

Research Experience

PhD Candidate in Applied Mathematics *Brown University*

Sep 2025 - present

- Current project, advised by Dr. Baylor Fox-Kemper and Dr. Mara Freilich: Developing machine-learning models to predict sea level at NOAA tide gauges in Narragansett Bay and surrounding waters, providing fast, flexible alternatives to computationally intensive physics-based models. The work benchmarks ML predictions against the Ocean State Ocean Model (a ROMS model) and existing tidal predictions, with applications to flood forecasting, climate scenario evaluation, and transferability to other coastal regions.
- Completed project, advised by Dr. Björn Sandstede: Developed a probabilistic mathematical framework for multidimensional demographic diversity metrics, formulating and proving a theorem establishing anti-correlation and tight bounds between “intersecting diversity” and “shared identity,” with applications to empirical social datasets.

Master’s Student in Mathematics

Sep 2021 - May 2023

California Polytechnic State University, San Luis Obispo

- Thesis, advised by Dr. Paul Choboter and Dr. Ryan K. Walter: Applied Lagrangian coherent structure (LCS) theory to evaluate ocean surface circulation in a Central California offshore Wind Energy Area, comparing FTLE- and geodesic-based hyperbolic LCS detection using HF radar data.
- Summer research, advised by Dr. Charles D. Camp: Led a team of three undergraduates, researching effects of periodic and quasi-periodic forcing on the pace of ice ages in five coupled, nonlinear ODE models of the late Pleistocene climate.

Education

Brown University

Ph.D. Applied Mathematics

expected May 2028

- Advisors: Dr. Baylor Fox-Kemper and Dr. Mara Freilich
- Qualifying exam topics: Geophysical Fluid Dynamics, Dynamical Systems, Computational Fluid Dynamics, Machine Learning and Statistical Theory
- Co-organizer of the Social Equity and Applied Mathematics (SEAM) Seminar [[website](#)]

California Polytechnic State University, San Luis Obispo

M.S., *summa cum laude*, Mathematics

June 2023

- Advisors: Dr. Paul Choboter and Dr. Ryan K. Walter
- Thesis: *Detecting coherent transport structures in ocean surface flows*
- Qualifying exam topics: Abstract Algebra and Real Analysis

Calvin College (now Calvin University)

B.A., Mathematics and International Development

May 2013

Scholarship

Hoogstra, L., Slyman, K., and Sandstede, B., *Quantitative metrics for trait and identity distributions*, arXiv preprint, 2025. [[preprint](#)]

Hoogstra, L., *Detecting Coherent Transport Structures in Ocean Surface Flows*, Master’s thesis, California Polytechnic State University, San Luis Obispo, 2024. [[thesis](#)]

Hoogstra, L., Ehrnstein, E., Choboter, P., Walter, R.K., *Spatially and temporally coherent transport structures in the Central California offshore Wind Energy Area*, Video submission, Gallery of Fluid Motion, 76th Annual Meeting of the APS Division of Fluid Dynamics, 2023. [[video](#)]

Hoogstra, L., Ehrnstein, E., Choboter, P., Walter, R.K., *Spatially and temporally coherent transport structures in the Central California offshore Wind Energy Area*, Poster presentation, College of Science and Mathematics Research Conference, California Polytechnic State University, San Luis Obispo, 2023.

Hoogstra, L., *Forced Dynamical Systems in Paleoclimate Modeling*, Invited talk, Monthly Meeting of American Association for University Women - San Luis Obispo Chapter, 2023.

Coutin, R., Fletcher, C., Hoogstra, L., Stensland, L, Camp, C.D., *Forced Dynamical Systems in Paleoclimate Modeling*, Poster presentation, Frost Undergraduate Research Poster Symposium, California Polytechnic State University, San Luis Obispo, 2022.

Awards

California Doctoral Incentive Program Fellow *Sep 2023 - Present*
California State University

Simon Ostrach ScM'1949 PhD'1950 Graduate Fellowship *Sep 2023 - May 2024*
Brown University

**American Association for University Women
Selected Professions Fellowship** *Sep 2021 - May 2022*
California Polytechnic State University, San Luis Obispo

National Merit Scholarship *Sep 2009 - May 2013*
Calvin University

NSF Scientific Computing Scholarship *Sep 2012 - May 2013*
Calvin University

Additional Scholarships *Various, 2009-2013*
Calvin University
Robert C. Byrd Honors Scholarship, Doris Twinstra Cross Cultural Scholarship, Brown Deer Women's Club Scholarship, MCF Staff Scholarship

Relevant Graduate Coursework

Geophysical Fluid Dynamics
Research in Geological Science
Nonlinear Dynamical Systems I
Numerical Solutions of PDEs I

Computational Fluid Dynamics
Mathematics and Climate
Nonlinear Dynamical Systems II
Real Analysis

Fluid Mechanics I
Climate Modeling I
Machine Learning
Functional Analysis

Teaching and Tutoring Experience

Writing Associate *Sep 2025 - present*
Brown University Writing Center

- Provide one-on-one feedback to develop students' writing skills across disciplines and styles.

Teaching Assistant *Sep 2024 - May 2025*
Brown University Division of Applied Mathematics

- Graded assignments and course papers, held office hours, and guided undergraduate research projects.
- Courses: Statistical Inference I (Dr. Amalia Culiuc); Math and Climate (Dr. Mara Freilich).

Teaching Assistant *Jun 2023 - Aug 2023*
American Institute of Mathematics, Mathematics and Climate Research Network

- Assisted students with homework and research during a virtual summer school and in-person research week.
- Mentored a working group studying cellular automata wildfire models (group advisor: Dr. Claudia Falcon).

Teaching Assistant (Instructor of Record) *Sep 2021 - Jun 2022*
California Polytechnic State University, San Luis Obispo, Mathematics Department

- Taught Precalculus Algebra I & II, including lecturing, creating assignments/exams, holding office hours, and assigning final grades.

Tutor *Aug 2010 - Jan 2012*
Calvin College Student Academic Services (now Calvin University Center for Student Success)

- Tutored Calculus I–III and Intercultural Communications in individual and group settings.

Work Experience

Reporting Analyst II *Jul 2019 - Aug 2021*
Fidelity National Information Services (FIS)

- Automated and optimized revenue reporting processes for a large financial services firm, compiling over 2 million rows of data quarterly with Python and building interactive Power BI reports used by 200+ employees, including executives, to analyze client, product, and location trends.

Refugee Program Data Specialist *Aug 2018 - Jul 2019*
Mennonite Central Committee SALT Program - placed at Collateral Repair Project

- Managed data systems on site for a nonprofit serving refugees in Amman, Jordan, including transitioning the primary database to Azure SQL and creating grant-tracking and family-registration applications in Salesforce and AppSheet. Synthesized siloed data for 5,000+ families into a cohesive architecture to support program operations, case management, and sustainable long-term technical planning.

Research Associate *May 2014 - Jun 2017*
Basis Policy Research

- Supported a variety of applied K–12 education policy projects for private foundations, school districts, charter networks, and state governments. Leveraged technical skills in SQL, Stata, Tableau, Power BI, and R to manage large student datasets, build dashboards and data pipelines, implement a student-teacher matching algorithm, and generate analyses and visualizations that directly informed client decision-making.

Research Coordinator *Feb 2012 - Apr 2014*
Calvin College Center for Social Research (now DataWise Consulting)

- Supported a wide range of social science research initiatives by integrating multi-year survey and registrar data, creating analytic datasets, and designing interactive Tableau reports to inform departmental decisions. Designed and administered online Qualtrics surveys, provided technical support, and co-led staff training in database theory and Microsoft Access.

Technical Skills Python (pandas, numpy, scipy, xarray, statsmodels, pytorch, scikit-learn, matplotlib, seaborn, cartopy, netCDF4, requests), LaTeX, Matlab, SQL, R