Nathan J. M. Laxague

Assistant Professor
University of New Hampshire
Department of Mechanical Engineering

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Google Scholar

Education

2012 - 2016 **Ph.D.**, *Applied Marine Physics*
Rosenstiel School of Marine and Atmospheric Science, University of Miami

Dissertation title: "Development and Application of Gravity-Capillary Wave Fourier Analysis for the Study of Air-Sea Interaction Physics".
Doctoral Advisor: Dr. Brian K. Haus

2007 - 2011 **B.S.**, *Physics*
University of Miami

Professional Appointments

2020 – present **Assistant Professor**, University of New Hampshire
Department of Mechanical Engineering and Center for Ocean Engineering

2017 – 2020 **Postdoctoral Research Scientist**, Columbia University
Lamont-Doherty Earth Observatory, Division of Ocean and Climate Physics

2017 **Postdoctoral Scientist**, University of Miami
Rosenstiel School of Marine and Atmospheric Science, Department of Ocean Sciences

Research Interests

- Air-sea interaction physics
- Boundary layer fluid mechanics
- Geophysical turbulence
- Ocean surface waves
- Ocean surface currents
- Ocean pollutant transport

Peer-Reviewed Publications

[24] **Laxague, N. J. M.** & Zappa, C. J., 2020; The impact of rain on ocean surface waves and currents. *Geophysical Research Letters*, 47(7):e2020GL087287. http://doi.org/10.1029/2020GL087287

[23] **Laxague, N. J. M.** & Zappa, C. J., 2020; Observations of mean and wave orbital flows in the ocean's upper centimetres. *Journal of Fluid Mechanics*, 887:A10. http://doi.org/10.1017/jfm.2019.1019

[22] **Laxague, N. J. M.**, Haus, B. K., Ortiz-Suslow, D. G., & Graber, H. C., 2018; Quantifying highly variable air-sea momentum flux using wavelet analysis. *Journal of Atmospheric and Oceanic Technology*, 35(9). http://doi.org/10.1175/JTECH-D-18-0064.1

[21] **Laxague, N. J. M.**, Zappa, C. J., LeBel, D. A., & Banner, M. L., 2018; Spectral characteristics of gravity-capillary waves, with connections to wave growth and microbreaking. *Journal of Geophysical Research: Oceans*, 123(7). http://doi.org/10.1029/2018JC013859

[20] **Laxague, N. J. M.**, Özgökmen, T. M., Haus, B. K., Novelli, G., Shcherbina, A. Y., Sutherland, P., Guigand, C. M., Lund, B., Mehta, S., Alday, M., & Molemaker, J., 2018; Observations of Near-Surface Current Shear Help Describe Oceanic Oil and Plastic Transport. *Geophysical Research Letters*, 45(1). http://doi.org/10.1002/2017GL075891

[19] **Laxague, N. J. M.**, Haus, B. K., Ortiz-Suslow, D. G., Smith, C. J., Novelli, G., Dai, H., Özgökmen, T. M., & Graber, H. C., 2017; Passive optical sensing of the near-surface wind-driven current profile. *Journal of Atmospheric and Oceanic Technology*, 34(5):1097–1111. http://doi.org/10.1175/JTECH-D-16-0090.1

[18] **Laxague, N. J. M.**, Curcic, M., Björkqvist, J.-V., & Haus, B. K., 2017; Gravity-capillary wave spectral modulation by gravity waves. *IEEE Transactions on Geoscience and Remote Sensing*, 55(5). http://doi.org/10.1109/TGRS.2016.2645539

[17] **Laxague, N. J. M.**, Haus, B. K., Bogucki, D. J., & Özgökmen, T. M., 2015; Spectral characterization of fine-scale wind waves using shipboard optical polarimetry. *Journal of Geophysical Research*, 120(4). http://doi.org/10.1002/2014JC010403

[16] Zappa, C. J., Brown, S. M., **Laxague, N. J. M.**, Dhakal, T., Harris, R. A., Farber, A. M., & Subramaniam, A., 2020; Using Ship-Deployed High-Endurance Unmanned Aerial Vehicles for the Study of Ocean Surface and Atmospheric Boundary Layer Processes. *Frontiers in Marine Science*, 6:777. http://doi.org/10.3389/fmars.2019.00777

[15] Lund, B., Haus, B. K., Graber, H. C., Horstmann, J., Carrasco, R., Novelli, G., Guigand, C. M., Mehta, S., **Laxague, N. J. M.**, & Özgökmen, T. M., 2020; Marine X-band radar currents and bathymetry: An argument for a wavenumber-dependent retrieval method. *Journal of Geophysical Research: Oceans*. http://doi.org/10.1029/2019JC015618

[14] Shao, M., Ortiz-Suslow, D. G., Haus, B. K., Lund, B., Williams, N. J., Özgökmen, T. M., **Laxague, N. J. M.**, Horstmann, J., & Klymak, J. M., 2019; The Variability of Winds and Fluxes Observed Near Submesoscale Fronts. *Journal of Geophysical Research: Oceans*, 124(11):7756–7780. http://doi.org/10.1029/2019JC015236

[13] Zappa, C. J., **Laxague, N. J. M.**, Brumer, S. E., & Anderson, S. P., 2019; The Impact of Wind Gusts on the Ocean Thermal Skin Layer. *Geophysical Research Letters*, 46(20):11301–11309. http://doi.org/10.1029/2019gl083687

[12] D'Asaro, E. A., Shcherbina, A. Y., Klymak, J. M., Molemaker, J., Novelli, G., Guigand, C. M., Haza, A. C., Haus, B. K., Ryan, E. H., Jacobs, G. A., Huntley, H. S., **Laxague, N. J. M.**, Chen, S., Judt, F., McWilliams, J. C., Barkan, R., Kirwan, A. D., Poje, A. C., & Özgökmen, T. M., 2018; Ocean convergence and the dispersion of flotsam. *Proceedings of the National Academy of Sciences*, page 201718453. http://doi.org/10.1073/pnas.1718453115

[11] Lund, B., Haus, B. K., Horstmann, J., Graber, H. C., Carrasco, R., **Laxague, N. J. M.**, Novelli, G., Guigand, C. M., & Özgökmen, T. M., 2018; Near-surface current mapping by shipboard marine X-band radar: A validation. *Journal of Atmospheric and Oceanic Technology*, 35(5):1077–1090. http://doi.org/10.1175/JTECH-D-17-0154.1

[10] Novelli, G., Guigand, C. M., Cousin, C., Ryan, E. H., **Laxague, N. J. M.**, Dai, H., Haus, B. K., & Özgökmen, T. M., 2017; A biodegradable surface drifter for ocean sampling on a massive scale. *Journal of Atmospheric and Oceanic Technology*, 34(11):2509–2532. http://doi.org/10.1175/JTECH-D-17-0055.1

[9] Ortiz-Suslow, D. G., Haus, B. K., Mehta, S., & **Laxague, N. J. M.**, 2016; Sea Spray Generation in Very High Winds. *Journal of the Atmospheric Sciences*, 73(10):3975–3995. http://doi.org/10.1175/JAS-D-15-0249.1

[8] Soloviev, A. V., Haus, B. K., McGauley, M. G., Dean, C. W., Ortiz-Suslow, D. G., **Laxague, N. J. M.**, & Özgökmen, T. M., 2016; Surface dynamics of crude and weathered oil in the presence of dispersants: Laboratory experiment and numerical simulation. *Journal of Geophysical Research: Oceans*, 121(5):3502–3516. http://doi.org/10.1002/2015JC011533

[7] Mariano, A. J., Ryan, E. H., Huntley, H. S., Laurindo, L. C., Coelho, E. F., Griffa, A., Özgökmen, T. M., Berta, M., Bogucki, D. J., Chen, S. S., Curcic, M., Drouin, K. L., Gough, M. K., Haus, B. K., Haza, A. C., Hogan, P. J., Iskandarani, M., Jacobs, G. A., Kirwan, A. D., **Laxague, N. J. M.**, Lipphardt, B. L., Magaldi, M. G., Novelli, G., Reniers, A. J. H. M., Restrepo, J. M., Smith, C. J., Valle-Levinson, A., & Wei, M., 2016; Statistical properties of the surface velocity field in the northern Gulf of Mexico sampled by GLAD drifters. *Journal of Geophysical Research: Oceans*, 121(7):5193–5216. http://doi.org/10.1002/2015JC011569

[6] Huguenard, K. D., Bogucki, D. J., Ortiz-Suslow, D. G., **Laxague, N. J. M.**, MacMahan, J. H., Özgökmen, T. M., Haus, B. K., Reniers, A. J. H. M., Hargrove, J., Soloviev, A. V., & Graber, H. C., 2016; On the nature of the frontal zone of the Choctawhatchee Bay plume in the Gulf of Mexico. *Journal of Geophysical Research*, 121(2). http://doi.org/10.1002/2015JC010988

[5] Bogucki, D. J., Huguenard, K. D., Haus, B. K., Özgökmen, T. M., Reniers, A. J. H. M., & **Laxague, N. J. M.**, 2015; Scaling laws for the upper ocean temperature dissipation rate. *Geophysical Research Letters*, 42(3). http://doi.org/10.1002/2014GL062235

[4] Ortiz-Suslow, D. G., Haus, B. K., Williams, N. J., **Laxague, N. J. M.**, Reniers, A. J. H. M., & Graber, H. C., 2015; The spatial-temporal variability of air-sea momentum fluxes observed at a tidal inlet. *Journal of Geophysical Research*, 120(2):660–676. http://doi.org/10.1002/2014JC010412

[3] Coelho, E. F., Hogan, P. J., Jacobs, G. A., Thoppil, P. G., Huntley, H. S., Haus, B. K., Lipphardt, B. L., Kirwan, A. D., Ryan, E. H., Olascoaga, M. J., Beron-Vera, F. J., Poje, A. C., Griffa, A., Özgökmen, T. M., Mariano, A. J., Novelli, G., Haza, A. C., Bogucki, D. J., Chen, S. S., Curcic, M., Iskandarani, M., Judt, F., **Laxague, N. J. M.**, Reniers, A. J. H. M., Valle-Levinson, A., & Wei, M., 2015; Ocean current estimation using a Multi-Model Ensemble Kalman Filter during the Grand Lagrangian Deployment experiment (GLAD). *Ocean Modelling*, 87:86–106. http://doi.org/10.1016/j.ocemod.2014.11.001

[2] Jacobs, G. A., Bartels, B. P., Bogucki, D. J., Beron-Vera, F. J., Chen, S. S., Coelho, E. F., Curcic, M., Griffa, A., Gough, M. K., Haus, B. K., Haza, A. C., Helber, R. W., Hogan, P. J., Huntley, H. S., Iskandarani, M., Judt, F., Kirwan, A. D., **Laxague, N. J. M.**, Valle-Levinson, A., Lipphardt, B. L., Mariano, A. J., Ngodock, H. E., Novelli, G., Olascoaga, M. J., Özgökmen, T. M., Poje, A. C., Reniers, A. J. H. M., Rowley, C. D., Ryan, E. H., Smith, S. R., Spence, P. L., Thoppil, P. G., & Wei, M., 2014; Data assimilation considerations for improved ocean predictability during the Gulf of Mexico Grand Lagrangian Deployment (GLAD). *Ocean Modelling*, 83:98–117. http://doi.org/10.1016/j.ocemod.2014.09.003

[1] Johnson, N. F., Carran, S., Botner, J., Fontaine, K., **Laxague, N. J. M.**, Nuetzel, P., Turnley, J., & Tivnan, B., 2011; Pattern in escalations in insurgent and terrorist activity. *Science*, 333(6038). http://doi.org/10.1126/science.1205068

Teaching Experience @ UNH

Spring 2021	ME 603, *Heat Transfer*
Fall 2020	ME 795/895, *Experimental Fluid Dynamics* (co-taught)
Fall 2020	OE 400, *Ocean Engineering Seminar* (co-taught)

Funded Grant Proposals

2021 – 2023 **Nathan J. M. Laxague** *with Christopher J. Zappa*, $52,708
Collaborative Research: Investigating the Relationship Between Ocean Surface Gravity-Capillary Waves, Surface-Layer Hydrodynamics, and Air-Sea Momentum Flux
NSF, Physical Oceanography, **#20-49578**

2020 – 2022 Christopher J. Zappa & **Nathan J. M. Laxague**, $939,645
A Multi-Spectral Thermal Infrared Imaging System for Air-Sea Interaction Research
NSF, Ocean Technology and Interdisciplinary Coordination, **#20-23678**

2019 – 2021 Christopher J. Zappa & **Nathan J. M. Laxague**, $345,758
Ocean Gravity-Capillary Waves: Dependence on Sea-Surface Processes and Microlayer Properties
NSF, Physical Oceanography, **#19-23935**

Awards and Honors

2018 **Geophysical Research Letters Editor Highlights**
"Observations of Near-Surface Current Shear Help Describe Oceanic Oil and Plastic Transport"
Among the editor-selected highlights, representing approximately 4% of GRL papers published in 2017

2014-2016 **Gulf of Mexico Research Initiative (GoMRI) Scholar**
Recognition by GoMRI as a student "whose vital research contribute(s) to improv(ing) understanding about the damage, response, and recovery following the Deepwater Horizon oil spill."

Invited Talks

2018 *The Role of Gravity-Capillary Waves in Air-Sea Momentum Flux*
Physical Oceanography seminar series, Graduate School of Oceanography, University of Rhode Island

Conference Proceedings

[2] **Laxague, N. J. M.**, Ortiz-Suslow, D. G., Haus, B. K., Williams, N. J., & Graber, H. C., 2016; Water surface slope spectra in nearshore and river mouth environments. *IOP Conference Series: Earth and Environmental Science*, 35(1):012013. http://doi.org/10.1088/1755-1315/35/1/012013

[1] Ortiz-Suslow, D. G., Haus, B. K., Mehta, S., & **Laxague, N. J. M.**, 2016; A laboratory study of spray generation in high winds. *IOP Conference Series: Earth and Environmental Science*, 35(1):012008. http://doi.org/10.1088/1755-1315/35/1/012008

Professional Activities

Session Primary Chair, 2020 Ocean Sciences Meeting

Session Co-Chair, 2016 & 2018 Ocean Sciences Meeting

American Geophysical Union, Member

American Meteorological Society, Member

Institute of Electrical and Electronics Engineers, Member

Oceanic Engineering Society, Member

Invited reviewer for *Journal of Geophysical Research: Oceans*, *Journal of Fluid Mechanics*, *Journal of Physical Oceanography*, *Flow*, *IEEE Transactions on Geoscience and Remote Sensing*, *Dynamics of Atmospheres and Oceans*, *Ocean Science Discussions*, *Continental Shelf Research*, *Marine Pollution Bulletin*

Invited reviewer for *National Science Foundation* grant proposals

Conference Presentations

2021 *The impact of rain on ocean surface waves and currents* **and**
Observations of mean and wave orbital flows in the upper centimeters of the ocean surface layer
22nd Conference on Air-Sea Interaction (online)

2020 *Evolution of sea ice radiometric properties during melt and breakup*
American Geophysical Union Fall Meeting (online)

2020 *Observations of mean and wave orbital flows in the upper centimeters of the ocean surface layer* **and**
Changes in ocean-atmosphere heat and momentum fluxes during sea ice melt and breakup
Ocean Sciences Meeting, San Diego, CA
***Session primary chair**, "Fluxes and Physical Processes Near the Air-Sea Interface:
Observations and Modeling (Cosponsored by the AMS Committee on Air-Sea Interaction)"

2018 *Spectral characteristics of gravity-capillary waves, with connections to wave growth and microbreaking*
21st Conference on Air-Sea Interaction, Oklahoma City, OK

2018 *Unpacking Observed Air-Sea Momentum Flux in Frequency and Time*
Ocean Sciences Meeting, Portland, OR
***Session co-chair**, "Turbulent Air-Sea Fluxes: Observations and Modeling"

2018 *Observations of the vertical profile of currents in the upper meter of the ocean* (presenting author)
Ocean Sciences Meeting, Portland, OR

2016 *Laboratory Observations of Short Wave Hydrodynamic Modulation by Gravity Waves*
20th Conference on Air-Sea Interaction, Madison, WI

2016 *Sea surface wave spectral properties in coastal waters*
Ocean Sciences Meeting, New Orleans, LA
***Session co-chair**, "Advances in Understanding the Physical Processes at the Air-Sea interface"

2016 *Laboratory Measurements of Near-Surface Wind-Wave-Current Interaction* (poster)
Gulf of Mexico Oil Spill and Ecosystem Science Conference, Tampa, FL

2015 *Water Surface Slope Spectra in Nearshore and River Mouth Environments*
7th Symposium on Gas Transfer at Water Surfaces, Seattle, WA

2015 *Coastal Dynamics Observed from a Mobile Air-Sea Interaction Platform* (presenting author)
11th Currents, Waves, and Turbulence Measurement Workshop, St. Petersburg, FL

2015 *Wavenumber Dependence of Surface Roughness Over A Variety of Wind Conditions*
Gulf of Mexico Oil Spill and Ecosystem Science Conference, Houston, TX

2015 *Wavenumber Dependence of Surface Roughness Over A Variety of Wind Conditions*
19th Conference on Air-Sea Interaction, Phoenix, AZ

2014 *Polarimetric Sea-Surface Measurements Made During The GLAD Experiment*
Ocean Sciences Meeting, Honolulu, HI

2014 *Polarimetric Sea-Surface Measurements Made During The GLAD Experiment*
Gulf of Mexico Oil Spill and Ecosystem Science Conference, Mobile, AL

2013 *Polarimetric Remote Sensing of Wind-Induced Surface Roughness*
Gulf of Mexico Oil Spill and Ecosystem Science Conference, New Orleans, LA

Field Research Experience

Nov-Dec 2019 **AIR↓↑SEA**, South Pacific Ocean, R/V Falkor.
Project supported by the Schmidt Ocean Institute.
35 total field days

Aug-Sep 2019 **ASIT** platform air-sea interaction observations, Martha's Vineyard, MA.
Project supported by the National Aeronatics and Space Administration.
14 total field days

Apr-May 2019 **Ikaaġvik Sikukun**, Kotzebue, AK.
Project supported by the Gordon and Betty Moore Foundation.
30 total field days

Apr-May 2018 **Ikaaġvik Sikukun**, Kotzebue, AK.
Project supported by the Gordon and Betty Moore Foundation.
15 total field days

Apr 2017 **SPLASH** (Submesoscale Processes and Lagrangian Analysis on the SHelf), Gulf of Mexico, R/V F.G. Walton Smith.
Project supported by the Gulf of Mexico Research Initiative.
14 total field days

Jan 2016 **LASER** (LAgrangian Submesoscale ExpeRiment), Gulf of Mexico, R/V F.G. Walton Smith.
Project supported by the Gulf of Mexico Research Initiative.
23 total field days

Dec 2013 **SCOPE** (Surfzone-Coastal Oil Pathways Experiment), Destin, FL.
Project supported by the Gulf of Mexico Research Initiative.
17 total field days

Jun 2013 **RIVET-II** (RIVerine and Estuarine Transport), mouth of the Columbia River.
Project supported by the Office of Naval Research.
14 total field days

Jul 2012 **GLAD** (Grand LAgrangian Deployment), Gulf of Mexico R/V F.G. Walton Smith.
Project supported by the Gulf of Mexico Research Initiative.
17 total field days

May 2012 **RIVET** (RIVerine and Estuarine Transport), Topsail Beach, NC.
Project supported by the Office of Naval Research.
25 total field days