

# Jacob Steinberg

Website: [jakesteinberg.github.io](https://jakesteinberg.github.io)  
Email: [jsteinberg@whoi.edu](mailto:jsteinberg@whoi.edu)  
LinkedIn: [jacobmsteinberg](https://www.linkedin.com/in/jacobmsteinberg)  
GitHub: [github.com/jakesteinberg](https://github.com/jakesteinberg)

## RESEARCH EXPERIENCE & EMPLOYMENT

---

research interests: mesoscale turbulence, eddy vertical structure, energy cascades (scale-dependence problems), deep-ocean dynamics, remote sensing, sea level, ocean warming, autonomous platforms (piloting and sampling strategy development)

### Woods Hole Oceanographic Institution

Postdoctoral Investigator

Woods Hole, MA

May 2020 – present

- Analyze and synthesize diverse set of observations of eddy kinetic and potential energy in a scale-aware, consistent manner to improve mesoscale eddy parameterizations in global climate models. This work considers large scale density structure as related to eddy formation and mixing. A main focus is the joint analysis of observational and model data. (Ocean Transport and Eddy Energy Climate Process Team w/ Sylvia Cole)
- Investigate regional patterns of sea surface height variability. Focus on physical/dynamical relationships among ocean warming, coastal sea level, and ocean bottom pressure trends. Analyses employ model output (ECCO state estimate) and observational data (collected by: satellite altimeters, GRACE/GRACE-FO, Argo, tide gauges). Specifically interested in the oceanic response to heat content changes. (Oct. 2021 - present; NASA-OSTST w/ Christopher Piecuch)

### University of Washington

Graduate Research Assistant

Seattle, WA

September 2013–March 2020

- Focus: ocean mesoscale eddy radial-vertical structure, eddy evolution, eddy decay, geostrophic turbulence, energy cascades, and surface expression of interior motions. Development, deployment, piloting, and extensive use of Seaglider and Deepglider autonomous underwater vehicles.

### University of Delaware

Research Experience for Undergraduates: sea spray research at wind-wave tank facility

Lewes, DE

Summer 2012

### N.O.A.A.

Data Analyst/Intern for bio-extractive removal of nitrogen study

Silver Spring, MD

2011-2013

## EDUCATION

---

### University of Washington

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

Seattle, WA

2013–2020

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

### University of Washington

M.S. in Applied Mathematics

Seattle, WA

2016

### University of Washington

M.S. in Physical Oceanography

Seattle, WA

2016

### University of Maryland

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

College Park, MD

2009–2013

## PUBLICATIONS

---

- Steinberg, J.M.**, Piecuch, C., Hamlington, B., Thompson, P., & Coats, S. (n.d.). Influence of Deep Ocean Warming on Coastal Sea Level Trends in the Gulf of Mexico. *in prep / to submit to the Journal of Geophysical Research: Oceans*.
- 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.**, & 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>

## Prior Work

Bricker, S.B. and Grizzle, R. and Trowbridge, P. and Rose, J.M. and Ferreira, J.G. and Wellman, K. and Zhu, C. and Galimany, E. and Saurel, C. and Landeck-Miller, R. and Wands, J. and Rheault, R. and **Steinberg, J.M.** and Jacob, A. and Davenport, E.D. and Ayvazian, S. and Chintala, M. and Tedesco, M.A.. “Bioextractive Removal of Nitrogen by Oysters in Great Bay Piscataqua River Estuary, New Hampshire, USA”. *Estuaries and Coasts*, 43:23, 2020.

Bricker, S.B. and Ferreira, J.G. and Zhu, C. and Rose, J.M. and Galimany, E. and Wikfors, G. and Saurel, C. and Landeck-Miller, R. and Wands, J. and Trowbridge, P. and Grizzle, R. and Wellman, K. and Rheault, R. and **Steinberg, J.M.** and Jacob, A. and Davenport, E.D. and Ayvazian, S. and Chintala, M. and Tedesco, M.A.. “Role of Shellfish Aquaculture in the Reduction of Eutrophication in an Urban Estuary” *Environmental Science and Technology*, 52:173-183, 2018.

## FIELDWORK

---

### Seaglider and Deepglider Operations

Graduate Research Assistant

UW  
2013–2020

- Participated in the preparation, deployment, piloting, and recovery of Seaglider and Deepglider autonomous underwater vehicles. Completed over a dozen small boat operations on university, chartered, and private vessels at the starts and ends of multi-month missions in the Northeastern Pacific and North Atlantic.

### Ocean Inquiry Project

field and classroom instructor and diver

Seattle, WA  
2014–2019

- Led education-based one-day research cruises on Puget Sound focused on mini CTD operations, net tows, and water samples.

## TEACHING

---

- **Teaching Assistant** at the University Washington Winter 2018-2019, 2019-2020  
*Geophysical Fluid Dynamics (OCN 512)*  
Lectured as well as organized and carried out demonstrations in the UW GFD lab.
- **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

---

- NASA Physical Oceanography: ROSES PO-22 Proposal Review Panel Member Sept. 2022
- Ocean Sciences Meeting: Session Organizer/Chair Feb. 2022  
*PL06 Mesoscale Eddy Energy and Ocean Transport*
- Member of the OceanGliders community 2021–present  
*Focused on the development and publication of glider best practice procedures (specifically depth average current considerations)*
- Postdoctoral Association: At-Large Member 2020–2021  
*Elected member of the WHOI postdoctoral association responsible for organizing and engaging with the WHOI postdoc community. Including organizing seminars, workshops, panels, and happy-hours.*
- UW College of the Environment: Student Advisory Committee Member 2017–2018  
*Oceanography graduate student representative in the council serving as liaison between students and faculty/administration*
- Reviewed for the Journal of Physical Oceanography (JPO)
- Reviewed for the Journal of Geophysical Research: Oceans (JGR: Oceans)
- Reviewed for the Journal of Advances in Modeling of Earth Systems (JAMES)
- Reviewed for the Journal of Marine Systems

## CONFERENCES & PRESENTATIONS

---

- Ocean Surface Topography Science Team Meeting Venice, Oct. 2022  
*Talk: Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico*
- GRACE Science Team Meeting Oct. 2022  
*Talk: Influence of Deep-Ocean Warming of Coastal Sea Level Rise in the Gulf of Mexico*
- NCAR Boulder, Aug. 2022  
*Talk: Exploring Mesoscale Eddy Vertical Structure Regimes in the Global Ocean*
- Institute of Science and Technology Austria Vienna, May 2022  
*Invited Talk: Ocean Energetics: Interesting and Outstanding Problems in Observational Physical Oceanography*
- EGU22 Vienna, May 2022  
*Talk: Seasonality of the Mesoscale Inverse Cascade*
- Climate Process Team Annual Meeting: Ocean Transport and Eddy Energy Boulder, Apr. 2022  
*Talk: A Landscape of Eddy Vertical Structure*
- Ocean Sciences Meeting Feb. 2022  
*Talk: Observed Seasonality of the Mesoscale Inverse Cascade in the Global Ocean*
- Aspen Center for Physics: Transport and Mixing of Tracers in Geophysics and Astrophysics June 2021  
*Meeting Participant*
- NOAA Monster Jam Seminar: Invited Talk May 2021

*Talk: Using Deepglider AUVs to explore the structure of large ocean eddies and the role they play in the redistribution of energy and tracers*

- UCLA: Biogeochemistry Group: Invited Talk Mar. 2021  
*Talk: Eddy Vertical Structure and Variability: Deepglider Observations of Geostrophic Turbulence in the North Atlantic*
- NCAR-CESM: Ocn. Model Working Group / CPT: Ocn. Transport and Eddy Energy Annual Meeting Feb. 2021  
*Talk: Scale Aware Eddy Kinetic Energy from Along-Track Sea Surface Height Measurements*
- Woods Hole Oceanographic Institution: Department Seminar Woods Hole, Jul. 2020  
*Talk: Eddy Vertical Structure and Variability: Deepglider Observations of Geostrophic Turbulence in the North Atlantic*
- Ocean Sciences Meeting San Diego, Feb. 2020  
*Talk: Observations of Eddy Vertical Structure Variability in the North Atlantic and Energy Partitioning Across Vertical Modes*
- Bermuda Institute of Ocean Sciences Bermuda, Aug. 2019  
*Talk: Geostrophic Turbulence and Eddy Vertical Structure*
- Oregon State University Corvallis, Jun. 2019  
*Invited Talk: Geostrophic Turbulence and Eddy Vertical Structure*
- University of Washington Seattle, Jun. 2019  
*Talk: Geostrophic Turbulence and Eddy Vertical Structure*
- US CLIVAR Workshop: Sources and Sinks of Mesoscale Eddy Energy Tallahassee, Mar. 2019  
*Poster: Interpreting Geostrophic Turbulence from Eddy Vertical Structure and Variability*
- Ocean Sciences Meeting Portland, Feb. 2018  
*Poster: Geostrophic Turbulence Observed in Eddy Vertical Structure*
- GHER: Liege Colloquium Liege, Belgium, Jun. 2016  
*Poster: The Evolution of a California Undercurrent Submesoscale Eddy (Cuddy)*
- Ocean Sciences Meeting New Orleans, Feb. 2016  
*Poster: The Evolution of a California Undercurrent Submesoscale Eddy (Cuddy)*

(virtual talk if no location listed)

## OUTREACH & VOLUNTEERING

---

- WHOI: PO Website Development 2021 –present  
*Committee member helping update, improve, and maintain the department website*
- Letters to a Pre-Scientist 2020 –2021  
*Pen-pal/mentor for letter-writing non-profit with the goal of exposing middle school STEM students to new career pathways*
- MIT: EAPS Mentoring Program 2020 –2021  
*Mentor to graduate students in the Joint MIT-WHOI Program*
- Orca Bowl: Science Judge 2014–2019  
*High School STEM quiz-bowl competition*
- Pacific Science Center: Polar Science Weekend 2014–2019  
*Annual expo showcasing ocean-observing instruments to the public*
- Hazel Wolf Elementary 2016–2019  
*STEM career 'advisor' to middle school students*

## AWARDS

---

- Liege Colloquium: Jacques Nihoul Poster Award (2016)

## REFERENCES

---

Charles C. Eriksen, eriksen@uw.edu

Sylvia T. Cole, scole@whoi.edu  
Christopher Piecuch, cpiecuch@whoi.edu