

Paulina Czarnecki

pczarnecki@ipsl.fr | ORCID 0000-0002-5011-882X

ACADEMIC APPOINTMENTS

Postdoctoral Researcher

November 2025 – present

Sorbonne University

- Advisors: Dr. Nicolas Bellouin, Dr. Olivier Boucher, Dr. Etienne Vignon

EDUCATION

Columbia University

Applied Mathematics – Doctor of Philosophy

August 2025

Applied Mathematics – Masters of Science, Philosophy

February 2022, 2024

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*

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., Pfreundschuh 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.

PROFESSIONAL SERVICE

Seminar Organization

Equilibrium Climate Sensitivity (ECS) Symposium

January 2026 – present

Peer Review

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

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). |