>Judge</b>	Senior Physics Division Assistant Captain, Colorado State Science and Engineering Fair, Fort Collins, CO, 2017 AGU Conference Outstanding Student Poster Awards, 2016-2017
<b>Speaker</b>	PeoriaCorps Career Series, 2022 Presenter, NASA Frontier Development Lab 2019 Showcase, Google Cloud HQ, Mountainview CA, 2019 Colorado Science Day, Colorado State Capitol, Denver, CO, 2018 National Honors Society Induction, Osan Air Force Base High School, Pyongtaek, S. Korea, 2016
<b>Mentor</b>	Mentor, Neurips Tackling Climate Change with AI Workshop, 2021 Mentor, ICML Tackling Climate Change with AI Workshop, 2020 Earth Explorers Program (STEM program for 7th and 8th graders), Boulder, CO, 2017 STEM mentor, Girls Do Hack, Adler Planetarium, Chicago, IL, 2015 STEM mentor, Next Gen 2013 Conference, Museum of Science and Industry, Chicago, IL 2013-2014 IMPACT peer mentor, University of Chicago, 2012-2013
<b>Science Advisor</b>	Instrument to Instrument Translation/NASA Multi-domain Reusable AI Tools (Trillium), 2023-2024

## MEDIA & PRESS

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We're finally solving the puzzle of how clouds will affect our climate. [Link], New Scientist, September, 2024.  
Ice-Cloud Puzzle Master, [Link], DOE Atmospheric System Research Profile Piece, March, 2024.  
How AI could power the climate breakthroughs the world needs. [Link], CNN, November, 2023.  
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