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EDUCATION

Doctor of Philosophy, Physical Oceanography — February 2016
Massachusetts Institute of Technology and Woods Hole Oceanographic Institution
Cambridge, MA and Woods Hole, MA

Bachelor of Arts, Physics — June 2009
Amherst College, Amherst, MA

PROFESSIONAL EXPERIENCE

University of Washington — November 2017 – present
Affiliate Faculty
Department of Civil & Environmental Engineering

Applied Physics Laboratory, University of Washington — February 2021 – present
Principal Research Scientist/Engineer
Department of Air-Sea Interaction and Remote Sensing

National Center for Atmospheric Research — October 2022 – present
Project Scientist II
Climate & Global Dynamics Laboratory

National Center for Atmospheric Research — October 2019 – September 2022
Project Scientist I
Climate & Global Dynamics Laboratory

Applied Physics Laboratory, University of Washington — February 2016 – February 2021
Senior Research Scientist/Engineer
Department of Air-Sea Interaction and Remote Sensing

Woods Hole Oceanographic Institution — February 2016 – present
Guest Investigator
Department of Applied Ocean Physics and Engineering

Woods Hole Oceanographic Institution — June 2010 – February 2016
Graduate Research Assistant
Department of Physical Oceanography

Institute of Marine Sciences, Zanzibar, Tanzania — June – September 2009
Postbaccalaureate Researcher
NSF International Research Experiences for Students

Woods Hole Oceanographic Institution — June – August 2008
Undergraduate Summer Student Fellow
Department of Applied Ocean Physics and Engineering

MANUSCRIPTS IN REVIEW OR IN PREPARATION

Moulton, M., J. B. Zambon, Z. G. Xue, J. C. Warner, D. Bao, D. Yin, Z. Defne, R. He, and C. Hegermiller (In Review), Modeled coastal-ocean pathways of land-sourced contaminants in the aftermath of Hurricane Florence, *Journal of Geophysical Research: Oceans*.

Nuss, E. S., **M. Moulton**, S. Suanda, C. M. Baker*, M. Palmsten, and K. Brodie (In Review), Short-crested wave breaking and associated vorticity input under varying directional spread, *Journal of Geophysical Research: Oceans*.

Baker, C. M.*, **M. Moulton**, C. C. Chickadel, E. Nuss, M. Palmsten, and K. Brodie (In Review), Two-dimensional inverse energy cascade in a laboratory surf zone for varying wave directional spread, *Physics of Fluids*.

Morris, D., D. Cherian, F. Castruccio, J. Kleypas, K. Krumhardt, **M. Moulton**, R. D. Williamson, S. Zohdy, and K. Dunning (Submitted), How changes projected by climate models inform climate adaptation policies: an interdisciplinary prototype methodology, *PNAS*.

Casper, A.*, E. Nuss*, C. M. Baker*, **M. Moulton**, and G. Dusek (In Review), Assessing NOAA rip-current hazard likelihood predictions: comparison of an operational model with lifeguard observations in the context of rip-current types, *Weather and Forecasting*.

Baker, C. M.*, **M. Moulton**, C. C. Chickadel, E. Nuss, M. Palmsten, and K. Brodie (In Prep.), Linking directionally spread wavefields, short-crested wave breaking, and surfzone eddy processes in a laboratory basin, *Journal of Physical Oceanography*.

Torres, W. I., **M. Moulton**, and C. C. Chickadel (In Prep.), Liftoff and spreading dynamics of a rip-current plume entering a stratified shelf, *Journal of Physical Oceanography*.

Torres, W. I., **M. Moulton**, and C. C. Chickadel (In Prep.), From rip currents to reefs: characterizing bathymetric wave-driven flows in the nearshore, *Journal of Geophysical Research: Oceans*.

Chickadel, C., **M. Moulton**, and W. Torres (In Prep.), Temperature variability of rip-current plumes, *IEEE Geoscience and Remote Sensing Letters*.

REFEREED PUBLICATIONS

Rainville, E. J.*, J. Thomson, **M. Moulton**, and M. Derakhti (2023, preprint), Measurements of nearshore waves through coherent arrays of small-scale, free-drifting wave buoys, *Earth System Science Data*. doi:10.5194/essd-2023-64.

Baker, C. M.*, **M. Moulton**, E. Nuss*, M. Palmsten, K. Brodie, E. Nuss, and C. C. Chickadel (2023), Remotely sensed short-crested breaking waves in a laboratory directional wave basin, *Coastal Engineering*, doi:10.1016/j.coastaleng.2023.104327.

Moulton, M., A. Suanda, J. C. Garwood, N. Kumar, M. Fewings, and J. Pringle (2023), Exchange of plankton, pollutants, and particles across the nearshore region, *Annual Review of Marine Science*,doi:10.1146/annurev-marine-032122-115057.

Bao, D., Z. G. Xue, J. C. Warner, **M. Moulton**, D. Yin, C. Hegermiller, J. Zambon, and Z. R. He (2022), A numerical investigation of Hurricane Florence-induced compound flooding in the Cape Fear Estuary using a dynamically coupled hydrological-ocean model, *Journal of Advances in Modeling Earth Systems*. , doi:10.1029/2022MS003131.

Spydell, M., A. Suanda, D. Grimes, J. Becherer, J. McSweeney, C. C. Chickadel, **M. Moulton**, J.

Thomson, J. Lerczak, J. Barth, J. MacMahan, J. Colosi, R. Romeiser, A. Waterhouse, J. Calantoni, F. Feddersen (2021), Internal bore evolution across the shelf near Pt. Sal, CA interpreted as a gravity current, *Journal of Physical Oceanography*, doi:10.1175/JPO-D-21-0095.1.

Kumar, N., J. C. Lerczak, ... **M. Moulton**, et al. (many authors), The Inner-Shelf Dynamics Experiment (2021), *Bulletin of the American Meteorol. Society*, doi:10.1175/BAMS-D-19-0281.1.

Moulton, M., C. C. Chickadel, and J. Thomson, Warm and cool nearshore plumes connecting the surf zone to the inner shelf (2021), *Geophysical Research Letters*, doi:10.1029/2020GL091675.

Baker, C. M.*, **M. Moulton**, N. Kumar, S. Elgar, and B. Raubenheimer, Modeling of three-dimensional currents and eddies on an alongshore variable barred beach (2021), *Journal of Geophysical Research: Oceans*, doi:10.1029/2020JC016899.

Elgar, S., B. Raubenheimer, D. Clark, and **M. Moulton** (2019), Extremely low frequency (0.1 to 1.0 mHz) surf zone currents, *Geophysical Research Letters*, *46*, 1531–1536, doi:10.1029/2018GL081106.

Moulton, M., G. Dusek, S. Elgar, and B. Raubenheimer (2017), Comparison of rip current hazard likelihood forecasts with observed rip current speeds, *Weather and Forecasting*, *32*, 1659–1666, doi:10.1175/WAF-D-17-0076.1.

Moulton, M., S. Elgar, B. Raubenheimer, J. C. Warner, and N. Kumar (2017), Rip currents and alongshore flows in single channels dredged in the surf zone, *Journal of Geophysical Research: Oceans*, *122*, doi:10.1002/2016JC012222.

Zavala-Garay, J., J. Theiss, **M. Moulton**, C. Walsh, R. van Woesik, C. Mayorga-Adame, M. Garcia-Reyes, D. Mukaka, K. Whilden, and Y. Shaghude (2015), On the dynamics of the Zanzibar Channel, *Journal of Geophysical Research: Oceans*, *120*, 6091–6113, doi:10.1002/2015JC01087.

Moulton, M., S. Elgar, and B. Raubenheimer (2014), A surfzone morphological diffusivity estimated from the evolution of excavated holes, *Geophysical Research Letters*, *41*, 4628–4636, doi:10.1002/2014GL060519. (Fye Award for Excellence in Oceanographic Research, WHOI)

Moulton, M., S. Elgar, and B. Raubenheimer (2014), Improving time resolution of surfzone bathymetry using in situ altimeters, *Ocean Dynamics*, *64*(5), 755–770, doi:10.1007/s10236-014-0715-8.

Elgar S., B. Raubenheimer, J. Thomson, and **M. Moulton** (2012), Resonances in an evolving hole in the swash zone, *Journal of Waterway, Port, Coastal, and Ocean Engineering*, *138*, 299–302, doi:10.1061/(asce)ww.1943-5460.0000136. (ASCE "Research Highlight")

PROCEEDINGS, DATASETS, AND SOFTWARE

Elgar, S., B. Raubenheimer, and **M. Moulton** (2023), BARGAP: waves, currents, and bathymetry near dredged channels in the surfzone seafloor. *DesignSafe-CI*. doi:10.17603/ds2-t76g-p598.

Baker, C. M., **M. Moulton**, and E. S. Nuss (2023), Experimental investigation of short-crested wave breaking in a laboratory directional wave basin. *Designsafe-CI*. doi:10.17603/ds2-qgd5-jk92.

Rainville, E. J., J. Thomson, M. Moulton, and M. Derakhti (2023), Measurements of nearshore waves through coherent arrays of free-drifting wave buoys *Dryad*. doi:/10.5061/dryad.hx3ffbgk0.

Moulton, M., S. H. Suanda, J. C. Garwood, N. Kumar, M. R. Fewings, and J. M. Pringle (2022),

Nearshore-exchange tool- box, *Zenodo*, doi:10.5281/zenodo.6816225.

Defne, Z., J. C. Warner, J. B. Zambon, R. He, Z. G. Xue, D. Yin, D. Bao, **M. Moulton**, and C. Hegermiller (2022), Hurricane Florence Numerical Modeling Geonarrative, Available from: https://geonarrative.usgs.gov/florence_2018_modeling/.

Thomson, J., **M. Moulton**, A. de Klerk, J. Talbert, S. Kastner, M. Smith, M. Schwendeman, S. Zippel, and S. Nylund (2019), A new SWIFT platform for waves, currents, and turbulence in the ocean surface layer, in *IEEE/OES Currents, Waves & Turbulence Meas.*

F. Feddersen, ... **M. Moulton**, et al. (many authors) (2016), Inner Shelf Dynamics Science and Experiment Plan, Tech. rep., Applied Physics Laboratory, UW, www.apl.washington.edu/innershelf.

Moulton, M. (2016), Hydrodynamic and morphodynamic responses to surfzone seafloor perturbations, *Ph.D. Thesis, MIT-WHOI Joint Program in Oceanography.*

Jaffre, F., P. Traykovski, **M. Moulton**, G. Lawson, and T. Austin (2015), Development of underwater acoustic backscatter and Doppler instruments from a small and versatile multi-frequency sonar board, in *OCEANS'15 MTS/IEEE*, Genova, 141204-105.

Moulton, M., S. Elgar, and B. Raubenheimer (2013), Evolution of rip currents in dredged channels, in *Proceedings of Coastal Dynamics '13*, ASCE, Arcachon, France, 1263–1274.

CONFERENCE ABSTRACTS AND PRESENTATIONS

Baker, C. M.*, **M. Moulton**, C. C. Chickadel, E. S. Nuss, M. Palmsten, and K. Brodie (2024, Upcoming), Wave breaking, eddies, and transient rip current dynamics in large-scale wave basin experiments, *9th International Conference on Physical Modelling in Coastal Engineering (Coastlab24), Delft, NL.*

Chickadel, C., **M. Moulton**, and W. Torres (2024, Upcoming), Rip-current plume shape and evolution dependency on temperature gradients, *Ocean Sciences Meeting, New Orleans, LA.*

Torres, W., **M. Moulton**, and C. C. Chickadel (2024, Upcoming), From rips to reefs: characterizing nearshore wave-driven flows through topography, *Ocean Sciences Meeting, New Orleans, LA.*

Moulton, M., J. B. Zambon, Z. G. Xue, J. C. Warner, D. Bao, D. Yin, Z. Defne, R. He, and C. Hegermiller (2024, Upcoming), Modeled onset and duration of coastal water quality hazards in the aftermath of Hurricane Florence and future extreme precipitation scenarios, *Ocean Sciences Meeting, New Orleans, LA.*

Nuss, E. S.*, **M. Moulton**, S. Suanda, and C. M. Baker (2024, Upcoming), Modeled surf-zone eddies on a laboratory scale barred beach with varying wave period and directional spread, *Ocean Sciences Meeting, New Orleans, LA.*

Rainville, E. J., J. Thomson, M. Moulton, M. Derakhti, and C. Hegermiller (2024, Upcoming), Mapping phase-resolved wave breaking and currents in the surf-zone during extreme conditions using arrays of ?microSWIFT? drifters, *Ocean Sciences Meeting, New Orleans, LA.* Sundberg, L., J. Moriarty, and **M. Moulton** (2024, Upcoming), Modeling the impact of biofouling, photooxidation, and sediment abrasion on microplastic transport, *Ocean Sciences Meeting, New Orleans, LA.*

Luchauer, G., K. Dunning, K. M. Krumhardt, F. S. Castruccio, **M. Moulton**, and D. Cherian (2024, Upcoming), Systematic Review of Climate Change Scenario Planning for Coral Reef Ecosystems and Coral Reef Using Communities, *Ocean Sciences Meeting, New Orleans, LA.*

Moulton, M., A. Suanda, J. C. Garwood, N. Kumar, M. Fewings, and J. Pringle (2023), Exchange of pollutants, nutrients, and organisms across the nearshore region: parameterization framework and communication tools, *Coastal and Estuarine Research Federation (CERF) Biennial Conference, Portland, OR.*

Sundberg, L., J. M. Moriarty, and **M. Moulton** (2023), Impact of microplastic transport pathways on microplastic transformation at a regional scale, *Coastal and Estuarine Research Federation (CERF) Biennial Conference, Portland, OR.*

Torres, W., **M. Moulton**, C. C. Chickadel (2023), Wave-driven flows in nearshore environments, *Coastal and Estuarine Research Federation (CERF) Biennial Conference, Portland, OR.*

Jimenez, K.*, E. Nuss*, **Moulton, M.**, C. C. Chickadel, and W. Torres (2023), Reefs, rocks, and rips: a plankton's perspective, *Coastal and Estuarine Research Federation (CERF) Biennial Conference, Portland, OR.*

Moulton, M., A. Suanda, J. C. Garwood, N. Kumar, M. Fewings, and J. Pringle (2023), Exchange of pollutants, nutrients, and organisms across the nearshore region: parameterization framework and communication tools, *Coastal and Estuarine Research Federation (CERF) Biennial Conference, Portland, OR.*

Rainville, E. J.*, J. Thomson, **M. Moulton**, and M. Derakhti (2023), Nearshore waves and circulation observed with swarms of small buoys, *American Shore and Beach Association (ASBPA) National Coastal Conference, Providence, RI.*

Rainville, E. J.*, J. Thomson, **M. Moulton**, and M. Derakhti (2023), Case study investigation of depth-induced breaking energy dissipation parameterizations in the SWAN wave model, *Young Coastal Scientists and Engineers Conference (YCSEC), Madison, WI.* (Best Student Presentation Award)

Baker, C. M.*, **M. Moulton**, C. C. Chickadel, E. S. Nuss, M. Palmsten, and K. Brodie (2023), Surfzone vorticity dynamics in a directional wave basin, *Gordon Research Conference on Coastal Ocean Dynamics, Smithfield, RI.*

Nuss, E. S.*, **M. Moulton**, S. Suanda, C. M. Baker*, K. Brodie, K., and M. Palmsten (2023), How does surfzone eddy activity vary with wave conditions on a laboratory scale barred beach?, oral and poster presentations, *Gordon Research Conference on Coastal Ocean Dynamics, Smithfield, RI.* (Student Presentation Award)

Torres, W. I., **M. Moulton**, and C. C. Chickadel (2023) Spreading of a rip current plume, *Gordon Research Conference on Coastal Ocean Dynamics, Smithfield, RI.*

Moulton, M., S. H. Suanda, J. C. Garwood, N. Kumar, M. R. Fewings, and J. M. Pringle (2023), Exchange of pollutants, nutrients, and organisms across the nearshore region: a parameterization framework and communication tools, *Gordon Research Conference in Coastal Ocean Dynamics, Smithfield, RI.*

Rainville, E. J.*, J. Thomson, **M. Moulton**, and M. Derakhti (2023), Investigation of cross shore variation of wave heights in the nearshore environment using arrays of drifting wave buoys, *28th Waves In Shallow Environments (WISE) Conference, Princeton, NJ.*

M. Moulton, S. H. Suanda, J. C. Garwood, N. Kumar, M. R. Fewings, and J. M. Pringle (2023), From the beach to the sea and back: how pollutants, nutrients, and organisms move in the coastal ocean, *Community Surface Dynamics Modeling System (CSDMS), Boulder, CO.*

Casper, A.*, **M. Moulton**, G. Dusek, E. Nuss*, and C. M. Baker* (2023), Assessing NOAA hazardous rip-current predictions with lifeguard observations in the context of different rip-current types, *American Meteorological Society Annual Meeting, Denver, CO.*

Nuss, E., **M. Moulton**, S. Suanda, N. Kutz, and C. M. Baker* (2023), Using machine learning to predict wave-breaking induced eddy generation in the surf zone, *American Meteorological Society Annual Meeting, Denver, CO.*

Baker, C. M.*, **M. Moulton**, M. L. Palmsten, K. Brodie, and E. Nuss (2022), Surfzone eddy processes consistent with an inverse energy cascade: laboratory experiments in a directional wave basin, *American Geophysical Union Fall Meeting, Chicago, IL.*

Nuss, E., **M. Moulton**, Baker, C. M.*, K. Brodie, and M. L. Palmsten (2022), Breaking-wave crest lengths and associated vorticity input under varying directional spread, *American Geophysical Union Fall Meeting, Chicago, IL.*

Baker, C. M.*, **M. Moulton**, M. L. Palmsten, K. Brodie, and E. Nuss (2022), Deciphering determinants of breaking wave crest length in the surf zone by remotely sensing directional wave fields in the laboratory, *27th Waves In Sea Environment (WISE) meeting, Brest, France.*

Rainville, E. J.*, J. Thomson, **M. Moulton**, and M. Derakhti (2022), Surf-zone measurements with arrays

of 'microSWIFT' drifters, *Waves In Shallow Environments (WISE) Conference, Brest, France.*

Moulton, M., J. C. Warner, J. Zambon, Z. G. Xue, R. He, Z. Defne, D. Yin, D. Bao, and C. Hegermiller (2022), Coupling hydrology and ocean models to forecast pathways of contaminants from land to the ocean during extreme flood events, *Community Surface Dynamics Modeling System (CSDMS) Annual Meeting, University of Colorado, Boulder, CO.*

Nuss, E. S.*, **M. Moulton, M.**, S. Suanda, and C. M. Baker (2022), Integrating Machine Learning with Numerical Models to Improve Coastal Predictions, *AI Institute Kick Off Meeting, University of Washington, Seattle, WA.*

Rainville, E. J.*, J. Thomson, **M. Moulton**, and M. Derakhti (2022), Measurements of nearshore waves through coherent arrays of small-scale, free-drifting wave buoys, *American Shore and Beach Association (ASBPA) National Coastal Conference, Long Beach, CA.*

Moulton, M., J. C. Warner, J. Zambon, Z. G. Xue, R. He, H. Zong, Z. Defne, D. Yin, D. Bao, and C. Hegermiller (2022) Coastal ocean transport pathways of land-sourced contaminants in the aftermath of Hurricane Florence, *Ocean Sciences Meeting*, virtual.

Trimble, S. M., A. Penko, **M. Moulton**, and C. Maryan (2022), Quantifying the reliability of machine-learning-identified visual signatures in time-averaged video imagery as indicators of rip current flow, *Ocean Sciences Meeting*, virtual.

Rainville, E. J.*, J. Thomson, **M. Moulton**, M. Derakhti, and C. Hegermiller (2022), Mapping phase-resolved wave breaking and currents in the surf-zone during extreme conditions using arrays of 'microSWIFT' drifters, *Ocean Sciences Meeting*, virtual.

Baker, C. M.*, **M. Moulton**, M. L. Palmsten, K. Brodie, and E. Nuss (2022), Vorticity injection at crest ends, eddy evolution, and transient rip current formation in a laboratory surf zone, *Ocean Sciences Meeting*, virtual.

Nuss, E.*, **M. Moulton**, S. Suanda, C. M. Baker*, K. Brodie, and M. L. Palmsten (2022), Investigating short-crested breaking waves under variable directional spreads using phase-resolved modeling and laboratory observations, *Ocean Sciences Meeting*, virtual.

Chickadel, C. C., and **M. Moulton** (2022), *Temperature variability in surf zone rip current plumes, Ocean Sciences Meeting*, virtual.

Smith, E.*, S. Zick, A. Shumacher, and **M. Moulton** (2022), Bayesian modeling to generate maps of rainfall forecast uncertainty for tropical cyclones, *AMS 10th Symposium on Building a Weather-Ready Nation: Enhancing Our Nation's Readiness, Responsiveness, and Resilience to High Impact Weather Events.*

Moulton, M., C. C. Chickadel, and J. Thomson (2021), *Warm and cool nearshore rip-current plumes connecting the surf zone to the inner shelf, Coastal and Estuarine Research Foundation (CERF) Conference*, virtual.

Nuss, E.*, **M. Moulton**, A. Suanda, C. M. Baker*, K. Brodie, and M. Palmsten (2021), *Phase-resolved modeling and laboratory investigation of surfzone eddies and transient rip currents, Coastal and Estuarine Research Foundation (CERF) Conference*, virtual. (Student Presentation Award)

Rainville, E. J.*, **M. Moulton**, J. Thomson, and M. Derakhti (2021), Wave measurements and models during nearshore events, *American Shore and Beach Preservation Association (ASBPA) Conference, New Orleans, LA.*

Nuss, E. S.*, **M. Moulton**, S. Suanda, C. M. Baker, K. Brodie, and M. Palmsten (2021), Phase-resolved modeling and laboratory investigation of surfzone eddies and transient rip currents, *Young Coastal Scientists and Engineers Conference, Mytle Beach, SC.* (Student Presentation Honorable Mention)

Baker, C. M.*, E. Nuss, K. Brodie, M. Palmsten, and **M. Moulton** (2021), Short-crested wave breaking, eddies, and transient rip currents in a laboratory wave basin, *Coastal Dynamics Conference, Delft, The Netherlands.* (Student Presentation Award)

Trimble, S. M, A. Penko, C. Maryan, and **M. Moulton** (2021), Investigating spatial coincidence between rip channels automatically identified in time exposure imagery and in situ observations of bathymetry and

flow, *Coastal Dynamics Conference, Delft, The Netherlands.*

Vigh, J. L., D. J. Smith, ... **M. Moulton**, et al. (many authors) (2021), Updates on the Hurricane Risk Calculator: App capabilities, risk messaging, and pilot testing, *AMS 34th Conference on Hurricanes and Tropical Meteorology*, virtual.

Smith, E.*, S. Zick, A. Siems-Anderson, and **M. Moulton**, Using Bayes' Theorem to Understand Uncertainty in the North American Mesoscale (NAM) Model: A Spatial Analysis of Rainfall Forecast Error for Hurricane Barry (2021), *American Meteorological Society Annual Meeting, Special Symposium on Tropical Meteorology and Tropical Cyclones, Baltimore, MD.*

Xue, Z. G., D. Bao, D. Yin, R. He, J. B. Zambon, **M. Moulton**, J. C. Warner, Z. Defne, D. Gochis, and W. Yu (2020), Investigating hurricane-induced compound flooding and sediment dispersal using coupled hydrology and ocean models, *AGU Fall Meeting, San Francisco, CA.* (Invited)

Kleypas, J. A., S. D. Bachman, and C. J. Shakespeare, **M. Moulton**, F. Bryan, F. Judt, D. Cherian, F. S. Castruccio, R. E. Mora-Escalante, P. Ureña-Mora*, E. N. Curchitser (2020), Coral reefs are complex and so are the science disciplines needed to save them, *AGU Fall Meeting, San Francisco, CA.*

Trimble, S. M., A. Penko, C. Maryan, and **M. Moulton** (2020), Investigating the correlation between optically identified rip channels in time exposure imagery and in situ observations, including bathymetry and flow, *AGU Fall Meeting, San Francisco, CA.*

Nuss, E. S.*, C. M. Baker*, **M. Moulton**, and N. Kumar (2020), Phase-resolved modeling and lab investigation of surfzone eddies and transient rip currents, *AGU Fall Meeting, San Francisco, CA.*

He, R., J. Zambon, J. C. Warner, Z. G. Xue, **M. Moulton**, D. Yin*, D. Bao*, and Z. Defne (2020), Investigating compound flooding and contaminant dispersal during Hurricane Florence using coupled hydrology and ocean models, *Unified Forecast System (UFS) Users Workshop*, virtual.

Thomson, J., **M. Moulton**, M. Derakhti and E. J. Rainville (2020), Measuring and modeling surf zone dynamics during storm events, *American Shore and Beach Preservation Association (ASBPA) Conference*, virtual.

Moulton, M., J. Zambon, Z. G. Xue, R. He, Z. Defne, D. Yin, D. Bao, H. Zong, and J. C. Warner (2020), Investigating compound flooding and contaminant dispersal during Hurricane Florence using coupled hydrology and ocean models, *American Shore and Beach Preservation Association (ASBPA) Conference*, virtual.

Moulton, M., J. Zambon, Z. G. Xue, R. He, Z. Defne, D. Yin, D. Bao, H. Zong*, and J. C. Warner (2020), New forecast tools for coastal flooding and contaminant dispersal during extreme precipitation, Research and Practice Highlight, *45th Annual Natural Hazards Research and Applications Workshop.*

Kumar, N., J. M. Pringle, **M. Moulton**, S. Suanda, and M. R. Fewings (2020), Quantifying the relative importance of various physical mechanisms for plankton and nutrient transport between the shore and the shelf waters, *Ocean Sciences Meeting, San Diego, CA*, PI11A-04.

Baker, C. M.*, **M. Moulton**, M. Palmsten, K. Brodie, and N. Kumar (2020), Remote sensing of transient rip currents and surface waves in a laboratory wave basin, *Ocean Sciences Meeting, San Diego, CA*, CP42A-04.

Spydell, M., F. Feddersen, J. MacMahan, J. Thomson, M. Kovatch, and **M. Moulton** (2020), The effect of inner shelf processes on surface drifter trajectories and dispersion, *Ocean Sciences Meeting, San Diego, CA*, CP34E-1290.

Moulton, M., C. Chickadel, and J. Thomson (2020), Remote sensing and modeling of warm and cool plumes connecting the surf zone and inner shelf, *Ocean Sciences Meeting, San Diego, CA*, CP44G-1447.

Chickadel, C., **M. Moulton**, J. Thomson, A. F. Waterhouse, J. A. MacKinnon, J. Moum, and J. Becherer (2020), Horizontal temperature length scales on the inner shelf due to breaking internal waves, *Ocean Sciences Meeting, San Diego, CA*, CP34E-1284.

Moulton, M., (2019), Processes controlling exchange between the surf zone and the inner shelf (Invited speaker in session: Advances in understanding the physics of shallow and nearshore coastal waters), *Gordon Research Conference in Coastal Ocean Dynamics, Manchester, NH.*

Baker, C. M.*, **M. Moulton**, and N. Kumar (2018), Three-dimensional modeling of transient rip currents, *Young Coastal Scientists and Engineers Conference – Americas, Mérida, México.* (Student Presentation Award)

Baker, C. M.*, **M. Moulton**, and N. Kumar (2018), Rip-current driven cross-shore exchange: observations and model simulations, *Eastern Pacific Oceanography Conference, Timberline, OR.*

Moulton, M., C. Chickadel, and J. Thomson (2018), Observations of rip-current and internal-wave driven exchange between the surf zone and inner shelf, *Ocean Sciences Meeting, Portland, OR*, CD14C-0071.

Baker, C. M.*, **M. Moulton**, S. Elgar, B. Raubenheimer, and N. Kumar (2018), Rip-current driven cross-shore exchange dynamics on a natural barred beach, *Ocean Sciences Meeting, Portland, OR*, CD14B-0042.

Chickadel, C., **M. Moulton**, M., and G. Farquharson (2018), Spatial and temporal scales of internal waves, fronts, and eddies on the inner shelf, *Ocean Sciences Meeting, Portland, OR*, CD11A-04.

Barth, J., J. A. Lerczak, **M. Moulton**, et al. (2018), An Overview of the 2017 Point Sal, California, Inner Shelf Dynamics Experiment, *Ocean Sciences Meeting, Portland, OR*, CD14C-0056.

Kovatch, M., F. Feddersen, **M. Moulton**, et al. (2018), Headland Flow Dynamics and Differential Upwelling Around Point Sal, CA, *Ocean Sciences Meeting, Portland, OR*, CD14C-0058.

Swann, C., J. Calantoni, ... **M. Moulton**, et al. (many authors) (2018), Field Observations of Turbulent Bottom Boundary Layer Processes along the Inner Shelf, *Ocean Sciences Meeting, Portland, OR*, CD14C-0077.

Moulton, M., C. Chickadel, G. Farquharson (2017), Airborne remote sensing of inner shelf processes, *Coastal Ocean Dynamics Gordon Research Conference, University of New England, Biddeford, ME.*

Moulton, M., G. Dusek, S. Elgar, and B. Raubenheimer (2017), Comparing statistical rip current forecast model output with in situ and theoretical rip current speeds, *97th American Meteorological Society Annual Meeting, 15th Symposium on the Coastal Environment, Seattle, WA*, 305823.

Moulton, M., C. Chickadel, S. Elgar, and B. Raubenheimer (2016), Comparison of in-situ and optical current-meter estimates of rip-current circulation, *AGU Fall Meeting, San Francisco, CA*, 130838.

Moulton, M. (2016), Hydrodynamic and morphodynamic responses to surfzone seafloor perturbations, *Physical Oceanography Dissertation Symposium, Honolulu, Hawaii*, Sponsored by ONR and NSF.

Moulton, M., S. Elgar, B. Raubenheimer, and J. C. Warner (2016), What controls rip-current speeds?: Comparing observations, simulations, and a parameterization, *Ocean Sciences Meeting, New Orleans, LA*, EC11A-02.

Moulton, M., S. Elgar, B. Raubenheimer, J. C. Warner, and N. Kumar (2015), Bathymetric controls on rip currents and alongshore flows, *Coastal Sediments Conference, San Diego, CA*, 145.

Moulton, M., S. Elgar, J. C. Warner, and B. Raubenheimer (2014), Modeled and observed transitions between rip currents and alongshore flows, *AGU Fall Meeting, San Francisco, CA*, OS11A-1249.

Moulton, M., S. Elgar, and B. Raubenheimer (2014), Field observations of transitions between rip currents and alongshore flows in dredged channels, *Young Coastal Scientists and Engineers Conference, University of Delaware, DE.* (Best Presentation Award)

Moulton, M., S. Elgar, and B. Raubenheimer (2013), Structure and evolution of rip currents in dredged channels, *Coastal Dynamics, Arcachon, France.* (Best Student Presentation Award)

Moulton, M., S. Elgar, and B. Raubenheimer (2012), Diffusive smoothing of surfzone bathymetry by gravity-driven sediment transport, *AGU Fall Meeting, San Francisco, CA*, OS21B-1715.

Moulton, M., S. Elgar, and B. Raubenheimer (2012), Effects of large bottom slopes on sediment transport and bed level changes in holes in the surf zone, *Ocean Sciences Meeting, Salt Lake City, Utah*, OS-B0855, 9953.

Moulton, M., S. Elgar, and B. Raubenheimer (2010), Holes in the surf zone: waves, currents, and sediment transport in a seafloor perturbation experiment, *AGU Fall Meeting, San Francisco, CA*, OS51B-1299.

Moulton, M., G. Mayorga-Adame, G., M. Garcia-Reyes, P. Nadeau, J. Zavala-Garay, and J. Theiss (2010), Modeling seasonal dynamics in the Zanzibar Channel, *Ocean Sciences Meeting, Portland, OR*, ED25B-01.

Moulton, M., B. Raubenheimer, E. Ladouceur, and S. Elgar (2008), Nearshore circulation over a muddy seafloor, *AGU Fall Meeting, San Francisco, CA*, OS33C-1359.

*Student author advisee of Moulton

INVITED/DEPARTMENTAL SEMINARS AND PANELS

Ocean Modeling for Marine Resource Management, *NCAR Day of Science and Discovery, Plenary*, Sept. 2023

NOAA Coastal Ocean Modeling Seminars, *NOAA Coastal Marine Modeling Branch*, Sept. 2023

Invited Discussion Leader in Session: Novel Approaches to Observing in Coastal Systems, *Coastal Dynamics Gordon Research Conference*, June 2023

Panelist, Rising Voices: Indigenous and Earth Sciences, Department of Atmospheric Science Seminar, *Colorado State University, Fort Collins*, April 2023

Atmospheric and Oceanic Sciences Department, *U. Colorado, Boulder*, April 2023

Institute of Marine Sciences Seminar, *U. North Carolina Chapel Hill*, Nov. 2021

Transient Rip Current Dynamics, *Nirnimesh Kumar Research Symposium*, *UW*, Sept. 2021

Coastal Ocean Fluid Dynamics Laboratory Seminar, *WHOI*, July 2021

A coastal oceanographer's perspective on waves in climate models, *CESM workshop*, June 2021

Physical Oceanography Seminar, *University of Rhode Island*, Dec. 2020

Faculty Innovators Summer Seminar, *NCAR, Boulder, CO*, August 2019

Summer Seminar Series, *Naval Research Laboratory, Stennis, MS*, July 2019

Invited Speaker in Session: Advances in Understanding the Physics of Shallow and Nearshore Coastal Waters, *Coastal Dynamics Gordon Research Conference*, June 2019

Physical Sciences Seminar, *Virginia Institute of Marine Science*, May 2019

Ocean Resources Engineering Seminar, *University of Hawaii*, May 2019

Earth Sciences Seminar, *University of Minnesota*, March 2019

Civil and Environmental Engineering Seminar, *MIT*, March 2019

Civil and Environmental Engineering Seminar, *Northeastern University*, Jan. 2019

Physical Oceanography Seminar, *Dalhousie University*, Oct. 2018

Department of Marine and Coastal Sciences Seminar, *Rutgers University*, May 2018

Coastal Ocean Fluid Dynamics Laboratory Seminar, *WHOI*, June 2017

Physical Oceanography Dissertation Symposium, *Sponsored by ONR & NSF*, Oct. 2016

Physics Colloquium, *Amherst College*, Sept. 2015

Applied Physics Laboratory Seminar Series, *APL-UW*, Sept. 2015

Hydrology & Environmental Fluid Mechanics Seminar, *MIT*, Sept. 2015

Coastal Hydraulics Laboratory Seminar, *US Army Corps of Engineers*, Duck, NC, April 2015

Environmental Fluid Mechanics Seminar, *University of Washington*, Feb. 2015

Coastal Ocean Fluid Dynamics Lab Seminar, *Woods Hole Oceanographic Inst.*, June 2013

AWARDS, HONORS, AND FELLOWSHIPS

Young Investigator Program Award, *Office of Naval Research*, April 2020

Panteleyev Award for Commitment to Improving the Graduate Education Experience, *MIT-WHOI*, June 2016

Fye Award for Excellence in Oceanographic Research, *MIT-WHOI*, June 2015

Best Presentation, *Young Coastal Scientists/Engineers Conference, U. Delaware*, July 2014

Best Student Presentation Award, *Coastal Dynamics Conference*, France, June 2013

Graduate Research Fellowship, *National Science Foundation*, 2013 – 2015

National Defense Science and Engineering Graduate Fellowship, *DoD*, 2010 – 2013

Bassett and Stifler Prizes in Physics, *Amherst College*, June 2006 & 2009

GRANTS

Sediment Transport Over the Nearshore Environment (STONE): Linking nonlinear wave effects across the shoaling and breaking zone, Co-PI with PI M. Derakhti, co-PIs C. Baker, C. Chickadel, C. Hegermiller, G. Wilson, *US Coastal Research Program (USCRP)*, 2023 – 2027, $1.94M

Pulse of the planet: A climate data decision-support dashboard for National Marine Sanctuary management and participatory adaptation planning, co-I, PI: K. Dunning (Auburn University), co-PIs D. Cherian, K. Krumhardt, co-I F. Castruccio, S. Personnel: J. Kleypas, *NOAA-OAR Improving Climate Information and Understanding for Marine Sanctuary Management Planning*, 2022–2025, $525k ($255k for NCAR)

Large-scale CoPe: Rising Voices, Changing Coasts: The National Indigenous and Earth Sciences Convergence Hub, Senior Personnel, *National Science Foundation*, 2022 – 2027, $20M ($3.9M for NCAR)

Nearshore plume dynamics: airborne observations and modeling of surf-shelf exchange, lead PI with Co-PI Chickadel, *National Science Foundation, Physical Oceanography*, 2021 – 2024, $696k

Combined effects of coastal ocean dynamics and hydrology on flooding and pollutant dispersal during extreme events: Hurricane Florence and future climate scenarios, PI, *United States Geological Survey, Coastal Change Hazards*, 2020 – 2023, $200k

Remote sensing and modeling of coastal exchange, PI, *Office of Naval Research, Young Investigator Program Award*, 2020 – 2023, $509k

Physics and connectivity informing reef conservation: an interdisciplinary study of coastal oceanography of the eastern tropical Pacific, Co-PI with J. Kleypas, S. Bachman, F. Judt, F. Bryan, D. Cherian, F. Castruccio, R. E. Mora-Escalante, P. Ureña-Mora, E. Curchitser, *President's Strategic Initiative Fund, UCAR*, 2019 – 2022, $150k

Coherent drifter arrays at DUNEX (nearshore extreme events rapid response observations), Co-PI with J. Thomson, M. Derakhti, *US Coastal Research Program (USCRP)*, 2019 – 2022, $499k

Transient rip currents: lab measurements and modeling of surfzone vorticity, Co-PI with N. Kumar,

National Science Foundation, Physical Oceanography, 2017 – 2021, $717k

Airborne remote sensing of cross-shelf exchange, PI, *University of Washington, Royalty Research Fund*, 2017 – 2018, $40k

Rip currents: coupling and feedbacks between waves, flows and morphology, Co-PI with S. Elgar, *National Science Foundation, Physical Oceanography*, 2015 – 2018, $542k

Using altimeters to improve the temporal resolution of surfzone bathymetry, PI, *Coastal Ocean Institute, Woods Hole Oceanographic Institution*, 2014 – 2015, $1k

DEI, OUTREACH, & EDUCATION ACTIVITIES

Rip currents are dangerous for swimmers but also ecologically important – here's how scientists are working to understand these 'rivers of the sea?, *The Conversation*.

Dangerous Rip Currents Give Marine Life a Speed Boost, *Scientific American*.

Mentor for Mentor Groups, Mentoring Physical Oceanography Women to Increase Retention (MPOWIR), 2022 – present (was a Mentee 2016 – 2021)

Mentor, Women in Coastal Geoscience and Engineering, 2022 – present

Steering Committee Member & Mentor, Significant Opportunities in Atmospheric Research and Science (SOARS), an undergraduate-to-graduate bridge program designed to broaden participation of historically underrepresented communities in the earth system sciences, 2020 – present

Core Science Team Member, supporting convergence research within the NCAR Early Career Faculty Innovator Program, 2021 – present

Model Behavior, authored by Julie Leibach, *Coastwatch, North Carolina Seagrant*, Autumn 2021

Search Committee Member for *Advanced Study Program (ASP) Postdoctoral Fellowship*, NCAR, 2021 – present

Core Science Team Member, supporting convergence research within the *NCAR Early Career Faculty Innovator Program*, 2021 – present

Writing Mentor for undergraduate protégés, *SOARS*, Summers 2020 & 2021

Across Lab Liaisons Board Representative, Applied Physics Laboratory, 2022 – present

Unlearning Racism in GEoscience (URGE) pod member, 2021

Women's Advisory Board Representative, Applied Physics Laboratory, 2018 – 2021

Engineering Discovery Days, *University of Washington*, annual, 2017 – present

Reviewer, Nearshore Processes Fundamentals curriculum, *COMET MetEd*, Spring 2020

Planning Committee Member, SeaTalk: building trust and respect within the University of Washington seagoing community, 2017 – 2019

Interviews and expert comments on coastal hazards, *The Weather Channel*, Apr. 2017, Nov. 2019

Co-developer, NOAA Rip Current Science public web page, 2018

Climate Symposium, *Furnace Brook Middle School*, Marshfield, MA, June 2016

Women's Committee Representative, Woods Hole Oceanographic Institution, 2013 – 2015

The Riddle of Rip Currents, authored by Evan Lubofsky, *Oceanus*, December 2015

STEM careers panel for undergraduate women, *Amherst College*, October 2014

Geophysical Fluid Dynamics Lab Tours, *Woods Hole Oceanographic Institution*, 2013 – 2014

Featured in STEM careers video series, *Office of Naval Research*, 2010

Elementary after-school education program, *All Kids Are Scientists!*, Portland, OR, 2009

Co-Founder and Co-Editor-in-Chief of a science literacy magazine, *Amherst College*, 2009

TEACHING EXPERIENCE

Guest Lecturer, Dynamics of Ocean Tides, developed and taught one lecture with in-class activities, *Virginia Institute of Marine Science*, Spring 2019

Guest Lecturer, Coastal Engineering, developed and taught lecture with in-class activities, *Civil and Env. Engineering, U. Washington*, Spring 2018

Guest Lecturer, Numerical Modeling of Hydrodynamics, developed and taught two lectures with in-class activities, *Civil and Env. Engineering, U. Washington*, Spring 2017 & 2018

Teaching Assistant and Guest Lecturer, Coastal Physical Oceanography, developed weekly assessments and developed and taught one full lecture, *MIT-WHOI*, Fall 2014

Lecturer, Math Review Course, developed and taught lectures and in-class activities for differential equations and Fourier transforms, *MIT / Woods Hole Oceanographic Institution*, Summer 2013

Graduate Teaching Certificate Program, full semester course in teaching and learning, including workshops on "Research and How People Learn," "Designing a Course and Constructing a Syllabus," "Constructing Effective Problem Sets and Exam Questions," "Planning and Presenting a Lecture," "Interactive Teaching and Active Learning," "Enhancing Learning with Educational Technologies," and "Teaching in a Multicultural Classroom," *MIT*, Spring 2013

Teaching Assistant and Peer Tutor in several Physics courses, including theoretical and laboratory courses and courses for non-majors, *Amherst College*, 2006 – 2009

FIELD AND LAB EXPERIENCE

During Nearshore Event Experiment (DUNEX) drifter releases, Duck, NC, Fall 2021

Nearshore Extreme Events Reconnaissance (NEER), Virtual participant, 2019 – present

Wake verification and validation study, NIWC-PAC, Washington, Summer 2019

Transient rip current experiments, Hinsdale Wave Research Laboratory, National Hazards Engineering Research Infrastructure, Oregon State University, Spring and Fall 2018

ONR Inner Shelf DRI aircraft and small-boat observations, Point Sal, CA, Fall 2017

Quinault river mouth UAV remote sensing and drifter releases, Taholah, WA, April 2017

ROLLEX infrared remote sensing, Duck, NC, October 2016

Katama Bay and Inlet study, Martha's Vineyard, MA, Summers 2013 and 2014

Surfzone vorticity experiments, USACE Field Research Facility, Duck, NC, October 2013

Tropical Field Ecology course, MIT-WHOI, Panama, January 2013

Channel dredging experiments, USACE Field Research Facility, Duck, NC, Summer 2012

ONR RIVET I, New River Inlet, NC, April 2012

Altimeter field tests, USACE Field Research Facility, Duck, NC, October 2011

Hole excavation experiments, USACE Field Research Facility, Duck, NC, Summer 2010

Zanzibar Channel dynamics study, Zanzibar, Tanzania, Summer 2009

Bioluminescent bays, Keck Geology Consortium, Puerto Rico, Summers 2006 and 2007

AAUS-certified SCUBA diver, Specialties: NITROX, Dry Suit, since 2010 (lapsed)

OTHER PROFESSIONAL ACTIVITIES

Graduate Students and Postdocs Advised:

Laura Sundberg, *CU Boulder, Postdoc*, co-advisor with lead advisor J. Moriarty, 2023 – present
Walter I. Torres, *UW APL, Postdoc*, co-advised with C. C. Chickadel, 2022 – present
Emma S. Nuss, *UW CEE, PhD student*, 2020 – present
E. J. Rainville, *UW CEE, PhD student*, co-advised with J. Thomson & M. Derakhti, 2020 – present (MS Aug. 2022)
Christine M. Baker, *UW CEE, PhD student*, 2017 – 2023 (MS Dec. 2019, co-advised with N. Kumar)

Graduate Student Committees:

Brianna Undzis, *CU Boulder, Atmospheric & Oceanic Sciences, PhD student*, 2022 – present
Tina Geller, *CU Boulder, Atmospheric & Oceanic Sciences, PhD student*, 2022 – present
Kenichi Sasaki, *CU Boulder Aerospace Engineering and Sciences, PhD student*, 2021 – 2023
Sam Kastner, *UW CEE, PhD*, 2018 – 2020 (PhD received Aug. 2020)

Undergraduates Advised:

Karla Jimenez, *FIU, CICOES REU*, 2023
Audrey Casper, *GWU, CICOES REU and APL Data Analyst*, 2022 – present
Anastasia Tomanek, *UW-Madison, SOARS protegé, writing mentee*, 2023
Ebone Smith, *VA-Tech & UI, SOARS protegé, writing mentee*, 2021 – present

Reviewer:

US Coastal Research Program: Human & Ecosystem Health in Coastal Systems Report
Natural Hazards
Journal of Geophysical Research: Earth Surface
Journal of Physical Oceanography
Ocean Modelling
Ocean Science (European Geosciences Union)
Marie Curie Postdoctoral Fellowships Programme
National Science Foundation, Major Research Instrumentation Program, mail-in reviews
National Science Foundation, Physical Oceanography, mail-in reviews

Review Panelist:

National Aeronautics and Space Administration, Review Panel, program and year omitted
National Science Foundation, Merit Review Panel, program and year omitted
National Science Foundation, Graduate Research Fellowship Program
National Defense Science and Engineering Graduate Fellowship

Member:

American Shore and Beach Preservation Association, 2020 – present

NEER: Nearshore Extreme Events Reconnaissance, 2019 – present
Society for Women in Marine Science, 2017 – present
Coastal Imaging Research Network, 2016 – present
The Coastal Society, 2015 – present
American Geophysical Union, 2008 – present

Representative:

Dive Control Board, Woods Hole Oceanographic Institution, 2012 – 2016
MIT-WHOI Student Organization, 2012 – 2013

Convener:

Coastal transport pathways of plankton, pollutants, and particles, *CERF*, 2023
Novel Approaches to Observing in Coastal Systems, *Gordon Res. Conf.*, 2023
The Inner Shelf: Impacts of Interconnected Processes, *Ocean Sciences*, 2020
Interdisciplinary studies of transport from the shelf to the shoreline, *EPOC*, 2018
Nearshore Processes Session, *American Geophysical Union Fall Meeting*, 2016

Workshops and Training:

Rising Voices Center for Indigenous and Earth Sciences, Annual Workshops, 2022–present
Workshop on SHared Operational REsearch Logistics in the Nearshore Environment (SHORELINE21): Uniting field and lab research across disciplines to reduce hurricane impacts to the built and natural environments, virtual, 2021
US Coastal Research Program: Human & Ecosystem Health Workshop, virtual, 2021
The Community WRF-Hydro Modeling System Training Workshop, virtual, 2020
Coastal Zone Foundation Water Quality Short Course, virtual, 2020
Natural Hazards Research and Applications Workshop, virtual, 2020
Nearshore Extreme Events Reconnaissance (NEER) Workshop, Arlington, VA, 2019
Natural Hazards Reconnaissance Facility (RAPID) Intensive Workshop, NHERI, 2019
Software Carpentry Workshop, UW eScience Institute, 2019
Coastlines and People (CoPe) Workshop, *National Science Foundation*, 2018
Coastal image annotation repository for machine learning applications, contributor, 2018
Unmanned Aerial Vehicle Imaging, *Coastal Imaging Research Network*, Duck, NC, 2017
Coastal Hazards & Resilience Workshop, *NOAA*, Suffolk, VA, 2015
COAWST Modeling System Workshop, *USGS*, Woods Hole, MA, 2014
Self-Organized Morphodynamic Patterns Short Course, Arcachon, France, 2013
The Past and Future of Nearshore Processes Research, Kitty Hawk, NC, 2013
Path of Professorship Workshop, *MIT*, 2013