# Ellen H. Davenport


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| Education | **Scripps Institution of Oceanography** | |
| | PhD Candidate, *Oceanography* | June 2026 |
| | **University of California, San Diego** | |
| | Master of Science, *Electrical and Computer Engineering* | June 2023 |
| | **Dartmouth College** | |
| | Bachelor of Engineering, *Control Systems, minor in French* | June 2017 |
| Programming | Python, JAX, C/C++, Fortran, Matlab, Julia, Rust | |
| DevOps | Git, Docker, Bash, HPC, Sphinx | |
| Research Interests | Data assimilation and inverse problems, coupled simulations, ocean dynamics and predictability, scientific software, Bayesian inference and optimization | |

## Work Experience

**Graduate Student Researcher**, Scripps Institution of Oceanography June 2023–Present

- PhD Advisors: Matthew Mazloff and Bruce Cornuelle
- Ocean data assimilation using 4DVar with the MITgcm. Estimation and sensitivity analysis of the Tropical Pacific Ocean to improve representation of Equatorial dynamics including Tropical Instability Waves and Deep Cycle Turbulence.

**JCM Software Developer**, Scripps Inistitution of Oceanography Aug 2024–Present

- Development of a differentiable atmospheric model in Python with JAX. Porting of the Fortran speedy.f90 model and coupling to the Google Dinosaur Dycore. Project supervision by Dr. Duncan Watson-Parris.

**Graduate Student Researcher**, Jacobs School of Engineering *UCSD* Sep 2021– Sep 2023

- PI: Florian Meyer in the Situational Awareness Lab
- First PhD chapter: statistical signal processing applied to underwater robotics (e.g., Unscented Kalman Filters, Particle Filters, and Joint Probabilistic Data Association).

**Embedded Software Engineer I & II**, Sarcos Robotics *Salt Lake City, UT* Aug 2017–Aug 2021

- Development for the Sarcos Guardian XO (powered exoskeleton) including design, implementation, and testing.
- Collaboration with ME, EE, and controls groups to define, implement, and test robotics control algorithms.
- Development and maintenance of code base for real-time applications in C, C++, and Rust.
- As Level II: Lead technical design on new features, prioritize software team goals, interview and onboard new software team members, travel to customer sites to provide custom solutions.

## Publications

**E. Davenport**, A. Verdy, B. D. Cornuelle, M. R. Mazloff, A. F. Waterhouse, D. B. Whitt (2025). Mechanisms of Zonal Momentum Transport at 0N, 140W in an Ocean State Estimate, *In Review at the Journal of Physical Oceanography*

**E. Davenport**, K. Nguyen, J. Jang, C. Ma, S. Fish, L. Lenain, and F. Meyer (2025). A Landmark-Aided Navigation Approach Using Side-scan Sonar, *IEEE Journal of Oceanic Engineering* DOI:10.1109/JOE.2025.3578230

**E. Davenport**, J. Jang, and F. Meyer (2023). Toward Terrain-based Navigation Using Side-scan sonar, *IEEE 26th International Conference on Information Fusion* 10.23919/FUSION52260.2023.10224175

S. Bi, T. Wang, **E. Davenport**, R. Peterson, R. Halter, J. Sorber, D. Kotz (2017). Toward a Wearable Sensor for Eating Detection *WearSys '17*, https://dl.acm.org/doi/10.1145/3089351.3089355

## Presentations

**E. Davenport** "Mixing Parameterizations in GCM's: An introduction to why they are necessary and challenging", 2025 COMCEPTS (Combined Ocean Mixing Course, Experiments, and Practices for Turbulence Sampling). (invited lecture)

**E. Davenport**, et al. "JAX-GCM: An Intermediate-Complexity, Differentiable Atmospheric Model", 2025 Gordon Research Conference on Machine Learning for Actionable Climate Science. (poster)

**E. Davenport**, M. R. Mazloff, A. Verdy, and B. D. Cornuelle. "Understanding Tropical Mixing Processes and Their Parameterization Using an Ocean State Estimate", 2025 Wyrtki Symposium. (poster)

**E. Davenport**, M. R. Mazloff, A. Verdy, and B. D. Cornuelle. "Understanding Tropical Pacific Upwelling and Mixing with the 140°W EquatorMix Study and an Ocean State Estimate", 2024 Gordon Research Conference on Ocean Mixing. (poster)

**E. Davenport**, M. R. Mazloff, A. Verdy, and B. D. Cornuelle. "Understanding Tropical Pacific Mixing Processes with an Observational Campaign and a State Estimate", 2024 CaCAO Days (Chaos, Computation and Optimization at SIO). (invited talk)

**E. Davenport**, M. R. Mazloff, A. Verdy, and B. D. Cornuelle. "EquatorMix Remix: Modeling of Tropical Upwelling Processes Informed by the 140°W EquatorMix Study", 2024 Ocean Sciences Meeting. (talk)

## Funding and Awards

NCAR Exploratory Allocation *500,000 compute hours* Sep 2023–Present

## Workshops and Hackathons

SIO Python for Earth Science (organizer) *San Diego, CA* Aug 2025

CADRE-EPIC Data Assimilation Training *Fort Collins, CO* Jun 2025

NASA ECCO Hackweek *Pasadena, CA* Oct 2024

JAXathon: JAX-GCM Hackathon *San Diego, CA* Aug 2024

US CLIVAR Ocean Uncertainty Quantification Summer School *Miami, FL* Jul 2024

## Teaching Experience and Professional Development

**SIO Software Workshop for Earth Science** *Scripps Institution of Oceanography* Aug 2025

- Organized and instructed a community-wide software workshop to teach Python, Bash, and Git in the Earth Sciences.
- Created lesson content and recruited and trained other instructors.
- Instructed and obtained funding for 4 workshop sessions (40+ attendees including students, professors, research scientists, and engineers).
- Workshop content, including tutorials, can be found at the workshop website.

**Software Carpentry Instructor Training** *UCSD* Dec 2023

- 16-hour training in evidence-based teaching practices for science and computational research.

**Teaching Assistant**, Thayer School of Engineering *Dartmouth College, Hanover, NH* 2014-2017

- Scientific Computing, Digital Electronics, Intro to Material Science, Solid Mechanics

## Mentorship and Volunteering

**Community Outreach Science Guide**, SCOPE 2022–Present

- Guiding science tours at Scripps to highlight ongoing research in addition to local ecology and geology.

**Graduate and Undergrad Student Mentor**, Marine Physical Lab & SIO 2022–2024

- Mentorship of undergraduate and graduate engineering and oceanography students. Topics: graduate studies, model development, robotics development, software engineering, and embedded systems design.

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