KIRSTIN E. KOEPNICK

Research Interests

Climate dynamics; ice-atmosphere-ocean interactions; nonlinear systems; climate variability

Contact

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Technical Skills

Programming: Python, MATLAB, Mathematica

Modeling Tools: running CESM2 with boundary conditio changes, climate data analysis (CMIP6, iTRACE), numerical diffusion models

Typesetting: LaTeX

Languages: English (native), German (intermediate), French (basic)

References

Dr. Eli Tziperman
eli@eps.harvared.edu | (617) 384 8381
Dr. Peter Huybers
phuybers@g.harvard.edu | (617) 495 4811
Dr. Zhiming Kuang
kuang@fas.harvard.edu | (617) 495 7660
Dr. Jiang Zhu
jiangzhu@ucar.edu | (303) 497 1342

Education

Harvard University, Cambridge MA (2021 – Present)
- PhD in Applied Mathematics working with Eli Tziperman

Advance Climate Dynamics Courses, Abisko, Sweden (Summer 2025)
- Summer school hosted by University of Bergen focusing on the memory in the climate system

The Abdus Salam ICTP, Trieste, Italy (Summer 2022)
- Theory, Mechanisms and Hierarchical Modeling of Climate Dynamics: Tropical Oceans, ENSO and their teleconnections

Bates College, Lewiston ME (2017-2021)
- Bachelor of Arts: Physics & Mathematics

Nashville School of the Arts, Nashville TN (2014-2017)

Clayton High School, Saint Louis, MO (2013-2014)

Research Experience

Advisor for an Undergraduate Research Project (Spring 2025-Present)
- Supervising an undergraduate applying machine learning techniques to classify westerly wind bursts using CESM2 runs

Mathematics Department, Bates College (Fall 2019 – Spring 2022)
- Honors thesis project exploring fluid stirring on a sphere using braid groups and topological entropy (advised by Dr. Jeff Oishi)

Physics Department, Bates College (Fall 2019 – Spring 2022)
- Honors thesis project investigating the minimal requirements for topologically protected waves (advised by Dr. Peter Wong)

Princeton Plasma Physics Laboratory, Princeton University (Summer 2020)
- Research assistant under Dr. Chris Smiet investigating knotted stellarator fields using hypersphere coordinates

Environmental Studies Department, Bates College (Summer 2019)
- Research assistant to Professor Francis Eanes analyzing costs incurred to the city of Auburn, ME should new ordinances allow further develop in the agricultural zone

Publications

- **Koepnick, K**, Fu, M, and Tziperman E.: *Comparing the surface mass balance of the Laurentide ice sheet during the last deglaciation with geophysical reconstructions*, in revision
- **Koepnick, K**. and Tziperman, E.: *Distinguishing between insolation-driven and phase-locked 100-Kyr ice age scenarios using example models*, Paleoceanography and Paleoclimatology, 39, e2023PA004 739, 2024.

In Prep

- **Koepnick, K,** Zhu, J, Fu, M, and Tziperman, E: *What are the climate factors that determined when the Laurentide Ice Sheet grew or retreated?*
- **Koepnick, K**, Harnik, N, Randall, M, and Tziperman, E: *ENSO-QBO correlations: a robust dynamical coupling or a coincidence due to the short record?*
- **Koepnick, K,** Zhu, J, Fu, M, and Tziperman, E: *How sensitive is surface mass balance to perturbations in albedo?*

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Teaching Experience & Service

ClimaTea Co-organizer (2023-2024)
- Journal club and seminar series; coordinated speaker lineup, logistics, and event moderation

Department Trip Co-organizer (2024)
- Organized a department field trip for graduate students to Nova Scot

Teaching Fellow, Harvard University
- Introduction to Physical Oceanography (Spring 2026)
- Linear Algebra & Big Data (Spring 2025)
- Paleoclimate as a Proxy (Spring 2024)
- Global Warming (Spring 2023)

Teaching Assistant, Bates College
- Introduction to Abstraction (Fall 2020)
- Linear Algebra (Spring 2019 – Current)
- Multivariable Calculus (Fall 2019 – Current)

Grader, Bates College
- Introduction to Quantum Mechanics (Fall 2020)
- Abstract Algebra (Spring 2020)

General Tutor, **Bates College**
- Mathematics and Statistics Workshop (Fall 2018 – Current)
- Calculus, Linear Algebra, & Differential Equations

Awards & Fellowships

Herbert S. Winokur SEAS Graduate Fellowship in Engineering and Applied Sciences (Fall 2021 – Spring 2022)
- Endowed fellowship awarded by Harvard University

Department of Energy Science Undergraduate Laboratory Internship (SULI), Princeton University (Summer 2020)

Rawling's Grant, Bates College (Summer 2020)
- Granted by the Mathematics Department to support research on mathematics thesis during the summer prior to the start of the semester

Dean's List, Bates College (Fall 2018, Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021)
- Awarded to students with a semester GPA of 3.8 or higher

Employment

Yoga Instructor, Down Under School of Yoga (2024-Present)
Bates College AESOP Leader (2018-2021)
- Lead a small week-long orientation trip of incoming first-years at Bates College

Dance Stage Manager, Bates College (2018–2019)
- Managed multi-faceted stage team in order to ensure the success of dance concerts by guiding all technical and production elements

Technical Intern, Bates Dance Festival (2018)
- Managed, set up, and ran various dance concerts

Scenic Designer and Carpenter, Bates College (2017–2020)
- Designed and helped build all scenic elements for various theatrical productions