

Sara Rivero-Calle, PhD

Assistant Professor, Department of Marine Sciences
University of Georgia Skidaway Institute of Oceanography
10 Ocean Science Circle
Savannah, GA. 31411

RESEARCH INTERESTS

Ocean optics, phytoplankton ecology, satellite remote sensing, biogeochemical cycles, coral reef ecology, statistical modeling, Earth System Models, big data analysis.

EDUCATION

PhD. 2016. Biological Oceanography, Earth and Planetary Sciences Department.

Johns Hopkins University. Baltimore, MD.

Dissertation: *Anthropogenic change vs. natural variability: lessons learned from the Continuous Plankton Recorder*

Advisors: Dr. Anand Gnanadesikan & Dr. Carlos del Castillo

M.Sc. 2010. Biological Oceanography. Marine Sciences Department.

University of Puerto Rico, Mayaguez. Puerto Rico

Thesis: *Ecological Aspects of Sponges in Mesophotic Coral Ecosystems.*

Advisor: Dr. Roy Armstrong

B.S. 2005. Biology. Complutense University of Madrid, Spain. Major in Zoology.

Thesis: *Sponge Population Census along the Southeastern Coast of the Sinai Peninsula.*

Erasmus Exchange Program. 2002-2003. Environmental Marine Sciences Department.

University of Genoa, Italy

International Scientific Baccalaureate. 1999. Madrid (Spain). Graduated with honors

EMPLOYMENT

2020-present: Assistant Professor, Skidaway Institute of Oceanography, University of Georgia.

2018- 2020: Postdoctoral Fellow, University of North Carolina Wilmington with Dr. Morrison

2016-2018: Postdoctoral Researcher, University of Southern California with Dr. Levine.

2015-2016: Graduate Research Assistant, Johns Hopkins. Advisor: Dr. Gnanadesikan

2015: Graduate Teaching Assistant. Johns Hopkins. Advisors: Dr. Waugh and Dr. Zaitchik

2010-2014: Graduate Research Assistant Johns Hopkins Applied Physics Laboratory. Advisor:
Dr. del Castillo

2006-2010: Graduate Research Assistant, University of Puerto Rico. Advisor: Dr. Armstrong

2005: Research Assistant, Ecology Department Universidad Complutense de Madrid.

RESEARCH FUNDING

While at UGA, she has been PI or Co-PI on two major grants from NSF and the Moore Foundation, and PI of special grants from the Georgia Space Grant Consortium, the Phillips Foundation, Plataforma Oceanica de Canarias (PLOCAN) and a UGA interdisciplinary group. Since joining UGA she has been awarded \$2,667,791, with \$1,312,723 going to Rivero-Calle's lab.

- Supplement from UNCW: *Continuing the Mission: SeaHawk-1 Ocean Color CubeSat Nanosatellite*. Award #11171. \$60,000. August 2025-July 2026. Role: P. Bresnahan (PI) and **S. Rivero-Calle** (Co-PI).
- Sarah Mae and Lawrence V. Phillips Foundation. *Field Study on the Effects of Internal Waves on Net Community Production in the Island of Lastovo, Croatia*. Role: **S. Rivero-Calle** (PI) \$8,000. June 2023-December 2023.
- Plataforma Oceánica de Canarias (PLOCAN) Access Grants. *Validation of SeaHawk satellite data with gliders*. Role: **S. Rivero-Calle** (PI). An in-kind contribution of ~\$600,000. December 2022-December 2024.
- UGA Office of Research Pre-Seed Program for Interdisciplinary Research. *UGA Satellite Remote Sensing Applications for Global Water Resources*. Roles: **S. Rivero-Calle** (PI), co-Is: C. Alexander, C. Buck, A. Milewski, W. Miller, D. R. Mishra, Ramaswamy, R. Rivero \$3,750. January 2023-December 2023.
- Gordon and Betty Moore Foundation: *Continuing the Mission: SeaHawk-1 Ocean Color CubeSat Nanosatellite*. Award #11171. \$865,164 to UGA, \$2.2M total. August 2022-July 2025. Role: P. Bresnahan (PI) and **S. Rivero-Calle** (Co-PI).
- Georgia Space Grant. *Developing and testing a new hyperspectral backscattering instrument to improve Harmful Algal Bloom detections from Space*. \$15,000. June 2022-July 2023. Roles: **S. Rivero-Calle** (PI) and D. Mishra (Co-PI).
- UGA Graduate Retention and Inclusion Grants: *Science Communication and Team-Building among UGA Marine Science Campuses*. \$5,000. Role: **S. Rivero-Calle** (PI)
- NSF Ocean Instrumentation. *University of Georgia/RV Savannah Oceanographic Instrumentation*. Award #2114584. \$274,689. June 2021-May 2023. Role: **S. Rivero-Calle** (PI) and J. Bichy (Co-PI).
- Supplement from UNCW: *Management of SeaHawk/HawkEye Imagery Acquisition and Local Validation of Data*. Funded by the Gordon and Betty Moore Foundation. \$19,129. June 2022-December 2022. Role: **S. Rivero-Calle** (PI).
- Subaward from UNCW: *Management of SeaHawk/HawkEye Imagery Acquisition and Local Validation of Data*. Funded by the Gordon and Betty Moore Foundation. \$67,056. June 2021-June 2022. Role: **S. Rivero-Calle** (PI).
- NSF XSEDE Start-up Project. *Using Data Science to Expand Satellite Observations* (\$678 OCE190009). Awarded resources for 1 year starting May 2019. 6-month extension granted: May 2020 to December 2020. Role: **S. Rivero-Calle** (PI).
- Johns Hopkins Applied Physics Laboratory Graduate Fellowship. Tuition and stipend for 4 years (~\$280,000, 2011-2014). Role: **S. Rivero-Calle** (PI).

AWARDS, SCHOLARSHIPS, FELLOWSHIPS AND RECOGNITIONS

- 2024 - Appointed to NASA's Earth Science Advisory Committee
 - Top 100 most cited author in Limnology and Oceanography
 - ESA and EUMETSAT Travel award to attend *FICE-2024: In situ Ocean Colour Above-Water Radiometric Measurements Workshop* in Venice, Italy.
- 2023 - Nominated to join NASA's Earth Science Advisory Committee
- 2022 - OCB travel award to attend the *OOI biogeochemical sensor data working group and develop guidelines and best practices*. WHOI, MA.
 - OCB travel award to attend the Ocean Optics Meeting in Quy Nhon, Vietnam.
- 2020 - 2018-2019 Top downloaded paper in Geophysical Research Letters.
- 2019 - Nominated to AAAS/Science Early Career Award for Public Engagement with Science.
- 2018 - Ocean Carbon and Biogeochemistry Meeting Early Career Travel Award.
 - Ocean Optics Meeting Early Career Travel Award.
 - Biogeochemical Profiling Float Workshop Travel Award.
- 2017 - Ocean Carbon and Biogeochemistry Meeting Early Career Travel Award.
 - Third International Ocean Color Meeting Travel Award.
 - USC Postdoc Travel Award to attend the IOCS meeting
- 2016 - Johns Hopkins University Graduate Representative Organization Travel Award
- 2015 - Ocean Carbon and Biogeochemistry Meeting Student Travel Award.
- 2013 - Associated External Researcher Fund, Sir Alister Hardy Foundation for Ocean Science
- 2012 - Ocean Optics Meeting Student Travel Award from The Oceanography Society.
 - EPS and GH Williams Fund for summer fieldwork
- 2011-2014 - Johns Hopkins Applied Physics Laboratory Graduate Fellowship
- 2011 - American Society of Limnology and Oceanography Student Travel Award.
- 2008 - ICRS Field trip scholarship. Gulf Stream Natural Gas. July 2008
 - José Trias Monge Travel Award, University of Puerto Rico
- 2007-2010 - Sea Grant Travel Awards (2007, 2008, 2009, 2010)
- 2006-2010 - Center for Subsurface Sensing Imaging Systems. Research Assistantship
- 2005-2006 - University of Puerto Rico and Complutense University graduate scholarship.
- 2005 - Research assistantship at the Department of Ecology, Complutense University.
- 2002-2003 - European Erasmus Student Exchange Scholarship University of Genoa, Italy.
- 1999 - Beca del Estado por Méritos Académicos, (Spain) Graduated from high school with Honors, thus earning scholarship to underwrite the first year of university.

SEA-GOING EXPERIENCE

- R/V Savannah. September 2020 (2 days) Rosette and CTD, chlorophyll a, retinal
- R/V Savannah. April 2021 (2 days) Respiration, chlorophyll a, Lugol
- R/V Savannah. September 2021 (2 days) radiometry, proteorhodopsin
- R/V Shearwater. February 2022 (3 days) radiometry, proteorhodopsin
- R/V Savannah. March 2022 (3 days) radiometry, proteorhodopsin
- R/V Blanton 3 day-trips in 2022 for water quality and satellite validation.
- Croatia Fieldwork on Internal Waves project and satellite validation (17 days).

SELECTED SPECIALIZED TRAININGS AND WORKSHOPS

- 2024: - In situ Ocean Colour Above-Water Radiometric Measurements Workshop. Venice, Italy. May 5-18.
- 2022: - Water Quality and Satellite Validation Workshop. University of Madison, WI. June 7-9.
- Working group to develop guidelines and best practices for using OOI biogeochemical sensor data. Woods Hole Oceanographic Institute, MA. June 15-19.
- 2021: - Virtual Workshop on the New Global Ocean Biogeochemistry (GO-BGC) Array - Building a Community of Biogeochemical Float Data Users. June 28-30, 2021.
- Creating a Sustainable Writing Practice. UGA
- Early Career Geoscience Faculty Workshop: Teaching, Research and Managing Your Career. SERC Carleton virtual workshop (July 25-29) National Association of Geoscience Teachers.
- UGA Certificate in Diversity and Inclusion. UGA
- 2020: - Western Boundary Currents. NSF Workshop. UGA Skidaway. November 10, 17.
- 2019: - NASA PI-Launchpad, University of Arizona. Nov 18-20.
- Rising Leaders Certificate, UNCW. June-July.
- Active Learning Strategies for Inclusive Classrooms. UNCW.
- 2018: - Instructional Design Certificate. University of North Carolina Wilmington, UNCW. Fall
- Coaching Strong Women in the Art of Strategic Persuasion. Portland, OR. February 11.
- Biogeochemical Profiling Float Workshop. Seattle, WA July 9-13
- 2017: - Women Negotiating for Leadership Success. Los Angeles, CA. November 13.
- 2016: - Community Earth System Model (CESM) tutorial. NCAR Boulder, CO. August 8-12.
- 2015: - Data Carpentry workshop. Baltimore, MD. June 25-26.
- 2014: - Ecological Dissertations in the Aquatic Sciences. University of Hawaii. October 19-25.
- 2011: - Ocean Optics: Calibration and Validation. University of Maine. July 11-29.
- Remote Sensing for Biological Oceanographers. Cornell University. June 3-17.
- 2008: - Light and photosynthesis in coral reefs. Universidad Nacional Autonoma de Mexico.
- 2007: - Taxonomy & Ecology of Sponges. Smithsonian Tropical Research Institute, Panama. July

TEACHING and MENTORING EXPERIENCE

Since Joining UGA in 2020

Undergraduate Courses Taught:*Classroom Instruction:*

- MARS4520 (3 credits), Quantitative Analysis of Ocean Data. Fall 2021, 2022, 2023, 2024.

Directed Studies:

- MARS4960R: Faculty-Mentored Undergraduate Research I. Fall 2022, Fall 2024.
- MARS4970R: Faculty-Mentored Undergraduate Research II. Spring 2023, Fall 2023.
- MARS4980R: Faculty-Mentored Undergraduate Research III. Spring 2024.

Graduate Courses Taught:*Classroom Instruction:*

- MARS6520 (3 credits), Quantitative Analysis of Ocean Data. Fall 2021, 2022, 2023, 2024.

Directed Studies:

- MARS 7000: Master's Research.
- MARS 7300: Master's Thesis.
- MARS 8900: Research Techniques in Marine Science.
- MARS 9000: Doctoral Research.
- MARS 9300: Doctoral Thesis.

Development of New Courses:

MARS 4520/6520 Quantitative Analysis of Ocean Data – As a core course for the Ocean Science major, curriculum development focused on learning how to use statistical and computational tools with the R programming language, developing critical-thinking skills through discussion of scientific literature examples and code development in assignments, and analyzing real-world oceanographic datasets.

MARS 8000 Introduction to Ocean Satellite Remote Sensing. This is a new approved graduate student level course that will be offered starting in 2025. This optional course focuses on learning the fundamental optics, physics, and the technology involved in operational satellite oceanography and how to obtain and use satellite imagery for oceanographic research. It combines formal lectures and practical work.

Supervision of Undergraduate Student Research:

- Dillon Doomstorm, MARS4960R, Fall 2022, MARS4970R, Spring 2023
- John Isaac Stone, MARS4970R, Fall 2023, MARS4980R, Spring 2024
- Jackson Vassy, MARS4960R, Fall 2024

Internship supervision:

- Deanna Edwing (UNCW undergraduate) Skidaway Summer Internship 2021
- Kelsea Edwing (UNCW undergraduate) Skidaway Summer Internship 2021
- Keshav Raviprakash (UGA undergraduate) Skidaway Summer Internship 2021
- Arlyn Valeria Santiago-Garcia (UGA undergraduate) Skidaway Summer Internship 2021
- Kevin Truong (Georgia Southern University) NSF REU summer 2024

Graduate Students:

- Mallory Hunt, MSc., Fall 2021- Spring 2024 (Graduation).
MSc. Thesis Title: Using the PhytoPlankton Light Scattering (PPLS) instrument to investigate variations in hyperspectral backscattering of dinoflagellate species.
- Masud-Ul-Alam, PhD, Enrolled Fall 2021
- Benjamin Lowin, PhD, Enrolled Fall 2022
- Francisco J. Silva, MSc., Fulbright visiting scholar, University of Aveiro, Portugal, 2022-24
- Ashley Ohall, MSc., Enrolled Fall 2023
- John Isaac Stone, MSc., Enrolled Fall 2024

Graduate Student Advisory Committee Membership:

- Abigail McCormick, MS (Marine Sciences), Fall 2020-July 2022 (Graduation)

- Chintan Maniyar, PhD (Geography), Spring 2023-present
- Michelle Agonsi PhD (Marine Sciences), Fall 2023-present
- Brooke Purves MS (Marine Sciences), Fall 2024-present

Student Recognition and Outstanding Achievement:

- Benjamin Lowin received the Departmental Graduate Student Award for Service, 2022
- Ashley Ohall received the Best poster Award at Microplastics in the Coastal Region Conference, Charleston, SC. April, 2024
- Ashley Ohall selected for a NASA Summer internship, 2024

Prior to UGA:

- Instructor for “*PHY 491- Directed Independent Studies*”. Three students with personalized projects: Elizabeth Bailey, Kelsea Edwing, Deanna Edwing. UNCW Spring 2020.
- Developed and taught new UNCW Undergraduate Class: “*PHY 490- Special Topics: Introduction to Ocean Satellite Remote Sensing*”, Fall 2019.
- Guest Lecture Graduate Class “*BIO 564 - Biological Oceanography*”. UNCW, 2019.
- Advisor for the student-led “*UNCW CubeSat lab*” association. UNCW. Since 2018.
- Supervisor of three UNCW work-study undergraduate students and a high school volunteer. UNCW Summer and Fall semester, 2019.
- Instructor for three Directed Independent Studies. UNCW Spring 2020.
- Designed lab experiments and taught guest lecture on “*Remote Sensing applications for Biological Oceanography*” as part of the course “*Remote Sensing of the Environment*” taught by Dr. del Castillo and Dr. Zaitchik. Johns Hopkins University, Fall 2014.
- Graduate Teaching Assistant. “*Climate Change: Science and Policy*” taught by Dr. Waugh and Dr. Zaitchik. Johns Hopkins University, Spring 2015.

SERVICE

Service to International Programs

- Advisor for Clear Shores CubeSat satellite: New Zealand’s first Water Quality Satellite 2023.
- Led Agreement between UGA and Universidad de las Palmas de Gran Canarias (Spain).
- Host for Fulbright Graduate Student from Portugal (2023).
- Host for visiting PhD Student from Sapienza University (Italy) (2025)

Service to Professional Societies, Governmental Organizations, or Non-Governmental Agencies

- Member (2023-present) *NASA Earth Science Advisory Committee*
- Panelist (2021), *Georgia Sea Grant Fellows Student Onboarding*
- Panelist (2020), *UNCW Youth Climate Action Day*
- Guest speaker (2019, 2020). *Marine Quest Program*
- Convener (2019). *Association of Limnology and Oceanography (ASLO) Session: Ecological Applications of Earth System Models and Regional Climate Models*
- Organizing Committee (2020). *North Carolina Space Symposium*.

- Organizing Committee (2019, 2020). *Women in Science Forum*, Wilmington, NC.
- Participant (2022). *NASA and Geo AquaWatch Workshop on the Validation of Satellite-derived Optical and Water Quality Parameters for Coastal and Inland Waters*, Madison, WI.
- Participant (2022). *Ocean Observatories Initiative (OOI) Biogeochemical Sensor Data Working Group* to develop guidelines and best practices, Woods Hole Oceanographic Institute, MA.

Editorships or editorial board memberships for journals

- Guest Editor, *Frontiers in Marine Science* (IF: 5.247) special issue: *Ecological Applications of Earth System Models and Regional Climate Models. 2019-2021*.

Ad Hoc Manuscript Reviewer

- *Science*
- *Science Advances*
- *Nature Communications*
- *Nature Geoscience*
- *Global Biogeochemical Cycles*
- *Deep-Sea Research Part I*
- *Biogeosciences*
- *Hydrobiologia*
- *Marine Ecology Progress Series*
- *Marine Ecology*
- *Journal of Operational Oceanography*
- *Limnology and Oceanography*
- *Progress in Oceanography*
- *Remote Sensing*
- *Water: Oceans and Coastal Zones*

Grant Proposal Reviewer

- *National Science Foundation*: Biological Oceanography program (2 proposals: 2018, 2019.) Oceanographic Technology and Interdisciplinary Coordination Program (1 proposal, 2024).
- *Puerto Rico Sea Grant* (1 proposal): 2021.
- *Chilean Government*: Fondecyt National Projects Competition (1 proposal): 2023.

Service on Departmental, College or University Committees

- Member, Skidaway Search Committee (Public Relations position), Fall 2023–Spring 2024.
- Member, UGA Dept. of Marine Sciences, Faculty Search Committee (Academic Professional Associate), Fall 2022–Spring 2023.
- Member, UGA Dept. of Marine Sciences, Undergraduate Committee: 2020–Present
- Chair of the Training Subcommittee, UGA Dept. of Marine Sciences, Diversity, Equity and Inclusion Committee: 2020–Present.
- Member, Skidaway Information Technology Committee, 2020–Present.

- Member, Skidaway Education Committee, 2020–Present.
- Affiliated faculty, UGA Small Satellite Research Lab, 2020–present.
- Affiliated faculty, UGA Center for Geospatial Research, 2024–present.
- Affiliated faculty, UGA Latin American and Caribbean Studies Institute, 2020–present.

Service to student groups and organizations

- Founder faculty advisor, Society for Women in Marine Science. UGA chapter, 2020–Present.
- Faculty mentor, UGA Women in Science, 2021–Present.
- Faculty mentor, UGA Hispanic Student Association, 2021–Present.

PUBLICATIONS

Total number of Citations (as of February 20, 2025): 435. h-index: 10

* student mentored by Dr. Rivero-Calle

underlined: corresponding author

Top 5 publications:

1. **(156 citations)** **Rivero-Calle S**, Gnanadesikan A, Del Castillo CE, Balch WB, Guikema S. (2015). Multidecadal increase in North Atlantic coccolithophores and the potential role of rising CO₂. *Science*, 2015: 350 (6267), 1533-1537. doi:10.1126/science.aaa8026.
2. **(83 citations)** Jiang H., Fu F, **Rivero-Calle S.**, Levine N.M., Sañudo-Wilhelmy S.A., Qu P.*, Wang X., Pinedo Gonzalez P., Zhu Z., Hutchins D. (2018). Ocean warming alleviates iron limitation of marine nitrogen fixation. *Nature Climate Change*. doi 10.1038/s41558-018-0216-8
3. **(45 citations)** Del Castillo CE., Signorini S, Karakoylu E, **Rivero-Calle S**, (2019). Is the Southern Ocean getting greener? *Geophysical Research Letters*. DOI:10.1029/2019GL083163.
4. **(35 citations)** Sieradzki ET*, Fuhrman JA, **Rivero-Calle S**, Gómez-Consarnau L. (2018) Proteorhodopsins dominate the expression of phototrophic mechanisms in seasonal and dynamic marine picoplankton communities. *PeerJ* 6:e5798; DOI 10.7717/peerj.5798.
5. **(27 citations)** Asch R, Pilcher D, **Rivero-Calle S**, Holding J. (2016). Demystifying models: Answers to Ten Common Questions that Ecologists Have about Earth System Models. *Limnology and Oceanography Bulletin*, 25: 65–70. doi:10.1002/lob.10113.

All Publications:

1. **Bresnahan P., Rivero-Calle S.**, Morrison J., Feldman G.F, Holmes A., Bailey S., Scott A., Hong L., Patt F., Kuring N., Rojas C., Clark C., Charlick J., Lombard B., Gorter H, Travaglini R, Jeffrey H. (2024) High-resolution ocean color imagery from the SeaHawk-HawkEye CubeSat mission. *Sci Data* 11, 1246. <https://doi.org/10.1038/s41597-024-04076-4>
2. **Lowin, B.***, R. Izett, E. Taylor, C. Robertson, **S. Rivero-Calle** (2024) Design update to “The Pressure of In-situ Gases Instrument (PIGI) for Autonomous Shipboard Measurement of Dissolved O₂ and N₂ in Surface Ocean Waters”. *Oceanography* 37(2):174–179, <https://doi.org/10.5670/oceanog.2024.413>.

3. **Lowin B***, Strom S, Burt W, Kelly T, **Rivero-Calle S.** (2024). The importance of temporal variability in the relationship between line height absorption and chlorophyll concentration: a case study from the Northern Gulf of Alaska. *Optics Express*. 32, 20491-20502.
4. **Co-authors in alphabetical order:** Palevsky HI, Clayton S, Benway H, Maheigan M, Atamanchuk D, Battisti R, Batryn J, Bourbonnais A, Briggs EM, Carvalho F., Chase A.P., Eveleth R., Fatland R., Fogaren K.E., Fram J.P., Hartman S.E., Le Bras I., Manning C.M., Needoba J.M., Neely M.B., Oliver H., Reed A.C., Rheuban J.E., Schallenberg C., Walsh I., Wingard C., Bauer K., Chen B., Cuevas J., Flecha S., Horwith M., Melendez M., Menz T., Plueddemann A., **Rivero-Calle S.**, Roden N., Steinhoff T., Trucco-Pignata P.N., Vardaro M.F., Yoder M. (2024). A Model for Community-driven Development of Best Practices: The Ocean Observatories Initiative Biogeochemical Sensor Data Best Practices and User Guide. *Frontiers in Marine Science*. Volume 11 - 2024 | [doi: 10.3389/fmars.2024.1358591](https://doi.org/10.3389/fmars.2024.1358591)
5. **Doomstorm D.***, **Hunt M.***, Sanders J. Alves-de-Souza C., Wingert C. and **Rivero-Calle S.** (2023) Learning how to grow phytoplankton cultures with special needs: what soil extracts from coastal Georgia does *Levanderina fissa* prefer? Georgia Water Resources Conference Proceedings.
6. **Masud-Ul-Alam M.***, M. Ashif Imam Khan, B. S. Barrett, **S Rivero-Calle**, M. Rony Golder, M. Abdur Rouf. (2022) Spatial variability of the winter thermal inversion in the northern Bay of Bengal, *Regional Studies in Marine Science*, Volume 53, 102417.
7. Pawlik, J, R.A. Armstrong, S. Farrington, J. Reed, **S. Rivero-Calle**, H. Singh, B. Walker, J. White (2022). A comparison of recent survey techniques for estimating benthic cover on Caribbean mesophotic reefs. *Marine Ecology Progress Series*. Vol. 686: 201–211.
8. **Masud-Ul-Alam M***, Md. Ashif Imam Khan, Bradford S. Barrett, **S Rivero-Calle** (2022), Surface temperature and salinity in the northern Bay of Bengal: in-situ measurements compared with satellite observations and model output, *J. Appl. Remote Sens.* **16**(1), 018502, doi: 10.1117/1.JRS.16.018502.
9. Asch, R. G., J. M. Holding, D. J. Pilcher, **S. Rivero-Calle**, and K. A. Rose (2021), Editorial: Ecological Applications of Earth System Models and Regional Climate Models, *Frontiers in Marine Science*, 8(1440). doi: 10.3389/fmars.2021.773443.
10. Del Castillo CE., Signorini S, Karakoylu E, **Rivero-Calle S**, (2019). Is the Southern Ocean getting greener? *Geophysical Research Letters*. DOI:10.1029/2019GL083163.
11. Sieradzki ET*, Fuhrman JA, **Rivero-Calle S**, Gómez-Consarnau L. (2018) Proteorhodopsins dominate the expression of phototrophic mechanisms in seasonal and dynamic marine picoplankton communities. *PeerJ* 6:e5798; DOI 10.7717/peerj.5798.
12. Jiang H., Fu F, **Rivero-Calle S.**, Levine N.M., Sañudo-Wilhelmy S.A., Qu P.*, Wang X., Pinedo Gonzalez P., Zhu Z., Hutchins D. (2018). Ocean warming alleviates iron limitation of marine nitrogen fixation. *Nature Climate Change*. doi 10.1038/s41558-018-0216-8
13. **Rivero-Calle S**, Del Castillo CE, Gnanadesikan A, Dezfuli A., Zaitchik B. Johns D. (2016). Interdecadal *Trichodesmium* variability in cold North Atlantic waters. *Global Biogeochemical Cycles*, 30, 1620–1638. doi:10.1002/2015GB005361.
14. Asch R, Pilcher D, **Rivero-Calle S**, Holding J. (2016). Demystifying models: Answers to Ten Common Questions that Ecologists Have about Earth System Models. *Limnology and Oceanography Bulletin*, 25: 65–70. doi:10.1002/lob.10113.

15. Krumhardt K. and **S. Rivero-Calle** (2016). A chalkier ocean? Multi-decadal increases in North Atlantic coccolithophore populations. *Ocean Carbon and Biogeochemistry News*. Volume 9, Number 3. Fall 2016.
16. **Rivero-Calle S**, and Johns D. (2016). *Trichodesmium* in cold North Atlantic waters. SAHFOS 2016 Annual Report, page 31.
17. Coble, A. A., Asch, R. G., **Rivero-Calle, S.**, Heerhartz, S. M., Holding, J. M., Kremer, C. T., Finiguerra, M. and Strock, K. E. (2016). Climate is variable, but is our science? *Limnology and Oceanography Bulletin*, 25: 71–76. doi:10.1002/lob.10115.
18. **Rivero-Calle S**, Gnanadesikan A, Del Castillo CE, Balch WB, Guikema S. (2015). Multidecadal increase in North Atlantic coccolithophores and the potential role of rising CO₂. *Science*, 2015: 350 (6267), 1533-1537. doi:10.1126/science.aaa8026.
19. Co-authors in alphabetical order: R. Appeldoorn, R. Armstrong, D. Ballantine, C. Caldwell, Christopher F.G. Jeffrey, **S. Rivero-Calle**, H. Ruiz, E. Weil, AGRRA, CARICOMP and NOAA Biogeography Branch (2014). GCRMN Caribbean report: Status and Trends of Caribbean Coral Reefs: 1970-2012. Puerto Rico Chapter. Editors: J Jackson, M. Donovan, K. Cramer, V. Lam.
20. Co-authors in alphabetical order: A. Arellano, N. Briggs, F. Cao, A. Chase, H. Chen, A. Dave, C. Goyens, F. Henderikx, C. Kearney, M. Kheireddine S. Mishra, A. Neeley, M. Omand, L. Powers, A. Reisinger, **S. Rivero-Calle**, B. Russell, B. Seegers, R. Vandermeulen, W. Zhu. (2011). Technical document on Measurement, Processing, and Analysis Techniques for Optical Oceanography Data. University of Maine.
21. **Rivero Calle, S.** (2010) Ecological Aspects of Sponges in Mesophotic Coral Ecosystems. M.Sc. dissertation, University of Puerto Rico, Mayaguez (Puerto Rico).
22. Armstrong RA, Singh HA, **Rivero S**, Gilbes F. (2008). Monitoring Coral Reefs in Optically-Deep Waters. *Proceedings of the 11th International Coral Reef Symposium*. 2008. Vol. 1; 593-597.
23. **Rivero-Calle S**. Armstrong RA, Soto-Santiago FJ. (2008). Biological and physical characteristics of a mesophotic coral reef: Black Jack reef, Vieques, Puerto Rico. *Proceedings of the 11th International Coral Reef Symposium*. Vol. 1: 567-571.

Manuscripts submitted or in preparation:

1. Co-authors in alphabetical order: Avouris D. M., F. Maciel, S. L. Sharp, S. E. Craig, A. G. Dekker, C. Di Vittorio, J. R. Gardner, E. Goldsmith, J. I. Gossn, S. R. Greb, B. K. Grunert, D. Gurlin, M. Jampani, R. M. Khan, B. Lowin, L. McKinna, C. B. Mouw, I. Ogashawara, N. Pahlevan, **S. Rivero-Calle**, W. Salls, J. A. Sánchez Cabeza, B. Schaeffer, B. N. Seegers, J. Silander, E. Smail, M. Wang, and J. Werdell (submitted) . Advancements in satellite observations of inland and coastal waters: building towards a global validation network. *Earth Science Reviews*.
2. **Hunt M.***, Holmes A., Alves-de-Souza C., **Rivero-Calle, S.** (submitted). Using the PhytoPlankton Light Scattering (PPLS) instrument to investigate variations in hyperspectral backscattering of dinoflagellate species.
3. **Masud-Ul-Alam M***, **Lowin B.**, Feldman G.C., Holmes A., Morrison J., Hong L., Scott, A., Bresnahan, P., Bailey S. **Rivero-Calle S.** (in prep). SeaHawk Low-Cost Ocean Color CubeSat Produces High Spatial Resolution and High-Quality Data: A Comparison with NOAA-20 VIIRS, NASA MODIS-Terra and MODIS-Aqua.

4. **Kolluru S.***, **Rivero-Calle S.**, Bresnahan P., Kratzer S, Moore T.S., Arai K. (in prep). Accuracy of SeaHawk-HawkEye remote sensing reflectance products in globally distributed aquatic sites.

INVITED TALKS AND SEMINARS

Since joining UGA in 2020:

- In situ Ocean Colour Above-Water Radiometric Measurements Workshop. “Evaluating SeaHawk Ocean Color CubeSat Measurements: challenges, opportunities and lessons learned”. Venice, Italy. May 2024.
- Cornell University. “Introduction to Ocean Satellite Oceanography”. Guest Instructor in summer course. June 2023.
- International Ocean Color Science Symposium. Led special training workshop: “SeaHawk CubeSat Mission: history, image access and data processing”. 3 hrs and 18 participants. International Ocean Color Science Symposium. Tampa FL, November, 2023.
- Savannah State University, Marine Biology Department. “Studying phytoplankton from space: challenges and opportunities”. Departmental Seminar. October 31, 2023
- University of Barcelona (Spain), Department of Biology “El Rol del Fitoplancton en Ciclos Biogeoquímicos Marinos y Cómo Seguirlos desde el Espacio/ Ocean Biogeochemistry from Space”. December 16. 2022. (in Spanish).
- NASA Goddard Space Flight Center “A Ship, a CubeSat, and a Zoo of Algae: Optical Oceanography Applications at the Skidaway Institute of Oceanography”, November 2022.
- UNCW Visual Arts. Guest lecture for students working on a Seahawk Traveling Exhibit project, “The SeaHawk CubeSat Mission”, September 2022.
- OCB-sponsored Mixotrophy working group Seminar Series, “Can we use satellite remote sensing to study mixotrophs and mixotrophy?”, July 2022.
- Georgia Southern University, Biology Department. “It is all about the Optics: The use of Optical Sensors for Marine Ecology Projects at UGA Skidaway Institute of Oceanography (SkIO)”, April 2022.
- UGA Marine Sciences, Guest lecture for MARS Scientific Scuba Diving course, “Scuba Diving Experiences for Coral Reef Ecology Research. April 2022.
- UNCW, Earth and Ocean Sciences Department, “Satellites, Ships and a Zoo of Algae: Optical Oceanography initiatives at UGA Skidaway Institute of Oceanography”, April 2022.
- UGA Odum School of Ecology, “Shedding light on Marine Phytoplankton Ecology”, February 2022.
- UGA Evenings at Skidaway, “Oceanography from Space”, February 2021.
- Scripps Institution of Oceanography, Applied Ocean Science Department, “Optical Oceanography initiatives at UGA Skidaway Institute of Oceanography”, May 2021.

Prior to UGA:

- NOAA Ocean Color Coordinating Group (NOCCG) Seminar Series. “SeaHawk-1: The First Dedicated Ocean Color CubeSat mission”, March 2020.

- Coastal Carolina University, Department of Marine Sciences. “What can Optical Oceanography tell us about the future?”, February 2020.
- University, of Porto, Portugal. Engineering Department, “Challenges and approaches to understanding the global ocean carbon cycle: in situ observations, satellites, and models”, December 2019.
- North Carolina Space Grant Symposium. Raleigh, NC. “SeaHawks in Space: North Carolina’s First CubeSat Satellite”, April 2019.
- East Carolina University, Biology Department, Greenville, NC. “Mind the Gap: Using Patchy Data to Study Global Plankton Ecology”, March 2019.
- Old Dominion University, Ocean and Earth Sciences Department, Norfolk VA, “Challenges and approaches to understanding the global ocean carbon cycle: in situ observations, satellites, and models”, February 2019.
- Blue Heron Bowl Keynote Speaker, Wilmington, NC, “Satellite Observations of the Ocean: SeaHawk CubeSat”, February 2019.
- International Ocean Color Meeting, Lisbon, Portugal. Special Session on *Trichodesmium* from Space. “Global Distribution of *Trichodesmium* spp.” May 2017.
- NOAA Science Seminars, virtual. “Multidecadal increase in North Atlantic coccolithophores and the potential role of rising CO₂” Spring 2016.
- NASA Goddard Space Flight Center, Global Modeling and Assimilation Office, “Interdecadal *Trichodesmium* variability in cold North Atlantic waters”, December 2015.
- NASA Goddard Space Flight Center, Ocean Ecology Lab, Greenbelt, MD. “Multidecadal increase in North Atlantic coccolithophore presence driven by CO₂ and warming”, June 2015.

PRESENTATIONS AT CONFERENCES

*student/postdoc mentored by Dr. Rivero-Calle.

Since joining UGA in 2020:

Masud-UI-Alam, M.*, **Rivero-Calle, S.** Building a new regional algorithm to estimate total suspended solids in the South Atlantic Bight. Gray's Reef National Marine Sanctuary Science Symposium, Savannah, GA. November, 2024. Poster presentation.

Rivero-Calle, S., F. Dias Silva*, M Masud-UI-Alam*, B. Lowin*, Z. Ljubešić, A. Matek, H. Mihanović, H. Čizmek, B. Čolić. Chasing Internal Waves with Ocean Color Methods.

International Ocean Optics Meeting, Las Palmas, Spain. October, 2024. Poster presentation.

Ohall, A*, **Rivero-Calle, S.** Brandes, J, Holmes, A. Characterizing the inherent optical properties of microplastics towards remote sensing monitoring capabilities. International Ocean Optics Meeting, Las Palmas, Spain. October, 2024. Poster presentation.

Masud-UI-Alam, M.*, **Rivero-Calle, S.** Building a new regional algorithm to estimate total suspended solids in the South Atlantic Bight. International Ocean Optics Meeting, Las Palmas, Spain. October, 2024. Poster presentation.

Lowin, B.*, **S. Rivero-Calle**, R. Marrero, C. Barrera, J. Arístegui. Validating ocean color chlorophyll concentration data with gliders in the Canary Islands. International Ocean Optics Meeting, Las Palmas, Spain. October, 2024. Poster presentation.

- Kolluru S.*, **Rivero-Calle S**, Bresnahan P., Kratzer S, Moore T.S., Arai K. (in prep). Accuracy of SeaHawk-HawkEye remote sensing reflectance products in globally distributed aquatic sites. International Ocean Optics Meeting, Las Palmas, Spain. October, 2024. Poster presentation.
- Ohall, A*, **Rivero-Calle, S**. Brandes, J. Investigating the hyperspectral backscattering of microplastics as a technique for remote sensing of marine plastic pollution. Microplastics in the Coastal Region, Charleston, SC. April, 2024. Poster presentation.
- Rivero-Calle, S**, S. Kolluru*, M. Masud-Ul-Alam*, B. Lowin*, M. Hunt*, A. Ohall*, F. J. Dias Silva. Using high resolution ocean optics to better constrain ranges of marine phytoplankton variability. Ocean Sciences Meeting 2024. Invited Oral and poster presentation.
- Rivero-Calle, S**, Cohen N. The Society for Women in Science Townhall: The Georgia Chapter of SWMS. Ocean Sciences Meeting 2024. Oral presentation.
- Rivero-Calle, J**. Morrison, G.C. Feldman, A. Holmes, P. Bresnahan, M.Masud-Ul -Alam*, B. Lowin*, S. Bailey, A. Scott, L. Hong. The Potential of Ocean Color CubeSats for Operational Satellite Oceanography: the SeaHawk-HawkEye example. Third International Operational Satellite Oceanography Symposium. June, 2023. Busan, S. Korea. Oral presentation.
- Rivero-Calle, S**, S. Kolluru*, M. Masud-Ul-Alam*, B. Lowin*, M. Hunt*, A. Ohall*, F. J. Dias Silva. Unveiling submesoscale processes with high resolution ocean optics. International Ocean Color Science Symposium. Tampa FL, November, 2023. Poster presentation.
- Lowin B.* , Strom S., Burt W., T. Kelly, **S. Rivero-Calle**. The importance of seasonality in the relationship between Line Height Absorption and chlorophyll concentration: a case study from the Northern Gulf of Alaska. International Ocean Color Science Symposium. Tampa FL, November, 2023. Poster presentation.
- Masud-Ul-Alam M.* , B. Lowin*, GC. Feldman, A. Holmes, J. Morrison, L. Hong, A. Scott, P. Bresnahan, S. Bailey, **S. Rivero-Calle**, SeaHawk Low-Cost Ocean Color CubeSat Produces High Spatial Resolution and High-Quality Data: A Comparison with NOAA-20 VIIRS, NASA MODIS-Terra and MODIS-Aqua. International Ocean Color Science Symposium. Tampa FL, November, 2023. Poster presentation.
- Hunt M.* , A. Holmes, C. Alves-de-Souza, **S. Rivero-Calle**. Using the Phyto-Plankton Light Scattering (PLS) instrument to investigate variations in hyperspectral backscattering of dinoflagellate species. International Ocean Color Science Symposium. Tampa FL, November, 2023. Poster presentation.
- Kolluru S.* , P. Bresnahan, **Rivero-Calle**. Accuracy of SeaHawk-HawkEye remote sensing reflectance products in globally distributed aquatic sites. International Ocean Color Science Symposium. Tampa FL, November, 2023. Poster presentation.
- Lowin B.* , Strom S., Burt W., **Rivero-Calle**. The importance of seasonality in the relationship between Line Height Absorption and chlorophyll concentration: a case study from the Northern Gulf of Alaska. Association of Limnology and Oceanography (ASLO) Meeting. Mallorca, Spain. June 2023. Oral presentation.
- Masud-Ul-Alam M.* , B. Lowin*, GC. Feldman, A. Holmes, J. Morrison, L. Hong, A. Scott, P. Bresnahan, S. Bailey, **Rivero-Calle**, SeaHawk Low-Cost Ocean Color CubeSat Produces High Spatial Resolution and High-Quality Data: A Comparison with NOAA-20 VIIRS, NASA MODIS-Terra and MODIS-Aqua. ASLO Meeting. Mallorca, Spain. June 2023. Oral presentation.
- Doomstorm D.* , M. Hunt*, J. Sanders **S. Rivero-Calle**. Learning how to grow phytoplankton cultures with special needs: what soil extracts from coastal Georgia does *Levanderina fissa* prefer? Georgia Water Resources Conference, Athens, GA. March 2023. Poster presentation

- Hunt M*, A. Holmes, C. Alves-de-Souza, A. Neely, **S. Rivero-Calle**. First Hyperspectral Backscattering measurements of Phytoplankton Monocultures with the Phytoplankton Light Scattering Instrument (PPLS) Prototype. International Ocean Optics Meeting, Quy Nhon, Vietnam. October 2022. Poster presentation.
- Rivero-Calle, S.**, J. Morrison, G.C. Feldman, A. Holmes, S. Bailey, M. Masud-UI-Alam*, M. Hunt*, B. Lowin*, P. Bresnahan. A CubeSat, a Ship, and a Zoo of Algae: 3 New Optical Oceanography Applications at the Skidaway Institute of Oceanography. International Ocean Optics Meeting, Quy Nhon, Vietnam. October 2022. Oral presentation.
- Rivero-Calle, S.** Ocean Optics Projects in Georgia. Georgia Coastal Research Council, Richmond Hill, GA., October 2022. Oral presentation.
- Rivero-Calle, S.** OOI biogeochemical sensor data working group, Woods Hole Oceanographic Institute, MA. June, 2022. Lightning talk.
- Rivero-Calle, S.**, J. Morrison, G.C. Feldman, A. Holmes, S. Bailey, M. Masud-UI-Alam. Increasing the resolution of ocean observations while reducing the costs: CubeSats and ship flow-through systems. Ocean Sciences Meeting 2022. March 3, Oral presentation.

Prior to joining UGA in 2020:

- Edmonson, W. **S. Rivero-Calle**, R. Mendes, J. da Silva, A. Ferreira, J. Sousa, F. Aguado-Agelet, M. Grotte. A high-resolution multi-platform approach to understand the effects of internal waves on primary production. 4S Symposium: Small Satellites Systems Services. Vilamoura, Portugal. September 2020. (postponed due to COVID-19)
- Yang N.*, C.A. Merkel, Y. Lin, N.M. Levine, **S. Rivero-Calle**, H. Jiang, N. Hawco, P. Qu, F. Fu and D.A. Hutchins. The biogeochemical implications of the contrasting responses of iron-limited N₂-fixing cyanobacteria to ocean warming. 2020 Ocean Sciences, San Diego. Poster [642607](#)
- Lester C.*, T. Wagner¹, D. McNamara, M.R. Cape, H. Koopman and **S. Rivero-Calle**. The influence of sea ice melt on phytoplankton spring bloom dynamics in Fram Strait. 2020 Ocean Sciences, San Diego. Poster [648792](#)
- Bailey E.*, T.J.W. Wagner, M.R. Cape, A. Castagno*, **S. Rivero-Calle**, A.H. Alipour*, C. Alves-de-Souza and R. York. Differences in First and Multi-Year Sea Ice Melt Signatures and Impacts on the Local Ecosystem during Spring in Fram Strait. 2020 Ocean Sciences, San Diego. Poster [651151](#)
- Sara Rivero-Calle**, John Morrison, Gene Carl Feldman, Alan Holmes. SeaHawk: First Ocean Color CubeSat. International Ocean Colour Meeting, Busan (South Korea). April 2019. Poster.
- Rivero-Calle S.** and J. Morrison. Sustained Ocean Color Observations using Nanosatellites (SOCON). Ocean Carbon and Biogeochemistry (OCB) Workshop, Woods Hole, MA. June 2018. Poster.
- Rivero-Calle S.** and Levine NM. Deciphering phytoplankton community dynamics from HPLC pigment variability. Ocean Carbon and Biogeochemistry (OCB) Workshop, Woods Hole, MA. June 2017. Poster.
- Rivero-Calle, S.**, Gnanadesikan A, Del Castillo CE, Balch WB, Guikema S. Multidecadal increase in North Atlantic coccolithophores and the potential role of rising CO₂. Ocean Sciences Meeting, New Orleans, Louisiana. February 2016. Oral.
- Rivero-Calle S.**, Del Castillo C.E., Gnanadesikan A., Dezfuli A., Zaitchik B. Multiyear *Trichodesmium* increase in the North Atlantic at higher latitudes (38-65N) in the 1980's. Ecological Society of America. Baltimore, August 2015. Oral.

- Rivero-Calle, S.,** Del Castillo C.E., Gnanadesikan A., Dezfuli A., Zaitchik B. Dust deposition and *Trichodesmium* increase in temperate North Atlantic from 1980-1990s. Ocean Carbon and Biogeochemistry (OCB) Workshop, Woods Hole, MA. July 2015. Poster.
- Malinverno E., **Rivero-Calle S.,** Dimiza M., Triantaphyllou M.V. Coccolithophore contribution to sea surface PIC along a latitudinal transect in the W-Pacific sector of the Southern Ocean under non-bloom conditions. International Nannoplankton Association Meeting, Philippines, March 2015. Poster.
- Rivero-Calle, S.** Regime Shifts in Aquatic Ecosystems. ECO-DAS. Hawaii. October, 2014. Oral
- Rivero-Calle, S,** C.E. Del Castillo, A. Gnanadesikan, W.B. Balch, S. Guikema. Have coccolithophore abundances increased in the North Atlantic over the last 50 years? Evidence from the Continuous Plankton Recorder. International Nannoplankton Association Meeting, Crete, Greece. October 2014. Oral.
- Rivero-Calle, S,** A. Gnanadesikan, C.E. Del Castillo, W.B. Balch, S. Guikema. Why do CPR coccolithophores seem to be increasing in the North Atlantic in the last 50 years? Is the North Atlantic becoming the next Black Sea? Ocean Sciences Meeting, Honolulu, Hawaii. February 2014. Oral.
- Rivero Calle, S.** and Del Castillo, C. Climate Change and Long-Term Trends of Coccolithophores in the North Atlantic (1960's-present). Ocean Optics Meeting. October 8-12, 2012. Glasgow, UK. Poster.
- Goyens, C.; **Rivero-Calle, S.;** Boss E. Ocean Optics Course 2011: Calibration and Validation for Ocean Color Remote Sensing. NASA Carbon Cycle & Ecosystems Workshop. Arlington, VA. October 2011. Poster.
- Rivero-Calle, S.;** Goyens, C.; Seegers, B.; Freitas, F. H.; Cao, F.; Mischra, S.; Vandermeulen, R. Closure in Calibration and Validation of Ocean Color Remote Sensing: Ocean Optics Summer Course 2011. Ocean Sciences Meeting, Salt Lake City, Utah. February 2012. Poster.
- Rivero-Calle, S.;** Goyens, C.; Dave, A.; Chase, A.; Omand, M.; Seegers, B.; Vandermeulen, R. Ocean Optics Summer Course: Building a community of Optical Oceanographers. Ocean Sciences Meeting, Salt Lake City, Utah. February 2012. Poster.
- Rivero-Calle S.** and R.A. Armstrong. Ecological Aspects of Sponges in Mesophotic Ecosystems. ASLO Meeting San Juan, PR. February 2011. Oral.
- Rivero-Calle S.** and R.A. Armstrong Ecological Aspects of Sponges in Mesophotic Coral Ecosystems. 8th World Sponge Conference. Girona, Spain. September 20-24, 2010. Poster.
- Rivero-Calle S.** and R.A. Armstrong. Diversity and Abundance of Sponges at the Mesophotic Reef of Bajo de Sico, Puerto Rico. 34th Scientific Meeting of the Association of Marine Laboratories of the Caribbean (AMLC). Dominica. May 2009. Oral.
- Rivero-Calle S.** and R.A. Armstrong. Patterns of Vertical Zonation in Mesophotic Reef Communities of Southwestern Puerto Rico and Vieques Island. 11th International Coral Reef Symposium (ICRS). Fort Lauderdale, Florida. July 2008. Oral.
- Rivero S.** and R.A. Armstrong. Characterization of Shallow and Deep Reef Communities of Vieques Island using the Seabed AUV. Caribbean Coral Reef Investigator (CCRI) Meeting San Juan, Puerto Rico. December 2008. Oral.
- Rivero S.** and R.A. Armstrong. Characterizing the Deep Zooxanthellate Coral Reefs of Puerto Rico with the Seabed Autonomous Underwater Vehicle. 33rd Scientific Meeting of the Association of Marine Laboratories of the Caribbean (AMLC). St Thomas. June 2007. Poster.
- Zayas-Santiago, C.; **Rivero-Calle, S.;** Armstrong, R.A.; and Gilbes-Santaella, F. Spectral Libraries of Submerged Biotopes for Benthic Mapping in Southwestern Puerto Rico (2007). SeaBED Presentations. Paper 4. Poster.

PROFESSIONAL AFFILIATIONS

- The Oceanography Society (TOS)
- Data Carpentries
- Society for Women in Marine Science (SWMS)
- UGA Women in Science Association (WiSci)

INFORMATION TECHNOLOGY

R, MATLAB, IDL, ferret, python, SQL, git, UNIX / Bash scripting.
SeaDAS, ArcView, ENVI, ERDAS

LANGUAGES SPOKEN

English, Spanish, Italian, French. Learning Japanese and Korean.

OTHER

- SSI Open Water Diver: June 2003. PADI Advanced Diver 2006, Nitrox Certified 2006. Emergency First Response (EFR), First Aid and CPR 2009, Rescue Diver 2010.
- U.S. Coast Guard Auxiliary Boating Skills and Seamanship Course, 2005.