ANNA E. WINDLE

Senior Research Scientist
NASA Goddard Space Flight Center / Science Systems and Applications, Inc.
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EDUCATION

2023 **Ph.D. Marine Estuarine Environmental Sciences**
University of Maryland Center for Environmental Science (UMCES) Horn Point Laboratory, *Cambridge, MD*
Dissertation: Incorporating unoccupied aircraft systems (UAS) and earth observing satellites to enhance environmental remote sensing of Chesapeake Bay

2018 **Master of Environmental Management (M.E.M.)**
Duke University Nicholas School of the Environment *Durham, NC* & Duke University Marine Lab, *Beaufort, NC*
Master's Project: The use of autonomous terrestrial rovers for high resolution light pollution sampling in beach environments

2016 **B.S. Environmental Science, *Minors*:** Biology and Anthropology
Washington College, *Chestertown, MD*
International Research: Sustainability and Conservation Methods in Galapagos Islands, Ecuador (June 2014); Women's Health Care, Tanzania (May 2013)
Thesis: The effects of sand characteristics on the clutch survival and hatching success of the loggerhead sea turtle (*Caretta caretta)*

PROFESSIONAL APPOINTMENTS

2025-present **Senior Research Scientist**

2023-2025 **Satellite Mission Post-Doctoral Fellow**
Science Systems Applications, Inc. @ NASA Goddard Space Flight Center
Advancing NASA's Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission by improving ocean color algorithms and retrievals of phytoplankton community composition. Leading community engagement through organization of the PACE Data Hackweek and development of open-source tutorials and cloud-based workflows that expand global access to NASA ocean color data.

2018-2023 **Graduate Research Assistant**
University of MD Center for Environmental Science, Cambridge, MD
Dissertation research focused on aquatic remote sensing and optics using

satellite imagery and unoccupied aerial systems (i.e. drones) with a focus in Chesapeake Bay waters.

2019 **Academic Tutor**
Chesapeake College Academic Support Center, Cambridge, MD
Provided academic support for students enrolled in math and science courses at Chesapeake College.

2017-2018 **Community Outreach Coordinator**
Duke Marine Lab Community Science Initiative, Beaufort, NC
Enhanced community engagement through research on marine debris and water quality. Supported outreach by designing websites and social media content, delivering educational programs, collaborating with local teachers, and developing classroom lesson plans.

2017-2018 **Graduate Research Assistant**
Marine Robotics and Remote Sensing Lab, Beaufort, NC
Supported UAS field operations and processed imagery using Pix4D photogrammetry software. Contributed to monthly landscape classifications of the Cape Lookout National Seashore and enhanced lab communications through website and social media updates.

2016-2017 **Graduate Research Assistant**
Bernhardt Aquaterrestrial Biogeochemistry Lab, Durham, NC
Processed water and soil samples for aquaterrestrial biogeochemistry analyses supporting a long-term study on the impacts of saltwater intrusion in coastal marsh ecosystems.

2016 **Campaign Intern**
Environment North Carolina, Raleigh, NC
Organized and led local environmental advocacy campaigns addressing seismic testing, neonicotinoid impacts on pollinators, and fracking in North Carolina. Produced opinion pieces and outreach materials to inform and engage the public and influence policy discussions.

2015 **Sea Turtle Intern**
Rookery Bay National Estuarine Research Reserve, Naples, FL
Surveyed, identified, and verified *Caretta caretta* (loggerhead sea turtle) nesting activity across five shoreline sites. Maintained a comprehensive database of GPS coordinates and nest attributes, including tide line, vegetation cover, developmental stage, and predation status. Supervised and coordinated a team of 30 Rookery Bay sea turtle volunteers.

AWARDS, SCHOLARSHIPS, & FELLOWSHIPS

2025	NASA GSFC Hydrosphere, Biosphere, & Geophysics (HBG) Peer Award
2022	University of Maryland Ann G. Wylie Dissertation Fellowship ($15,000)
2021	University of Maryland Outstanding Graduate Student Distinguished Service Award
2021	Explorer's Club Washington Group Exploration & Field Research Grant ($1,500)
2021	University of Maryland Debbie Morrin-Nordlund Memorial Award ($2,500)
2021	American Association of University Women Easton Branch ($1,000)
2020	Maryland Sea Grant Graduate Research Support Grant ($10,000)
2020	Mid-Shore Chapter Izaak Walton League of America Scholarship ($2,000)
2019	Chesapeake Bay Trust Environmental Education Mini Grant ($5,000)
2019	Horn Point Lab Ryan Saba Memorial Student Fellowship ($2,000)
2018	Horn Point Lab Graduate Assistantship
2018	Sea Turtle Inc. Scholarship- South Padre, TX ($500)
2017	North Carolina Sea Grant / Space Grant Research Fellowship ($10,000)
2017	Duke University Edna Bailey Sussman Funding Award ($6,300)
2016	Departmental Honors in Environmental Science, Washington College
2015	Blackwater National Wildlife Refuge Environmental Sciences Scholarship ($3,000)
2012-2016	Dean's List, Washington College

PUBLICATIONS

In preparation

Windle, A. E., Sirk, E., Bailey, S., Ibrahim, A., Cetinić, I., Rousseaux, C. S., P. J. Werdell. Simulated PACE data to evaluate ocean color retrieval algorithms. *In prep for: Earth System Science Data.*

Windle, A. E, Gray P.C., Silsbe G.M. DroneWQ: A Python library for measuring water quality with a multispectral drone sensor. *In prep: Journal of Open Source Software,* on Github at https://github.com/aewindle110/DroneWQ

Gray P. C., Gronniger J., Sayvelev I., **Windle A. E.,** Dale J., Neibergall A., Lohman A., Cassar N., Levy M., Hunt D., Johnson Z., Boss E., Silsbe G., Blawas A., Bourdain G., Johnston D. W. (2022) The Impact of Gulf Stream Frontal Eddies on Ecology and Biogeochemistry near Cape Hatteras. *bioRxiv* at: doi: 10.1101/2023.02.22.529409

Peer reviewed

12) **Windle, A. E.**, Malkin, S. Y., Hood, R. R., & Silsbe, G. M. (2025). Optical water typing in optically complex waters: A case study of Chesapeake Bay. *Science of the Total Environment*, *981*, 179558. doi:10.1016/j.scitotenv.2025.179558

11) Gray, P. C., Savelyev, I., Cassar, N., Lévy, M., Boss, E., Lehahn, Y., G. Bourdin, K. A. Thompson, **A. Windle,** J. Gronniger, S. Floge, D. E. Hunt, G. Silsbe, Z. I. Johnson, & Johnston, D. W. (2024). Evidence for kilometer-scale biophysical features at the Gulf Stream front. *Journal of Geophysical Research: Oceans*, *129*(3), e2023JC020526. doi: 10.1029/2023JC020526

10) Román, A., Heredia, S., **Windle, A. E.,** Tovar-Sánchez, A., & Navarro, G. (2024). Enhancing georeferencing and mosaicking techniques over water surfaces with high-resolution unmanned aerial vehicle (UAV) imagery. *Remote Sensing*, *16*(2), 290. doi:10.3390/rs16020290

9) Canfield, K.N., Sterling, A.R., Hernández, C.M., Chu, S.N., Edwards, B.R., Fontaine, D.N., Freese, J.M., Giroux, M.S., Jones, A.E., McCarty, A.J. and Morrissette, H.K., Palevsky, H.I., Raker, C.E., Robuck, A.R., Serrato Marks, G., Thibodeau, P.S., **Windle, A.E.** (2023.) Building an inclusive wave in marine science: Sense of belonging and Society for Women in Marine Science symposia. *Progress in Oceanography*, *218*, doi:10.1016/j.pocean.2023.103110

8) **Windle, A.E.,** Staver, L., Elmore, A.J., Scherer, S., Keller, S., Malmgren, B. and Silsbe, G.M., Multi-temporal high-resolution marsh vegetation mapping using Unoccupied Aircraft System remote sensing and machine learning. (2023) *Frontiers in Remote Sensing*, *4*, doi:10.3389/frsen.2023.1140999

7) Gray, P. C., **Windle, A. E.,** Dale, J., Savelyev, I. B., Johnson, Z. I., Silsbe, G.M., Larsen, G.D. and Johnston, D.W. (2022). Robust ocean color from drones: Viewing geometry, sky reflection removal, uncertainty analysis, and a survey of the Gulf Stream front. *Limnology and Oceanography: Methods*. doi:10.1002/lom3.10511

6) **Windle, A. E**., Puckett, B., Huebert, K. B., Knorek, Z., Johnston, D. W., & Ridge, J. T. (2022). Estimation of Intertidal Oyster Reef Density Using Spectral and Structural Characteristics Derived from Unoccupied Aircraft Systems and Structure from Motion Photogrammetry. *Remote Sensing*, *14*(9), 2163, doi:10.3390/rs14092163

5) **Windle, A. E.,** Evers-King, H., Loveday, B. R., Ondrusek, M., & Silsbe, G. M. (2022). Evaluating Atmospheric Correction Algorithms Applied to OLCI Sentinel-3 Data of Chesapeake Bay Waters. *Remote Sensing*, *14*(8), 1881, doi:10.3390/rs14081881

4) **Windle, A. E**., & Silsbe, G. M. (2021). Evaluation of unoccupied aircraft system (UAS) remote sensing reflectance retrievals for water quality monitoring in coastal waters. *Frontiers in Environmental Science*, *9*, 182, doi:10.3389/fenvs.2021.674247

3) Ridge, J. T., Gray, P. C., **Windle, A. E.,** & Johnston, D. W. (2020). Deep learning for coastal resource conservation: automating detection of shellfish reefs. *Remote Sensing in Ecology and Conservation*, *6*(4), 431-440, doi:10.1002/rse2.134

2) **Windle, A. E.,** Poulin, S. K., Johnston, D. W., & Ridge, J. T. (2019). Rapid and Accurate Monitoring of Intertidal Oyster Reef Habitat Using Unoccupied Aircraft Systems and Structure from Motion. *Remote Sensing*, *11*(20), 2394, doi:10.3390/rs11202394

1) **Windle, A. E**., Hooley, D. S., & Johnston, D. W. (2018). Robotic vehicles enable high-resolution light pollution sampling of sea turtle nesting beaches. *Frontiers in Marine Science*, *5*, 493, doi:10.3389/fmars.2018.00493

PRESENTATIONS

Invited talks and seminars

From Multi to Hyper: Untangling Optical Water Types in Complex Waters. *NASA GSFC Ocean Ecology Lab seminar.* Virtual. August 14, 2025.

Evaluation of Unoccupied Aircraft System (UAS) Remote Sensing Reflectance Retrievals for Water Quality Monitoring in Coastal Waters. *VITO Remote Sensing FRM4drones-AQUATIC workshop*. Virtual. June 11, 2025.

Incorporating unoccupied aircraft systems (UAS) and earth observing satellites to enhance environmental remote sensing of coastal waters. *Duke University Marine Lab seminar.* Beaufort, NC. October 11, 2023.

Multi-temporal high-resolution marsh vegetation mapping using Unoccupied Aircraft System remote sensing and machine learning. *Poplar Island Habitat Subgroup Meeting*, June 14, 2023.

Bay Watch: Drones Monitor Water Quality From the Sky. *ShoreRivers,* Easton, MD. July 8, 2021.

Send in the Drones: A New Tool for Water Quality Monitoring. *Virginia Institute of Marine Science Physical-Biological Departmental Seminar Series.* September 28, 2020.

Eyes in the Sky: How drones can be used to monitor water quality in Chesapeake Bay. *She Maps EduDrone Online Drone Conference*. September 1, 2020.

Aquatic remote sensing in Chesapeake Bay: Atmospheric correction. *Oral presentation at a virtual NASA Interagency Chesapeake Bay Working Group Meeting*. January 2020.

Sea turtles dig the dark: The use of drones to monitor light pollution on NC beaches. *North Carolina Museum of Natural Sciences*, Raleigh, NC. July 12, 2018.

Impacts of light pollution on nesting sea turtles in North Carolina. *North Carolina Museum of Natural Sciences at Whiteville Coastal Teen Science Café*, Whiteville, NC. April 20, 2018.

Impacts of light pollution on nesting sea turtles in North Carolina. *North Carolina State University Center for Marine Sciences and Technology Coastal Teen Science Café*, Morehead City, NC. 2017.

Conference presentations

Windle, A.E. Cetinic, I., Carroll, I., Sirk, E.A., Ibrahim, A., Rousseaux, C.S., Craig, S.E., Werdell, P.J. Global Distributions of Modeled Phytoplankton Community Composition Derived from Synergistic Relationships Between Hyperspectral Remote Sensing Reflectance and Environmental Data. *Poster presented at the American Geophysical Union meeting*, Washington, D.C. December 10, 2024

Windle, A.E. A simulated PACE dataset to evaluate optical closure and phytoplankton community composition algorithms. *Poster presented at the International Ocean Color Science Meeting*, St. Petersburg, FL. November 15, 2023

Windle, A.E., Silsbe, G., Malkin, S. Optical water type classification of Chesapeake Bay. *Oral presentation at the Chesapeake Community Research Symposium*, Annapolis, MD. June 7, 2022.

Windle, A. E., Silsbe, G. Evaluation of unoccupied aircraft system (UAS) remote sensing reflectance retrievals for water quality monitoring in coastal waters. *Oral presentation at the virtual Ocean Sciences Meeting.* February 2022.

Windle, A. E. Ridge, J., Silsbe, G., Johnston, D. Structure from Motion photogrammetry: A remote, rapid, and nondestructive method for oyster reef monitoring. *Oral presentation at the virtual 26th biennial Coastal, Estuarine, Research Federation conference.* November 8, 2021.

Windle, A.E., Silsbe, G. Atmospheric correction algorithms portray differences in optical properties of Chesapeake Bay waters. *Poster presented at Ocean Sciences Meeting*, San Diego, CA. February 17, 2020.

Windle, A. E., Hooley, D., Johnston, D. High resolution measurements of nighttime ambient light conditions correlate with sea turtle nesting on developed and

undeveloped beaches in North Carolina. Nicholas School of the Environment. *Oral presentation at Duke University Master's Project Symposium*, Durham, NC. April 7, 2018.

Windle, A. E., Poulin, S., Ridge, J., Seymour, A., Johnston, D. Using Unmanned Aerial Systems (UAS) remote sensing imagery to assess oyster reef health. *Poster presented at 32nd Annual Tidewater Atlantic Fisheries Society Meeting*, Beaufort and Morehead City, NC. January 25, 2018.

Windle, A. E., Hooley, D., Newton, E., Johnston, D. The use of autonomous terrestrial rovers for high resolution environmental sampling in beach environments. *Poster presented at the Southeast Regional Sea Turtle Meeting*, Myrtle Beach, SC. February 14, 2018.

Windle, A. E., Hooley, D., Newton, E., Johnston, D. High resolution measurements of nighttime ambient light conditions correlate with sea turtle nesting on developed and undeveloped beaches in North Carolina. *Oral presentation at Southeast Regional Sea Turtle Meeting*, Myrtle Beach, SC. February 14, 2018.

Windle, A. E. The effects of sand characteristics on the clutch survival and hatching success of the loggerhead sea turtle *(Caretta caretta*). *Poster presented at the Washington College Environmental Science & Studies Department Senior Capstone Presentation,* Chestertown, MD. April 20, 2016.

TEACHING EXPERIENCE

Fall 2025 **Guest Lecturer,** UMCES, *Cambridge, MD*
Prepared and taught a lecture on satellite and drone remote sensing for environmental science for MEES689V: Environmental Field Methods.

Aug 2024/25 **Lead Organzier,** NASA PACE Data Hackweek
Led the planning and execution of a 5-day in-person hackweek for 40-50 participants, developing and presenting Jupyter Notebook tutorials to teach data access and analysis using NASA PACE data.

Fall 2024 **Guest Instructor,** NASA Applied Remote Sensing Training Program
Prepared and taught a workshop session: *Access and Visualization of PACE/OCI Data using Python/Jupyter Notebook Software* for the Introduction to Plankton, Aerosol, Cloud, Ocean Ecosystem (PACE) Hyperspectral Observations for Water Quality Monitoring ARSET training.

Summer 24 **Guest Lecturer**, Duke University Marine Lab, *Beaufort, NC*
Prepared and taught a lecture on ocean color remote sensing for MARSCI/BIO/ENV 335A: Drones in Biology, Ecology, and Conservation.

Fall 2023 **Guest Lecturer**, University of North Carolina Wilmington, *Wilmington, NC*
Prepared and taught a virtual lecture on satellite and drone ocean color remote sensing for OCN 350: Advanced Oceanography.

Spring 2023 **Teaching Assistant,** UMCES, *Cambridge, MD*
Provided instructor general course support, organized course fieldtrips, and taught a 2-hour lecture on ocean optics and remote sensing for MEES621: Biological Oceanography.

Spring 2022 **Guest Lecturer,** Cambridge South Dorchester High School, *Cambridge, MD*
Prepared and taught a lecture on drones for environmental science for Honors Environmental Science students.

Fall 2021 **Guest Lecturer,** Washington College, *Chestertown, MD*
Prepared and taught a lecture on ocean color remote sensing for ENV311: Field Methods.

Fall 2021 **Guest Lecturer,** UMCES, *Cambridge, MD*
Prepared and taught a lecture on Structure from Motion photogrammetry for MEES698X: Global Environmental Remote Sensing.

Spring 2021 **Guest Lecturer,** Monticello High School, *Charlottesville, VA*
Prepared and taught a virtual lecture on drones for environmental science for AP Environmental Science and Photography students.

Spring 2021 **Guest Lecturer,** Cecil County School of Technology, *Elkton, MD*
Prepared and taught a virtual lecture on Geographic Information Systems (GIS) for Biomedical Sciences students.

Fall 2020 **Guest Lecturer,** Washington College, *Chestertown, MD*
Prepared and ran a virtual Google Earth Engine workshop for a lab in ENV311: Field Methods.

Summer 20 **Invited Workshop Presenter,** Chesapeake Community Research Symposium
Prepared and ran a virtual Google Earth Engine workshop for 30 participants.

Fall 2019 **Guest Lecturer,** Washington College, *Chestertown, MD*
Prepared and ran a Google Earth Engine workshop for a lab in ENV311: Field Methods.

Fall 2014 **Teaching Assistant,** *Washington College, Chestertown, MD*

Provided professor general course support for ENV 101: Intro to Environmental Science. Guided students during fieldtrips and discussions.

ADDITIONAL PROFESSIONAL TRAINING

Spring 2024 **NASA Openscapes Champions Program**
Virtual
Engaged in a cohort-based mentorship program focused on applying open data science practices and supporting research teams in migrating workflows to cloud-based environments.

July 2024 **NASA Open Science 101**
Virtual
Completed NASA's Open Science Training course, gaining foundational knowledge in the principles, ethics, and best practices of open and collaborative scientific research.

Feb 2024 **Alan Alda Center for Communicating Science "Share the Science" Training Course**
Virtual
Developed skills to communicate complex scientific concepts clearly and engagingly through interactive, experiential learning.

Aug 2022 **Alliance of Coastal Technologies (ACT) Drone Hyperspectral Water Quality Monitoring Demonstration**
Maumee Bay Lodge & Conference Center, Toledo, OH
Engaged in a three-day workshop with remote sensing experts and hyperspectral sensor providers to establish best practices for collecting hyperspectral ocean color data using drone platforms.

Aug 2022 **NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) training course**
University of Maryland Baltimore County, Baltimore, MD
Acquired in-depth knowledge of NASA PACE mission, including satellite remote sensing for ocean and atmosphere, instrument performance, geophysical product derivation, uncertainties, and Earth system model applications.

Jul 2022 **International Ocean Color Coordinating Group (IOCCG) Summer Lecture Series**
Laboratoire d'Océanographie de Villefranche, Villefranche-sur-Mer, France
Learned from leading researchers about key challenges in ocean optics

and ocean color remote sensing. Gained hands-on experience with HydroLight radiative transfer modeling, Copernicus dataset analysis, and in-field data collection using an absorption and attenuation meter (ac-s).

2021-2022 **Ratcliffe Environmental Entrepreneurs Fellowship (REEF) Program**
Institute of Marine and Environmental Technology, Baltimore, MD
Developed leadership and business skills to translate technologies from lab or field to market through workshops with entrepreneurs, intellectual property training, customer discovery exercises, and a final pitch competition.

Jul/Aug 2021 **Calibration & Validation for Ocean Color Remote Sensing**
Bowdoin College Schiller Coastal Studies Center, Orr's Island, ME
Acquired foundational knowledge of ocean optics and optical sensor technology, with hands-on experience in measurements, uncertainty assessment, and comparison with remotely sensed ocean color data and derived products.

Jan 2020 **Pix4Dmapper Essentials Workshop**
Virtual
Trained in Pix4Dmapper structure-from-motion photogrammetry workflows, including best practices for drone-based RGB image capture and creating, managing, analyzing, and sharing mapping data.

Aug 2019 **Introduction to Satellite Data**
NASA Goddard Space Flight Center, Greenbelt, MD
Trained in remote sensing fundamentals, including accessing and analyzing NASA Ocean Color data in SeaDAS, using NASA Giovanni, and the interagency CyAN application.

Jun 2019 **International Operational Satellite Oceanography Training**
College Park, MD
Received training in NOAA CoastWatch Data Analysis Tools and Utilities, Copernicus Online Data Access, Sentinel Applications Platform (SNAP).

Jun 2019 **Cornell Satellite Remote Sensing Training Program**
Cornell University, Ithaca, NY
Completed an intensive 2-week summer course on satellite remote sensing with a focus on ocean color, gaining skills in acquiring, analyzing, and visualizing datasets from multiple satellite sensors using NASA SeaDAS and Python.

Feb 2018 **Scientific Research and Education Network (SciREN) Lesson Plan Workshop**

Duke Marine Lab, Beaufort, NC
Guided researchers in developing lesson plans under the mentorship of experienced science educators.

Oct 2017 **NOAA Tools Training**
NOAA Beaufort Lab, Beaufort, NC
Gained experience with various NOAA tools, including Sea Level Rise Viewer, Coastal Flood Exposure Mapper, and NOAA's Digital Coast.

Jan 2017 **Marine Planning Advancement Training**
Duke Marine Lab, Beaufort, NC
Participated in an interactive game-theory based educational activity to identify, address, and manage coastal and marine spatial planning areas.

ACADEMIC SERVICE

2023-present Peer reviewer: *EGUSphere* (1), *Ecological Indicators* (1), *Estuarine, Coastal and Shelf Science* (1), *Frontiers in Remote Sensing* (1), *AGU Earth and Space Science*, *Frontiers in Environmental Science* (1)

2019-present Member: NASA Interagency Chesapeake Bay Working Group

2024 Organizer: NASA PACE Applications Workshop, Washington, D.C. December 2024.

2023 Grant reviewer (panel): *NASA Ocean Biology and Biogeochemistry*

2020-2022 Graduate Student Council Chair, UMCES

2020-2022 COVID Communications Committee, UMCES

2020-2022 UMCES Representative, University System of Maryland Student Council

2020-2021 Diversity, Equity, Inclusion Collaborative, UMCES

2019-2021 Middle States Commission on Higher Education Accreditation Working Group IV: "*Support of the Student Experience*", UMCES

2017-2018 President of Duke University Student Chapter of The Coastal Society

Association Memberships
The Oceanography Society (TOS)
American Geophysical Union (AGU)
Society for Women in Marine Science (SWMS)
The Coastal Society (TCS)

OUTREACH

2019-2022	Tour Guide, Horn Point Lab, Cambridge, MD
2019-2022	Drone Mapping Workshops for 6th-12th graders (in conjunction with ShoreRivers (Camridge, MD), Talbot County Library (Easton, MD), Fair Hill Nature Center (Elkton, MD))
2019, 2021	Scholarship Committee, Cambridge Multisport, Cambridge, MD
2018-2021	Co-chair of Society for Women in Marine Science HPL chapter, Cambridge, MD
2020	Student speaker at ShoreRivers & UMCES Meaningful Watershed Educational Experience (MWEE) Teacher Academy, Cambridge, MD
2019-2021	Board member (non-voting) of ShoreRivers, Easton, MD
2019	Education volunteer at Waterfowl Festival, Easton, MD
2018	Planning member of Girls Exploring Science & Technology (GEST) @ Duke Marine Lab, Beaufort, NC
2015-2016	Horseshoe Crab Spawning Survey Volunteer, DE NERR, Dover, DE
2014-2016	Member, Student Environmental Alliance, Washington College
2014-2015	President of Washington College Dance Club

FIELD EXPERIENCE

Cruises:
R/V *Shearwater*, Gulf Stream Front Offshore N.C., August 24-29, 2021
R/V *Ira C.,* Harpswell Sound, ME, August 4, 2021
R/V *Rachel Carson,* Offshore Assateague Island National Seashore, MD, May 20th, 2019
R/V *Rachel Carson,* Choptank River, MD, 1 day trips, 2019, 2023
R/V *Callinectes*, Chester River, MD, many 1 days trips, 2012-2016

Other:
Numerous 1 day field work excursions in Choptank River and Middle Chesapeake Bay (MD) to collect optical measurements and conduct drone surveys (2018-2021)
Numerous 1-2 day field work excursions to conduct and support drone surveys in coastal environments (NC, MD) for various projects (2017-2021)

SKILLS AND CERTIFICATIONS

Certificate of Geospatial Analysis, Nicholas School of the Environment, Duke University

***Computer*:** Python, R, MATLAB, Google Earth Engine (JavaScript), Sentinel Application Platform (SNAP)**,** NASA SeaDAS, Geospatial analysis and GIS software (ArcPro, ArcGIS.x), Pix4DMapper SfM software, Adobe Suite.

Field: Federal Aviation Administration Certified Remote Pilot (expired 2024); deployment of optical instruments including TriOS radiometers, WET Labs AC-S, BB-9, YSI sensors; Gathering informatics using ArcPad, Trimble, and Emlid RTK GNSS Reach RS; Lifetime Certificate of Boating Education

Lab: Collection and preparation of whole water samples for HPLC, CDOM, absorption, and nutrient analyses; spectrophotometry (filter pad and whole water samples); chlorophyll fluorometry

*Last updated October 24, 2025