Paulina Czarnecki

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ACADEMIC APPOINTMENTS

Sorbonne University *November 2025 – present*
Postdoctoral Researcher

EDUCATION

Columbia University
Applied Mathematics – Masters of Science, Philosophy *February 2022, 2024*
Applied Mathematics – Doctor of Philosophy *2025*

University of Michigan, Ann Arbor *May 2020*
Honors Mathematics – Bachelor of Science
Computer Science – Minor

RESEARCH EXPERIENCE

Doctoral Research *May 2021 – August 2025*
Columbia University Applied Physics and Applied Mathematics
Lamont-Doherty Earth Observatory Ocean and Climate Physics
- Advisors: Prof. Robert Pincus and Prof. Lorenzo Polvani

Undergraduate Research *February 2017 – May 2020*
University of Michigan Biophysics
- Advisor: Prof. Michał Żochowski

ADDITIONAL TRAINING

WCRP km-Scale Hackathon *May 2025*
NOAA Geophysical Fluid Dynamics Laboratory
Project: *High Cloud Top Temperatures in km-Scale Models*

Dynamics and Data in the COVID-19 Pandemic Workshop *June 2020 – July 2020*
American Institute of Mathematics
Project: *The Relationship between Air Quality and COVID-19*

AM-SURE Summer Research Program *May 2019 – August 2019*
NYU Courant Institute of Mathematical Sciences
Project: *Building a Mathematical Model of the Merkel Cell*

STEM Summer Research Study Abroad *June 2018 – August 2018*
University of Queensland Biology
Project: *Global Analysis of Changes in Human Impacts on Coastal Sea Turtle Habitats*

PRESENTATIONS AND PUBLICATIONS

Publications

[7] **Czarnecki P.**, Brath M. (In prep). *Data-Driven Quadrature for Longwave and Shortwave Absorption by Major Greenhouse Gases.*

[6] **Czarnecki P.**, Pincus R. (Under Review). *How Clear-Sky Spectral Overlap Shapes Radiation in Cloudy Atmospheres.*

[5] **Czarnecki P.**, Polvani L., Pincus R. (2025). *An Analytical Theory for Instantaneous Radiative Forcing Across Opacity Regimes.* Journal of Climate.

[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

[4] **Czarnecki P.**, Brath, M., Pincus R., Polvani L. *Sparse, Empirically Optimized Quadrature for Broadband Spectral Integration.* SIAM CSE, Fort Worth, Texas. March 2025.

[3] **Czarnecki P.** *Data Driven Quadrature as a Fast, Flexible Gas Optics Scheme.* NASA GISS Seminar, New York, New York. February 2025.

[2] **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.

[1] **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.

Contributed Posters and Presentations

[7] **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.

[6] **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.

[5] **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.

[4] **Czarnecki P.**, Pincus R., Polvani L. *Sparse, Empirically Optimized Quadrature for Radiative Fluxes and Heating Rates.* CERES Team Meeting, NASA GISS, NYC. October 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 2021-23. EESCGU 4008: Intro to Atmospheric Science.
  Responsible for grading assignments and holding weekly office hours.
- Spring 2021. APMA 4300: Intro to Numerical Methods.
  Responsible for grading assignments and weekly office hours.
- Fall 2020. APMA 4200: Partial Differential Equations.
  Responsible for grading assignments and exams, and holding twice-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

The Weather and Climate Livestream *May 2025*
Director, speaker, organizer

WISC Girls' Science Day Volunteer *November 2021, April 2022, 2025*
Columbia University

Pen Pal *September 2023 – May 2024*
Letters to a Pre-Scientist

LDEO Open House Volunteer *October 2023*
Columbia University

Women in STEM at Columbia (WISC) Holistic Mentor *September 2020 – September 2023*
Columbia University

Science Fridays Guest Speaker *January 2022*
NYC Public School 205

Math Circle Volunteer *September 2018 – May 2020*
University of Michigan

Women in Math REU Panelist *November 2019*
University of Michigan

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
Journal of Climate; Journal of Quantitative Spectroscopy and Radiative Transfer; JGR: Atmospheres.