

Paulina Czarnecki

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EDUCATION

Columbia University

Applied Mathematics – Masters of Science, Philosophy
Applied Mathematics – Doctor of Philosophy

February 2022, 2024
expected 2025

University of Michigan, Ann Arbor

Honors Mathematics – Bachelor of Science
Computer Science – Minor

May 2020

RESEARCH EXPERIENCE

Doctoral Research

May 2021 – present

Columbia University Applied Physics and Applied Mathematics
Lamont-Doherty Earth Observatory Ocean and Climate Physics

- Advisors: Prof. Robert Pincus and Prof. Lorenzo Polvani

Dynamics and Data in the COVID-19 Pandemic Workshop

June 2020 – July 2020

American Institute of Mathematics

- Advisors: Prof. Mary Lou Zeeman, Prof. Mary Silber, and Prof. Richard McGehee

Undergraduate Research

February 2017 – May 2020

University of Michigan Biophysics

- Advisor: Prof. Michal Zochowski

AM-SURE Summer Research Program

May 2019 – August 2019

NYU Courant Institute of Mathematical Sciences

- Advisors: Dr. Jennifer Crodelle and Dr. Calina Copos

STEM Summer Research Study Abroad

June 2018 – August 2018

University of Queensland Biology

- Advisors: Prof. Noam Levin and Prof. Salit Kark

PRESENTATIONS AND PUBLICATIONS

Publications

- [6] **Czarnecki P.**, Brath M. (In prep). *Data-Driven Quadrature for Longwave and Shortwave Absorption by Major Greenhouse Gases*.
- [5] **Czarnecki P.**, Pincus R., Polvani L. (Submitted). *An Analytical Theory for Instantaneous Radiative Forcing Across Opacity Regimes*.
- [4] Buehler S. A., Larsson R., Lemke O., Pfreundshuh S., Brath M., Adams I., Fox S., Roemer F., **Czarnecki P.**, Eriksson P. (2025). *The Atmospheric Radiative Transfer Simulator ARTS, Version 2.6 – Deep Python Integration*. Journal of Quantitative Spectroscopy and Radiative Transfer.
- [3] **Czarnecki P.**, Pincus R., Polvani L. (2023). *Sparse, Empirically Optimized Quadrature for Broadband Radiative Calculations*. Journal of Advances in Modeling Earth Systems.
- [2] Albrecht L.*, **Czarnecki P.***, Sakelaris B.* (2021). *Investigating the Relationship Between Air Quality and COVID-19 Transmission*. Journal of Data Science.

- [1] **Czarnecki P.***, Lin J.*, Aton S., Zochowski M. (2021). *Dynamical mechanisms underlying scale-free network reorganization in low acetylcholine states corresponding to slow wave sleep*. Frontiers in Network Physiology.

* indicates co-first authors.

Invited Presentations

- [3] **Czarnecki P.**, Brath, M., Pincus R., Polvani L. *Sparse, Empirically Optimized Quadrature for Broadband Spectral Integration*. SIAM CSE, Fort Worth, Texas. March 2025.
- [2] **Czarnecki P.** *Data Driven Quadrature as a Fast, Flexible Gas Optics Scheme*. NASA GISS Seminar, New York, New York. February 2025.
- [1] **Czarnecki P.**, Pincus R., Polvani L. *A Simple Analytical Model for Radiative Forcing by Optically-Thin Gases*. Equilibrium Climate Sensitivity (ECS) Symposium, Online. July 2024.

Contributed Posters and Presentations

- [8] **Czarnecki P.**, Pincus R., Polvani L. *A Simple Analytical Model for Instantaneous Radiative Forcing by Optically-Thin Gases*. AGU, Washington, D.C., US. December 2024.
- [7] **Czarnecki P.**, Pincus R., Polvani L. *A Simple Model for Instantaneous Radiative Forcing by Optically-Thin Gases*. Poster. Cloud Feedback Model Intercomparison Project, Boston, US. June 2024.
- [6] **Czarnecki P.**, Brath M., Kluft L., Larsson R., Buehler S., Polvani L., Pincus R. *Sparse, Empirically Optimized Quadrature for Radiative Calculations in a Radiative-Convective Equilibrium Model*. Poster. American Geophysical Union, San Francisco, US. December 2023.
- [5] **Czarnecki P.**, Pincus R., Polvani L. *Sparse, Empirically Optimized Quadrature for Radiative Fluxes and Heating Rates*. CERES Team Meeting, NASA GISS, NYC. October 2023.
- [4] **Czarnecki P.**, Pincus R., Polvani L. *Sparse, Empirically Optimized Quadrature for Radiative Fluxes and Heating Rates*. Joint Seminar, Max Planck Institute for Meteorology, Hamburg, Germany. July 2023.
- [3] **Czarnecki P.**, Pincus R., Polvani L. *Alternatives to Correlated-K Distributions for Radiative Transfer Calculations*. International Radiation Symposium, Thessaloniki, Greece. July 2022.
- [2] **Czarnecki P.**, Crodelle J., Copos C. *Building a Mathematical Model of the Merkel Cell*. Joint Mathematics Meetings, Denver, Colorado. January 2020.
- [1] Albrecht L., **Czarnecki P.**, Sakelaris B. (speaker). *Investigating the Relationship Between Air Quality and COVID-19 Transmission*. Data Science Conference on COVID-19. August 2020.

TEACHING

Graduate Teaching Assistant

September 2020 – September 2023

Columbia University APAM

- Fall 2020. APMA 4200: Partial Differential Equations. Responsible for grading assignments and exams, and holding twice-weekly office hours.
- Spring 2021. APMA 4300: Intro to Numerical Methods. Responsible for grading assignments and weekly office hours.
- Fall 2021-23. EESCGU 4008: Intro to Atmospheric Science. Responsible for grading assignments and holding weekly office hours.

Grader

January 2019 – May 2020

University of Michigan Mathematics

- Fall 2019 – Winter 2020. MATH 451: Advanced Calculus.
- Winter 2019. MATH 433: Differential Geometry.

OUTREACH

Pen Pal Letters to a Pre-Scientist	<i>September 2023 – May 2024</i>
LDEO Open House Volunteer Columbia University	<i>October 2023</i>
Women in STEM at Columbia (WISC) Holistic Mentor Columbia University	<i>September 2020 – September 2023</i>
Science Fridays Guest Speaker NYC Public School 205	<i>January 2022</i>
WISC Girls' Science Day Volunteer Columbia University	<i>November 2021, April 2022, 2025</i>
Math Circle Volunteer University of Michigan	<i>September 2018 – May 2020</i>
Women in Math REU Panelist University of Michigan	<i>November 2019</i>

HONORS AND AWARDS

2024:	AGU Outstanding Student Presentation Award (OSPA) in Atmospheric Science.
2023:	AIM Travel Award (support for SIAM Data Science Meeting 2023).
2020:	University of Michigan Honors Critical Difference Grant (support for Joint Mathematics Meetings 2020). NYU RTG funding (support for Joint Mathematics Meetings 2020).
2016:	University of Michigan Regents Merit Scholarship (top graduates of Michigan high schools).

PROFESSIONAL SERVICE

Peer Review <i>Journal of Climate; Journal of Quantitative Spectroscopy and Radiative Transfer; JGR: Atmospheres.</i>
