

RESEARCH INTERESTS AND EXPERIENCE

interests: ocean heat content change, sea level (open-ocean to coastal sea level connectivity), mesoscale turbulence, eddy vertical structure, deep-ocean dynamics, remote sensing, AUVs

N.O.A.A. Geophysical Fluid Dynamics Laboratory [current]

Princeton, NJ

Research Physical Scientist - Ocean and Cryosphere Division

2023 – present

- Investigate patterns and drivers of sea level change using a suite of regional/global ocean models. Analyze coastal, in-situ and remotely sensed observations to better understand drivers of sea level variability. Development/use of a dynamical downscaling coastal sea level forecasting framework. Aid in development of GFDL's next-generation global earth system model.

Woods Hole Oceanographic Institution

Woods Hole, MA

Postdoctoral Investigator

2020 – 2023

- Developed a framework to quantify scale dependent eddy kinetic and potential energy seasonal cycles. Aided in the development of mesoscale eddy parameterizations in global climate models. (Ocean Transport and Eddy Energy Climate Process Team 2020-2025 - <https://ocean-eddy-cpt.github.io>)
- Investigated the regional patterns and drivers of sea level variability with a focus on ocean dynamics connecting ocean heat content change, coastal sea level, and ocean mass redistribution. (NASA-OSTST)

University of Washington

Seattle, WA

Graduate Research Assistant

2013–2020

- ocean mesoscale eddy structure, evolution, and decay; geostrophic turbulence; surface expressions of interior motions; extensive use of Seaglider and Deepglider AUVs (development, deployment, and piloting)

EDUCATION

University of Washington

Seattle, WA

Ph.D. in Physical Oceanography, Advisor: Charles Eriksen

2020

- Thesis: “Eddy Vertical Structure and Variability: vortex evolution and the geography of geostrophic turbulence”

University of Washington

Seattle, WA

M.S. in Applied Mathematics

2016

University of Washington

Seattle, WA

M.S. in Physical Oceanography

2016

University of Maryland

College Park, MD

B.S. in Civil and Environmental Engineering, Magna Cum Laude (minor: project management)

2013

PEER REVIEWED PUBLICATIONS

Coats, S., Thompson, P., Piecuch, C., Fasullo, J., Hamlington, B., Karnauskas, K., Nerem, R., Rodriguez, A., **Steinberg, J.M.**, & Busecke, J. (2025). Understanding the role for internal variability in driving past and future ocean dynamic sea-level trends in cmip6 simulations. *Journal of Climate*.
<https://doi.org/10.1175/JCLI-D-24-0336.1>

- Griffies, S., Adcroft, A., Beadling, R., Bushuk, M., Chang, C.-Y., Drake, H., Dussin, R., Hallberg, R., Hurlin, W., Khatri, H., Krasting, J., Lobo, M., MacGilchrist, G., Reichl, B., Sane, A., Sergienko, O., Sonnewald, M., **Steinberg, J.M.**, Tesdal, J., ... Zhao, M. (2025a). The gfdl-cm4x climate model hierarchy, part i: Model description and thermal properties. *Journal of Advances in Modeling Earth Systems*. <https://doi.org/10.1029/2024MS004861>
- Griffies, S., Adcroft, A., Beadling, R., Bushuk, M., Chang, C.-Y., Drake, H., Dussin, R., Hallberg, R., Hurlin, W., Khatri, H., Krasting, J., Lobo, M., MacGilchrist, G., Reichl, B., Sane, A., Sergienko, O., Sonnewald, M., **Steinberg, J.M.**, Tesdal, J., ... Zhao, M. (2025b). The gfdl-cm4x climate model hierarchy, part ii: Case studies. *Journal of Advances in Modeling Earth Systems*. <https://doi.org/10.1029/2024MS004862>
- Steinberg, J.M.**, Yankovsky, E., Cole, S., & Zanna, L. (2025). A landscape of eddy vertical structure: Methods of characterization and the role of bathymetry. *Journal of Physical Oceanography*. <https://doi.org/10.1175/JPO-D-25-0044.1>
- Zilberman, N., Llovel, W., **Steinberg, J.M.**, Meyssignac, B., Ablain, M., & R., F. (2025). Deep ocean steric sea level change in the subtropical northwest atlantic ocean. *Geophysical Research Letters*. <https://doi.org/10.1029/2024GL114158>
- Steinberg, J.M.**, Griffies, S., Krasting, J., Piecuch, C., & Ross, A. (2024). A Link Between U.S. East Coast Sea Level and North Atlantic Subtropical Ocean Heat Content. *Journal of Geophysical Research: Oceans*. <https://doi.org/10.1029/2024JC021425>
- Steinberg, J.M.**, Piecuch, C., Hamlington, B., Thompson, P., & Coats, S. (2024). Influence of Deep Ocean Warming on Coastal Sea Level Trends in the Gulf of Mexico. *Journal of Geophysical Research: Oceans*. <https://doi.org/10.1029/2023JC019681>
- Toole, J., Musgrave, R., Fine, E., **Steinberg, J.M.**, & Krishfield, R. (2023). On the Vertical Structure of Deep Ocean Subinertial Variability. *Journal of Physical Oceanography*. <https://doi.org/10.1175/JPO-D-23-0011.1>
- Loose, N., Abernathey, R., Grooms, I., Busecke, J., Guillaumin, A., Yankovsky, E., Marques, G., **Steinberg, J.M.**, Ross, A., Khatri, H., Bachman, S., Zanna, L., & Martin, P. (2022). GCM-Filters: A Python Package for Diffusion-based Spatial Filtering of Gridded Data. *Journal of Open Source Software*. <https://doi.org/10.21105/joss.03947>
- Marques, G., Loose, N., Yankovsky, E., **Steinberg, J.M.**, Chang, C.-Y., Bhamidipati, N., Adcroft, A., Fox-Kemper, B., Griffies, S., Hallberg, R., Jansen, M., Khatri, H., & Zanna, L. (2022). NeverWorld2: An idealized model hierarchy to investigate ocean mesoscale eddies across resolutions. *Geoscientific Model Development*, 15. <https://doi.org/10.5194/gmd-15-6567-2022>
- Steinberg, J.M.**, Cole, S., Drushka, K., & Abernathey, R. (2022). Seasonality of the Mesoscale Inverse Cascade as Inferred from Global Scale-Dependent Eddy Energy Observations. *Journal of Physical Oceanography*. <https://doi.org/10.1175/JPO-D-21-0269.1>
- Steinberg, J.M.**, & Eriksen, C. (2022). Eddy Vertical Structure and Variability: Deepglider Observations in the North Atlantic. *Journal of Physical Oceanography*, 52, 1091–1110. <https://doi.org/10.1175/JPO-D-21-0068.1>
- Grooms, I., Loose, N., Abernathey, R., **Steinberg, J.M.**, Bachman, S., Marques, G., Guillaumin, A., Yankovsky, E., & Zanna, L. (2021). Diffusion-based smoothers for spatial filtering of gridded geophysical data. *Journal of Advances in Modeling Earth Systems*. <https://doi.org/10.1029/2021MS002552>
- Steinberg, J.M.**, & Eriksen, C. (2020). Glider Sampling Simulations in High-Resolution Ocean Models. *Journal of Atmospheric and Oceanic Technology*, 37, 975–992. <https://doi.org/10.1175/JTECH-D-19-0200.1>
- Steinberg, J.M.**, Pelland, N., & Eriksen, C. (2019). Observed Evolution of a California Undercurrent Eddy. *Journal of Physical Oceanography*, 49, 649–674. <https://doi.org/10.1175/JPO-D-18-0033.1>

Pelland, N., Bennett, J., **Steinberg, J.M.**, & Eriksen, C. (2018). Automated Glider Tracking of a California Undercurrent Eddy Using the Extended Kalman Filter. *Journal of Atmospheric and Oceanic Technology*, 35, 2241–2264. <https://doi.org/10.1175/JTECH-D-18-0126.1>

ACADEMIC EXPERIENCE

- **Adjunct Assistant Professor** at Temple University Fall 2025
Introduction to Physical Oceanography (EES-8200)
- **PhD thesis committee member** at Temple University 2024-
Member of a graduate student's PhD advisory committee
- **Teaching Assistant** at the University Washington Winter 2018-2019, 2019-2020
Geophysical Fluid Dynamics (OCN 512)
- **Field and Classroom Instructor** at the Ocean Inquiry Project 2014–2019
CTD operations, diving, and science instruction
- **Teaching Assistant** at the University Washington Fall 2017
Physics Across Oceanography: Fluid Mechanics and Waves (OCN 285)
- **Teaching Assistant** at the University Washington Fall 2015
Introduction to Fluid Mechanics (OCN 511)

PROFESSIONAL ACTIVITIES

- U.S. CLIVAR - Phenomena, Observations, and Synthesis Panel Member 2024-2028
- Ocean Sciences Meeting: Session Convener, Co-Chair Feb. 2024
RH001 Advances in Understanding, Monitoring, and Simulating Sea Level
- National Academies: Gulf Research Program Fellowship Reviewer June 2023
- NASA Physical Oceanography: ROSES PO-22 Proposal Review Panel Member Sept. 2022
- Climate Process Team renewal proposal - drafting and revision funded - summer 2022
- Ocean Sciences Meeting: Session Convener, Co-Chair Feb. 2022
PL06 Mesoscale Eddy Energy and Ocean Transport
- peer reviewer for: National Science Foundation, Nature Communications, Geophysical Research Letters, Journal of Climate, Journal of Physical Oceanography, Journal of Geophysical Research: Oceans, Journal of Advances in Modeling of Earth Systems, Quarterly Journal of the Royal Meteorological Society, Continental Shelf Research, Advances in Space Research, Limnology and Oceanography, Earth's Future, Journal of Marine Systems

MENTORING, OUTREACH, AND VOLUNTEERING

- NOAA GFDL - mentor to NOAA Hollings, NOAA Lapenta, and Princeton CIMES summer interns 2023-2025
Advisor to undergraduate research scholars
- University of Washington: Student Seaglider Center 2022–2023
Advisor and mentor to undergraduates participating in a hands-on course to build, deploy, and pilot Seaglider autonomous underwater vehicles.

RECENT INVITED PRESENTATIONS

- Rutgers University - Formal Seminar New Brunswick, Apr. 2025
Regional Patterns and Drivers of Sea Level Change
- Understanding Gulf Ocean Systems Seminar Series (NAS Gulf Research Program) Apr. 2024
Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico
- Institute of Science and Technology Austria Vienna, May 2022
Ocean Energetics: Interesting and Outstanding Problems in Observational Physical Oceanography
- NCAR Boulder, Aug. 2022
Exploring Mesoscale Eddy Vertical Structure Regimes in the Global Ocean

RECENT CONFERENCE PRESENTATIONS, WORKSHOPS, AND SEMINARS

- Climate Process Team Annual Meeting: Ocean Transport and Eddy Energy New York, Aug. 2025
A Landscape of Eddy Vertical Structure
- American Geophysical Union - Annual Meeting Washington, D.C., Dec. 2024
Towards an Improved Understanding of the Physical Processes Connecting Coastal and Offshore Sea Level
- US CLIVAR Workshop: Optimizing Ocean Observing Networks for Detecting the Coastal Climate Signal Sept. 2024
Invited Talk: A link between U.S. east coast sea level rise and offshore subsurface ocean warming
- Ocean Sciences Meeting New Orleans, Feb. 2024
A Mechanistic Link between U.S. East Coast Sea Level and Offshore Ocean Heat Content
- American Meteorological Society Annual Meeting Baltimore, Jan. 2024
A Mechanistic Link between U.S. East Coast Sea Level and Offshore Ocean Heat Content
- NOAA GFDL Lunchtime Seminar Princeton, Nov. 2023
Regional Patterns and Drivers of Sea Level Change
- Climate Process Team Annual Meeting: Ocean Transport and Eddy Energy Woods Hole, May 2023
A Landscape of Eddy Vertical Structure - controls on the vertical distribution of mesoscale eddy kinetic energy
- University of Washington: Physical Oceanography Seminar Seattle, Feb. 2023
Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico
- ECCO Annual Meeting Pasadena, Jan. 2023
Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico
- Caltech Special Seminar Pasadena, Jan. 2023
A Landscape of Eddy Vertical Structure
- Ocean Surface Topography Science Team Meeting Venice, Oct. 2022
Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico
- GRACE Science Team Meeting Oct. 2022
Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico
- EGU Annual Meeting Vienna, May 2022
Seasonality of the Mesoscale Inverse Cascade
- Ocean Sciences Meeting Feb. 2022
Observed Seasonality of the Mesoscale Inverse Cascade in the Global Ocean
- NCAR-CESM: Ocn. Model Working Group / CPT: Ocn. Transport and Eddy Energy Annual Meeting Feb. 2021
Scale Aware Eddy Kinetic Energy from Along-Track Sea Surface Height Measurements
- Woods Hole Oceanographic Institution: Department Seminar July 2020
Eddy Vertical Structure and Variability: Deepglider Observations of Geostrophic Turbulence in the N. Atlantic
- US CLIVAR Workshop: Sources and Sinks of Ocean Mesoscale Eddy Energy Mar. 2019