MARGARET L. ESTAPA

University of Maine
School of Marine Sciences
Darling Marine Center
193 Clark's Cove Rd
Walpole, ME 04573
Email: margaret.estapa@maine.edu

RESEARCH INTERESTS

Oceanic biogeochemical processes mediated by organic and inorganic particles in open ocean, coastal, and near-bottom environments; validation and application of novel observational methods for marine organic matter; autonomous platforms for ocean observations; ocean color remote sensing; photochemical reactions of suspended particulate matter.

EDUCATION

Ph.D., Oceanography, 2011. University of Maine, Orono, ME. Thesis: Photochemical reactions of marine particulate organic matter. Advisors: Dr. Lawrence M. Mayer and Dr. Emmanuel Boss.

B.A., Chemistry, *Magna cum laude*, 2001. Carleton College, Northfield, MN.

PROFESSIONAL APPOINTMENTS

Libra Assistant Professor of Chemical Oceanography, School of Marine Sciences, University of Maine, 2020-present.

Adjunct Scientist, Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, 2016-present.

Assistant Professor, Department of Geosciences, Skidmore College, 2016-2020.

Visiting Assistant Professor, Department of Geosciences, Skidmore College, 2014-2016

Guest Investigator, Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, 2014-2016.

Postdoctoral Investigator, Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, 2013-2014.

Postdoctoral Scholar, Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, 2011-2013.

Graduate Research Fellow, School of Marine Sciences, University of Maine, Orono, ME, 2008-2011.

Graduate Research Assistant, School of Marine Sciences, University of Maine, Orono, ME, 2005-2008.

Assistant Scientist, Sea Education Association, Woods Hole MA, June 2001 – Aug. 2005.

FELLOWSHIPS AND AWARDS

Robert H. Goddard Group Honor Award for Science, EXPORTS Project Science Team, 2021.

NASA New Investigator Program in Earth Sciences awardee, 2014.

Woods Hole Oceanographic Institution Postdoctoral Scholarship, 2011.

Dissertation Symposium in Chemical Oceanography selectee, 2010.

NASA Earth Systems Science Graduate Fellowship, 2008.

Woods Hole Oceanographic Institution Summer Student Fellowship, 2003.
Hypercube Scholar Award in Computational Chemistry, 2001.
Beckman Scholar Award, 1999-2000.

MANUSCRIPTS IN REVIEW OR IN REVISION

Brzezinski M, L Johnson, **ML Estapa**, S Clevenger, M Roca-Martí, E Romanelli, K Buck, B Jenkins, J Jones. 2023. Physical mechanisms sustaining silica production following the demise of the diatom phase of the North Atlantic spring phytoplankton bloom during EXPORTS. *In review, Global Biogeochemical Cycles*.

PUBLICATIONS (* indicates undergraduate student)

25. Stephens, BM, CA Durkin, G Sharpe, T Nguyen, J Albers, **ML Estapa,** DK Steinberg, NM Levine, SM Gifford, CA Carlson, PW Boyd, AE Santoro. 2023. Microbial community succession on particles exporting carbon to the deep ocean. *In press, The ISME Journal*.
24. Clevenger SJ, Benitez-Nelson CR, Roca-Martí M, Bam W, **Estapa M**, Kenyon JA, Pike S, Resplandy L, Wyatt A, Buesseler KO. 2024. Carbon and silica fluxes during a declining North Atlantic spring bloom as part of the EXPORTS program. *Marine Chemistry* **258**: 104346. doi: 10.1016/j.marchem.2023.104346
23. **Estapa, M. L**., C. A. Durkin, W. H. Slade, C. L. Huffard, S. P. O'Neill, and M. M. Omand. 2023. A new, global optical sediment trap calibration. *Limnology & Oceanography: Methods* lom3.10592. doi:10.1002/lom3.10592
22. Wojtal, P.K, S.C. Doherty, C.H. Shean, B.N. Popp, C.R. Benitez-Nelson, K.O. Buesseler, **M.L. Estapa**, M. Roca-Martí, H.G Close, 2023. *Limnology and Oceanography*. Deconvolving Mechanisms of Particle Flux Attenuation using Nitrogen Isotope Analyses of Amino Acids. doi:10.1002/lno.12398
21. Steinberg D.K., K. Stamieszkin, A.E. Maas, C.A. Durkin, U. Passow, **M.L. Estapa**, M.M. Omand, A.M.P. McDonnell, L. Karp-Boss, M. Galbraith, D.A. Siegel, 2023. The outsized role of salps in carbon export in the subarctic Northeast Pacific Ocean. *Global Biogeochemical Cycles* **37**(1). doi:10.1029/2022GB007523
20. Durkin, C.A., I. Cetinić , **M.L. Estapa**, Z. Ljubešić , M. Mucko, A. R. Neeley, M.M. Omand, 2022. Tracing the source and export of carbon in the ocean though DNA sequencing of individual sinking particles. *The ISME Journal.* Doi: 10.1038/s41396-022-01239-2
19. Durkin CA, Buesseler KO, Cetinić I, **Estapa ML**, Kelly RP, Omand M. 2021. A Visual Tour of Carbon Export by Sinking Particles. *Global Biogeochem Cycles* **35**(10). doi: 10.1029/2021GB006985
18. Long JS, Fassbender AJ, **Estapa ML**. 2021. Depth-Resolved Net Primary Production in the Northeast Pacific Ocean: A Comparison of Satellite and Profiling Float Estimates in the Context of Two Marine Heatwaves. *Geophys Res Lett* **48**(19). doi: 10.1029/2021GL093462
17. Siegel, D.A., I. Cetinić, J.R. Graff, C. Lee, N. Nelson, M.J. Perry, I.S. Ramos, D.K. Steinberg, K. Buesseler, R. Hamme, A.J. Fassbender, D. Nicholson, M.M. Omand, M. Robert, A. Thompson, and the EXPORTS Science Team (includes **M.L. Estapa**), 2021. Overview of the Export Processes in the Ocean from RemoTe Sensing (EXPORTS) Northeast Pacific Field Deployment. *Elementa: Science of the Anthropocene* 9(1). doi: 10.1525/elementa.2020.00107

16. Roca-Martí, M., Benitez-Nelson, C.R., Umhau, B.P., Wyatt, A.M., Clevenger, S.J., Pike, S.M., **Estapa, M.L.**, Resplandy, L., Buesseler, K.O., 2021. Concentrations, ratios, and sinking fluxes of major bioelements at Ocean Station Papa. *Elementa: Science of the Anthropocene* 9(1). doi: 10.1525/elementa.2020.00166
15. **Estapa M.L.**, Buesseler KO, Durkin CA, Omand MM, Benitez-Nelson CR, Breves E, Kelly RP, Pike SM, Roca-Martí M. 2021. Biogenic sinking particle fluxes and sediment trap collection efficiency at Ocean Station Papa. *Elementa: Science of the Anthropocene* 9(1). doi: 10.1525/elementa.2020.20.00122
14. Buesseler, K.O., C.R. Benitez-Nelson, M. Roca-Martí, A.M. Wyatt, L.Resplandy, S.J. Clevenger, J. Drysdale, **M.L. Estapa**, S. Pike, B.P. Umhau, 2020. High resolution spatial and temporal measurements of particulate organic carbon flux using thorium-234 in the NE Pacific Ocean during the EXPORTS Program. *Elementa: Science of the Anthropocene* 8(1): 030. doi:10.1525/elementa.030
13. Baker, C. A., **M. L. Estapa**, M. Iversen, R. Lampitt, and K. Buesseler. 2020. Are all sediment traps created equal? An intercomparison study of carbon export methodologies at the PAP-SO site. *Progress in Oceanography* 184: 102317. doi:10.1016/j.pocean.2020.102317
12. **Estapa, M.,** J. Valdes, K. Tradd, J. Sugar, M. Omand, and K. Buesseler. 2020. The Neutrally Buoyant Sediment Trap: Two Decades of Progress. *Journal of Atmospheric and Oceanic Technology*. 37: 957–973. doi:10.1175/JTECH-D-19-0118.1
11. **Estapa, M.L**, M. Feen*, and E. Breves, 2019. Direct observations of biological carbon export from profiling floats in the subtropical North Atlantic. *Global Biogeochemical Cycles*, 282–300.
10. Fassbender, A.F., H.I. Palevsky, T.R. Martz, A.E. Ingalls, Martha Gledhill, S.E. Fawcett, J.A. Brandes, L.I. Aluwihare, the participants of COME ABOARD (includes **M. Estapa**), and DISCO XXV. 2017. Perspectives on Chemical Oceanography in the 21st century: Participants of the COME ABOARD Meeting examine aspects of the field in the context of 40 years of DISCO. *Marine Chemistry*, 196: 181-190, doi.org/10.1016/j.marchem.2017.09.002
9. **Estapa, M.**, C. Durkin, K. Buesseler, R. Johnson, and M. Feen*. 2017. Carbon flux from bio-optical profiling floats: Calibrating transmissometers for use as optical sediment traps. *Deep Sea Research Part I: Oceanographic Research Papers* 120: 100–111. doi:10.1016/j.dsr.2016.12.003
8. **Estapa, M.L.**, Siegel, D.A., Buesseler, K.O., Stanley, R.H.R., Lomas, M.R., Nelson, N.B., 2015. Decoupling of net community production and export production at submesoscale fronts in the Sargasso Sea. *Global Biogeochemical Cycles,* 29, doi:10.1002/2014GB004913.
7. **Estapa, M.L.**, Breier, J.A., German, C.R., 2015. Particle dynamics in the rising plume at Piccard Hydrothermal Field, Mid-Cayman Rise: new applications of optical sensors. *Geochemistry, Geophysics, Geosystems*, 16, doi:10.1002/2015GC005831.
6. Durkin, C. A., **M. L. Estapa**, and K. O. Buesseler 2015. Observations of carbon export by small sinking particles in the upper mesopelagic, *Marine Chemistry*, *175*: 72-81.
5. **Estapa, M.L.**, Buesseler, K.O., Boss, E., Gerbi, G.P., 2013. Autonomous, high-resolution observations of particle flux in the oligotrophic ocean. *Biogeosciences, 10:* 5517-5531.
4. **Estapa, M.L.**, Mayer L.M., Boss E., 2012. Rate and apparent quantum yield of photodissolution. *Limnology and Oceanography,* 57(6): 1743-1756.

3. **Estapa, M.L.**, Boss E., Mayer L.M., Roesler C.R., 2012. Role of iron and organic carbon in mass-specific light absorption by particulate matter from Louisiana coastal waters, *Limnology and Oceanography*, 57(1): 97-112.
2. **Estapa, M. L.**, Mayer, L.M., 2010. Photooxidation of particulate organic matter. *Marine Chemistry*, 122: 138-147.
1. Mayer, L.M., L.L. Schick, K.R. Hardy, **M. L. Estapa**, 2009. Photodissolution and other photochemical changes upon irradiation of algal detritus. *Limnology and Oceanography,* 54: 1688-1698.

RESEARCH GRANTS AWARDED

M. Estapa. Improving estimates of land-to-ocean carbon flux through characterization of colloidal inherent optical properties. NASA EPSCoR R3. Award period: 1/1/2023-12/31/2023. Award amount: $93,713.

M. Estapa, Colleen Durkin (MBARI), Nils Haëntjens (UMaine), Melissa Omand (URI): Collaborative Research: An open, platform-agnostic sediment trap controller and imaging sensor. NSF Ocean Technology and Interdisciplinary Coordination program. Award period: 9/1/2022-8/31/2025. Award amount (UMaine portion): $654,518.

M. Estapa, Onur Apul, Lauren Ross, Colleen Durkin (MBARI): Do biological particles scavenge and remove microplastic fibers from the ocean? University of Maine MARINE Initiative. Award period: 1/1/2022-12/31/2022. Award amount: $34,970.

W. Slade (Sequoia Scientific), **M. Estapa**: STTR Phase I: Bio-optical Sensor for the Direct Detection of Sinking Marine Particles. NSF Small Business Technology Transfer program. Award period: 1/1/2022-12/31/2022. Award amount (UMaine portion: $81,367).

A. Fassbender (MBARI), I. Cetinić (NASA), **M. Estapa**, K. Johnson (MBARI), D. Nicholson (WHOI): Collaborative Research: Multi-Platform Approach to Evaluate Spring Bloom Timing and Carbon Export Processes in the North Atlantic Ocean. NSF Chemical Oceanography. Award period: 9/1/2020-8/31/2023. Award amount (UMaine portion): $35,186.

M. Estapa, K. Buesseler (WHOI), C. Durkin (Moss Landing), M. Omand (URI): Linking Sinking Particle Chemistry and Biology With Changes in the Magnitude and Efficiency of Carbon Export Into the Deep Ocean. NASA Ocean Biology and Biogeochemistry. Award period: 9/1/2017-3/3/2023. Award amount: $1,715,174.

C. Durkin (Moss Landing, M. Omand (URI), **M. Estapa** – EAGER: Collaborative Research: Particle-specific DNA sequencing to directly observe ecological mechanisms of the biological pump. NSF Biological Oceanography. Award period: 12/15/2016-12/14/2018. Award amount (Skidmore portion): $76,915.

K. Buesseler (WHOI), **M. Estapa** - Collaborative Research: Are all traps created equal? A multi-method assessment of the collection and detection of sinking particles in the ocean. NSF

Chemical Oceanography. Award period: 1/15/2017-6/30/2018. Award amount (Skidmore portion): $137,493.

I. Cetinic (NASA), W. Slade (Sequoia Scientific), P. Werdell (NASA), **M. Estapa** - Measurement of Oceanic Particle Size Distribution in Support of Carbon Cycle Research and Ocean Color Remote Sensing. Submitted to Schmidt Ocean Institute for R/V Falkor ship time during 2017 for activities supported by NASA NIP award (below).

M. Estapa – Linking Satellite Observations of the Biological Pump to Autonomous, Float-Based Measurements of Twilight Zone Carbon Flux. NASA New Investigator Program in Earth Science. Award period: 8/1/2014 to 6/30/2018. Award amount: $248,463.

M. Estapa, K. Buesseler (WHOI) - Rapid, Autonomous Particle Flux Observations in the Oligotrophic Ocean. NSF Chemical Oceanography. Award period: 2/1/2013 to 1/31/2015. Award amount: $480,827.

M. Estapa, J. A. Breier (WHOI) - Optical-proxies of particulate iron formation kinetics in hydrothermal plumes: a proof-of-concept study for future in-situ measurements. Woods Hole Oceanographic Institution Deep Ocean Exploration Institute and Ocean Ridge Initiative. Award period: 7/1/2012 to 6/1/2014. Award amount: $27,722.

M. Estapa, E. Boss (U. Maine) - Assessing impacts on carbon transport from land to ocean: photochemical transformations of particulate organic carbon. NASA Earth Systems Science Graduate Fellowship. Award period: 9/1/2008 to 8/31/2011. Award amount: $90,000.

TEACHING EXPERIENCE

Instructor: Marine Environmental Change (SMS-491), University of Maine, Fall 2023. Laboratory and field course with undergraduate enrollment of 25 students. Introduction to aspects of physical and chemical change in the oceans and related water sampling methods.

Instructor: Oceanographic Field Methods (SMS-491), University of Maine, Fall 2022. Laboratory and field course with undergraduate enrollment of 27 students. Introduction to standard oceanographic sampling methods.

Instructor: Ocean Biological Carbon Cycle (SMS-598), University of Maine, Spring 2022. Seminar with graduate enrollment of 5 students. Discussion of classic and recent papers on the ocean biological carbon pump.

Instructor: Sea Change: Anthropogenic shifts in ocean systems (SMS-491), University of Maine, Fall 2021. Lecture with undergraduate enrollment of 7 students. Exploration of primary literature in global change oceanography, with emphasis on anthropogenic impacts.

Co-instructor: **Calibration and Validation for Ocean Color Remote Sensing** (with colleagues from University of Maine, Bowdoin College, NASA GSFC, and elsewhere), University of Maine/Bowdoin College, 2021, 2023. Graduate course for oceanography students covering theoretical, laboratory, and field techniques in ocean optics and remote sensing.

Instructor: Chemical Oceanography (SMS-520), University of Maine, Fall 2020-2023. Lecture with graduate enrollment of 6-8 students. Survey of chemical oceanography covering cycling and distribution of elements in the global ocean.

Instructor: Introduction to Oceanography (GE-112), Skidmore College, Fall 2014, 2015, 2016, 2018, 2019. Lecture and lab with undergraduate enrollment of ~50 general-education students. Survey of marine geology, physical oceanography, and biological oceanography with emphasis on human interactions with and impacts on the ocean.

Co-instructor: **Science Literacy Project** (HF-200) (with colleagues from departments in American Studies, Anthropology, English, Environmental Studies and Sciences, Math, Physics, and World Languages), Skidmore College, Fall 2015, Spring 2019, Spring 2020. Interdisciplinary science literacy seminars exploring topics such as extinction, food production, and uncertainty.

Instructor: Deep Seafloor Exploration (SSP-100), Skidmore College, Fall 2019. Seminar course with undergraduate enrollment of 15 general-education students. Interdisciplinary first-year course exploring scientific, historical, and technological developments in humanity's exploration of the seafloor, while simultaneously orienting first-year college students to ways of learning and knowing.

Instructor: The Coastal Ocean (GE-251), Skidmore College, Spring 2016, 2019. Combined lecture/lab with undergraduate enrollment of 10-20 students. Introduction to coastal ocean processes and dynamics, with emphasis on impacts of human activities.

Instructor: Remote Sensing of the Earth and Environment (GE-251/GE-305), Skidmore College, Spring 2015, 2016, 2019. Lecture and lab with undergraduate enrollments ~10 students. Introduction to the physical principles and applications of satellite remote sensing in the Earth and environmental sciences.

Instructor: Advanced Oceanography (GE-351), Skidmore College, Spring 2015. Seminar with undergraduate enrollment of 16 students. Primary literature-based exploration of current research in ocean biogeochemistry and its interaction with changing climate.

Instructor: Oceans and Global Change (GE-351), Skidmore College, Fall 2016. Seminar with undergraduate enrollment of 8 students. Primary literature-based exploration of modern changes in the global ocean.

Teaching Assistant: Calibration and Validation for Ocean Color Remote Sensing, University of Maine, 2011: Graduate course for oceanography students. Instructors: Dr. Emmanuel Boss, Dr. Curt Mobley, Dr. Mary Jane Perry, Dr. Collin Roesler, Dr. Kurt Voss, and Jeremy Werdell. Prepared and taught laboratory sessions, operated optical instrumentation during training cruises, and assisted students during data analysis workshops.

Assistant Scientist (oceanography instructor): Oceanography and Practical Oceanography, Sea Education Association, 2001-2005. Taught analytical techniques in physical, chemical, and biological oceanography to undergraduates in a shipboard setting, delivered lectures on various topics in introductory oceanography, graded practical and written examinations, managed data collection and archiving procedures, maintained sampling equipment, and trained new Assistant Scientists. Taught on 12 semester programs total.

ADVISING

Graduate advisees:

1. Mikayla Clark (M.S., Oceanography)
2. Sachithma Edirisinghe (M.S., Oceanography)

Graduate committees:

1. Drajad Seto (Ph.D., Oceanography, University of Maine)
2. Samuel Tan (Ph.D., Marine Biology, University of Maine)
3. Maya Thomas (Ph.D., Oceanography, Virginia Institute of Marine Science)
4. Charlotte Begouen-Demeaux (Ph.D., Oceanography, University of Maine)
5. Zexi Mao (Ph.D., Oceanography, University of Maine)
6. Elsa Simon (Ph.D., Oceanography, Laboratoire d'Océanographie de Villefranche)

Dissertation reviewer:

1. Florian Ricour (Ph.D., Oceanography, University of Liège/Laboratoire d'Océanographie de Villefranche)

Undergraduate capstone/thesis advisees, UMaine

1. David Carter (Capstone, B.S., Marine Science, 2023)
2. Calista Zaenger (Capstone, B.S., Marine Science, 2023)
3. Camille Michaud (Honors thesis, Marine Science)
4. Andi Rudai (Honors thesis, Marine Science)

Undergraduate research advisees, Skidmore College

1. Melanie Feen (B.A., Geosciences, 2016). Data Scientist, Axiom Data Science
2. Emma McCully (B.A., Geosciences, 2016). PhD student, Igneous Petrology, Boise State University.
3. Emily Cheung (B.A., Biology, 2017). Shipboard technician on the *R/V Armstrong* (WHOI)
4. Evan Nitkin (B.A., Geosciences, 2017).
5. Laura Heinlein (B.A., Chemistry, 2019). PhD student, Atmospheric Chemistry, UC Davis.
6. Jared Rose (B.A., Chemistry, 2019). PhD student, Oceanography, Florida State University.
7. Lucy Walker (B.A., Geosciences, 2019).
8. Benjamin Crooke (B.A., Biology, 2021). Naturalist, San Mateo County Office of Education.
9. Katie Pelham (B.A., Chemistry, 2020). PhD student, Chemistry, Massachusetts Institute of Technology.

OUTREACH ACTIVITIES

Oceanography class guest instructor, Lincoln Academy High School, January 2023. "Observing the links between ocean life and the global carbon cycle"

Public presenter, Darling Marine Center Summer Science Seminar series, July 2020. "Untangling the links between ocean life, the global carbon cycle, and future climate"

Public presenter, Saratoga Springs "Science on Tap" series, November 2019. "Adventures at Sea: Finding Out How Ocean Life Affects Earth's Carbon Cycle"

Cruise blog post contributor, 2013-2018. Various expeditions and research vessels.

Contributor, "A Conversation with Dr. Margaret "Meg" L. Estapa: Celebrating 20 Years of Beckman Scholars," Beckman Foundation News. (August 15, 2017)

Guest speaker in short films, podcasts, and online video spots, 2015-2017. Various producers: U.S. Ocean Carbon and Biogeochemistry Program, This is Skidmore podcast, All Things Marine radio show, R/V *Endeavor* YouTube channel.

Volunteer educator: Gulf of Maine Foundation, 2006-2010. Led marine science field trips for K-12 students.

TECHNICAL AND WORKSHOP REPORTS

Buesseler K, Bianchi D, Chai F, Cullen JT, **Estapa M**, Hawco N, John S, McGillicuddy D, Nawaz S, et al. 2023. Paths forward for exploring ocean iron fertilization. Woods Hole Oceanographic Institution, Woods Hole, MA. doi: 10.1575/1912/67120

Cetinić Ivona, Soto Ramos I, and the EXPORTS Science Team (includes **M.L. Estapa**), 2022. EXPORTS Measurements and Protocols for the NE Pacific Campaign. NASA Goddard Space Flight Center. Report No.: TM-2020507358. doi: 10.1575/1912/27968

Chaves, J.E., Cetinić, I., Dall'Olmo, G., **Estapa, M.**, Gardner, W., Goñi, M., Graff, J.R., Hernes, P., Lam, P.J., Liu, Z., Lomas, M.W., Mannino, M., Novak, M.G., Turnewitsch, R., Werdell, P.J., Westberry, T.K., 2021. IOCCG Protocol Series. Particulate Organic Matter Sampling and Measurement Protocols: Consensus Towards Future Ocean Color Missions. IOCCG Ocean Optics and Biogeochemistry Protocols for Satellite Ocean Colour Sensor Validation, Volume 6.0, IOCCG, Dartmouth, NS, Canada. http://dx.doi.org/10.25607/OBP-1646

Estapa, M. L., and Boss, E. 2018. Observing the Biological Carbon Pump with Optical and Imaging Sensors, p. 66. In Rudnick, D., Costa, D., Johnson, K., Lee, C., and Timmermans, M.-L. [eds.], ALPS II – Autonomous Lagrangian Platforms and Sensors. A Report of the ALPS II Workshop, February 21-24, 2017, La Jolla, CA.

Buesseler K.O., Adams A., Bellingham J.G., Dever M., Edgcomb V.P., **Estapa M.L.**, Frank A., Gallager S.M., Govindarajan A.F., Horner T.J., Hunter J., Jakuba M.V., Kapit J., Katija K., Lawson G.L., Lu Y., Mahadevan A., Nicholson D.P., Omand M.O., Palevsky H.I., Rauch C., Sosik H.M., Ulmer K.M., Wurgaft E., Yoerger D.R. Pump it Up workshop report, Oct. 20 2017, Cape Cod, MA.

FIELD DATASETS CONTRIBUTED TO PUBLIC ARCHIVES (as lead PI only)

Estapa, M.L. and Durkin C.A. EXPORTS North Atlantic: Bulk flux determinations from sediment trap deployments in the North Atlantic. SeaWIFS Bio-optical Archive and Storage System (SeaBASS), NASA. 2022. DOI: 10.5067/SeaBASS/EXPORTS/DATA001

Estapa, M.L. and Durkin C.A. EXPORTS North Pacific: Bulk flux determinations from sediment trap deployments in the North Pacific. SeaWIFS Bio-optical Archive and Storage System (SeaBASS), NASA. 2019. DOI: 10.5067/SeaBASS/EXPORTS/DATA001

Estapa, M.L. Sea2Space Campaign: Bulk flux determinations from neutrally buoyant sediment trap (NBST) deployments in the North Pacific. SeaWIFS Bio-optical Archive and Storage System (SeaBASS), NASA. 2019. DOI: 10.5067/SeaBASS/SEA2SPACE/DATA001

Estapa, M.L., K.O. Buesseler, and R. Lampitt. Carbon, Nitrogen, biogenic silica, thorium-234, and mass fluxes from upper ocean sediment traps at the Porcupine Abyssal Plain Sustained Observatory (PAP-SO) site in the Northeast Atlantic Ocean during RRS Discovery cruise DY077 in April of 2017. 2019. DOI: 10.1575/1912/bco-dmo.765835.3

Estapa, M.L. and K.O. Buesseler. Carbon and nitrogen flux measurements from the Sargasso Sea from 2013-2014. Biological and Chemical Oceanography Data Management Office. 2018. DOI: 10.1575/1912/bco-dmo.734344

Estapa, M.L. and K.O. Buesseler. Float park phase data collected at depth in the Sargasso Sea from 2013-2014.. Biological and Chemical Oceanography Data Management Office. 2018. https://doi.org/10.1575/1912/bco-dmo.734334

Estapa, M.L. and K.O. Buesseler. Float profile data collected during surface ascents in the Sargasso Sea from 2013-2014. Biological and Chemical Oceanography Data Management Office. 2018. https://doi.org/10.1575/1912/bco-dmo.734339

Estapa, M.L. and K.O. Buesseler. Factory and field calibration data for float oxygen, beam transmission, backscatter, chlorophyll fluorescence and CDOM sensors from the Sargasso Sea from 2013-2014. Biological and Chemical Oceanography Data Management Office. 2018. https://doi.org/10.1575/1912/bco-dmo.734349

SERVICE

University of Maine

Committee member, Darling Marine Center Director Search, 2023-present.
Committee member, Darling Marine Center Program Manager Search, 2023.
Institutional Representative for UMaine, University-National Oceanographic Laboratory System, 2022-present.
Member, School of Marine Sciences' Graduate Admissions Committee, 2022-present.
Member, School of Marine Sciences' Ad Hoc Committee on Diversity, Equity, and Inclusion, 2022-present
Member, School of Marine Sciences' Unlearning Racism in the Geosciences (URGE) Pod, 2021.
Member, School of Marine Sciences undergraduate curriculum revision working group.

Skidmore College

Committee member for visiting faculty searches in solid-Earth geosciences, 2019 and 2020.
Skidmore Analytical Interdisciplinary Laboratory steering committee member, 2017-2020
Committee member for departmental self-study, 2017-2018

Geosciences departmental representative for Center for Integrated Sciences building planning, 2016-2017 and 2018-2020.
Committee member for 2016-2017 tenure-track faculty search in solid-Earth geosciences

External to institution
Co-lead, Northeast Regional Node, Ocean Carbon and Biogeochemistry mCDR Working Group, 2023-present
Member, Biogeochemical Argo Technology Task Team, 2023-present
Session convener, Ocean Sciences Meetings 2018, 2020, 2023.
Discussion leader, ExOIS Ocean Iron Fertilization Field Experiment Planning workshop, Moss Landing, CA, May 2023.
Member, Exploring Ocean Iron Solutions (ExOIS), 2022-present.
Participant, Marine Carbon Dioxide Removal: Essential Science and Problem Solving for Measurement, Reporting, and Verification Workshop, U.S. Ocean Carbon & Biogeochemistry, September 2022.
Member, Joint ICES-PICES Working Group on Ocean Negative Carbon Emissions (ONCE), 2021-present
Export Pathways Working and Synthesis Group lead, NASA EXPORTS Science Team, 2018-2022.
U.S. Biogeochemical Argo subcommittee member, 2017-2021.
Science Planning Team member and invited DISCO 2010 representative for NSF Chemical Oceanography MEeting: A BOttom-up Approach to Research Directions, 2017.
Member of EXPORTS Science Definition Team, NASA Ocean Biology and Biogeochemistry, Sept. 2015-2016.
WHOI Postdoctoral Association departmental representative, 2012-2013.
Reviewer of manuscripts and proposals for: *Biogeosciences; Deep-Sea Research I; Environmental Science: Process and Impacts; Geophysical Research Letters; Global Biogeochemical Cycles; Journal of Geophysical Research – Oceans; Limnology and Oceanography; Limnology and Oceanography: Methods; Nature Communications; Nature Geosciences*; NSF Biological Oceanography, Chemical Oceanography, Ocean Technology and Interdisciplinary Coordination, Office of Polar Programs, and Postdoctoral Research Fellowship program; and NASA Ocean Biology and Biogeochemistry and Carbon Cycle Science.

PRESENTATIONS (as lead author only)
Estapa, M.L. Evaluation of particle size proxies from biogeochemical profiling floats. Chemical Oceanography Gordon Research Conference, Manchester, NH, July 2023.
Estapa, M.L. What do backscattering profiles from Biogeochemical Argo floats tell us about global variability in particle size? (invited). University of California, Santa Cruz Ocean Sciences seminar series, May 2023.
Estapa, M.L. Evaluating optical proxies for sinking particle flux in the ocean. Monterey Bay Aquarium Research Institute Brown Bag seminar, May 2023.
Estapa, M.L. Evaluating optical proxies for sinking particle flux in the ocean. Bigelow Laboratory for Ocean Sciences seminar series, April 2023.
Estapa, M.L. Evaluating optical proxies for sinking particle flux in the ocean. University of Maine School of Marine Sciences seminar series, February 2023.

Estapa, M.L., C. Durkin, C. Huffard, M. Omand, S. O'Neill, W. Slade. Sinking particulate carbon flux from optical sediment traps. Poster presented at ARPA-E SEA-CO2 teaming meeting, Washington, DC, January 2023.

Estapa, M.L. Evaluating optical proxies for sinking particle flux in the ocean. (invited). University of Connecticut Marine Sciences seminar series. November 2022.

Estapa, M.L., C. Durkin, M. Omand, W. Slade. An updated method for optical sediment trap measurements of sinking POC flux. Poster presented at Ocean Carbon and Biogeochemistry Summer Workshop, Woods Hole, MA, June 2022.

Estapa, M.L., K. Buesseler, C. Durkin, M. Omand, A. Bodel, S. Clevenger, J. Drysdale, R.P. Kelly, S. O'Neill, S. Pike, M. Roca-Martí. Contrasting export pathways from sediment trap measurements during EXPORTS North Atlantic and North Pacific field campaigns. Talk presented at Ocean Sciences Virtual Meeting, February 2022.

Estapa, M.L. and Synthesis Working Group 1 Team. Preliminary and expected results from the North Atlantic. NASA EXPORTS Science Team meeting plenary, November 2021.

Estapa, M.L. Variability in sinking particle flux from optical sediment traps during EXPORTS. (invited). NASA Ocean Ecology Laboratory Seminar, December 2020.

Estapa, M.L., K. Buesseler, C. Durkin, M. Omand, C. Benitez-Nelson, E. Breves, P. Kelly, S. Pike, M. Roca-Martí. Biogenic particle fluxes during EXPORTS at Ocean Station Papa. EXPORTS Results Webinar series, June 2020.

Estapa, M.L. Diagnosing Export Pathways in the Biological Pump: Sediment Trap Data from the EXPORTS North Pacific Field Campaign. Poster presented at Ocean Sciences Meeting, San Diego, CA, February 2020.

Estapa, M.L., Diagnosing Export Pathways in the Biological Pump: New Data from the EXPORTS North Pacific Field Campaign. Goldschmidt Conference, Barcelona, Spain, August 2019.

Estapa, M.L., Diagnosing Export Pathways in the Biological Pump: New Data from the EXPORTS North Pacific Field Campaign. (invited). Chemical Oceanography Gordon Research Conference, Holderness, NH, July 2019.

Estapa, M., Ken Buesseler, Colleen Durkin, Melissa Omand, Annie Bodel, Elly Breves, Jessica Drysdale, Melanie Feen, Pat Kelly, Steve Pike, Montserrat Roca-Martí, Kaitlyn Tradd, Jim Valdes. Linking sinking particle chemistry and biology with changes in the magnitude and efficiency of carbon export into the deep ocean. EXPORTS Science Team Meeting, Williamsburg (VA), May 5 to May 10, 2019.

Estapa, M.L., Omand, M.M., and Durkin C.A. Episodic Particle Flux: A Sampling Artifact? Ocean Carbon and Biogeochemistry Summer Workshop, Woods Hole, MA, June 2019.

Estapa, M.L., "Direct Observations of Biological Carbon Export From Profiling Floats in the Subtropical North Atlantic" (invited), School of Marine Sciences Seminar Series, University of Maine, Orono, ME, March 2018.

Estapa, M.L., C.A. Baker, L. Heinlein*, L. Walker*, M. Iversen, R. Lampitt, K. Buesseler. Are all sediment traps created equal? Preliminary results of an intercomparison study. Poster presentation at Ocean Sciences Meeting, Portland, OR, February 2018.

Estapa, M., Durkin, C., Omand, M., Iverson, M., Cetinic, I, Lampitt, R.,Buesseler, K. Optical attenuance-based measurements of sinking carbon particles: Are differenct detectors quantifying the same thing? Poster presentation at the Gordon Research Conference on Chemical Oceanography, Colby-Sawyer College, New London, NH, July 2017.

Estapa, M.L., "Ocean biogeochemistry from autonomous platforms" (invited). 2nd Autonomous and Lagrangian Platforms and Sensors meeting (ALPS-II), La Jolla, CA, February 2017.

Estapa, M.L., et al (EXPORTS Science Definition Team), "The EXPORTS Implementation Plan." Oral presentation, Ocean Carbon and Biogeochemistry Summer Workshop, Woods Hole, MA, July 2016.

Estapa, M.L., Durkin, C.A., Buesseler, K.O., and McGillicuddy, D.M., "Spatiotemporal variability in particulate carbon export observed using bio-optical profiling floats." Ocean Sciences Meeting, New Orleans, LA, February 2016.

Estapa, M.L, Buesseler, K.O., and McGillicuddy, D.M., "A year-long record of particulate carbon export and net primary production from profiling floats in the Sargasso Sea." Ocean Carbon and Biogeochemistry Summer Workshop, Woods Hole, MA, July 2015.

Estapa, M.L, "A year-long record of particulate carbon export and net primary production from profiling floats in the Sargasso Sea." Joint meeting of the International Ocean Color Coordinating Group and the NASA Ocean Color Research Team, San Francisco, CA, June 2015.

Estapa, M.L., Durkin, C. A., Buesseler, K. O., "Carbon flux from bio-optical profiling floats: calibrating transmissometers for use as optical sediment traps." Ocean Optics XXII, Portland, ME, October 2014.

Estapa, M. L., "Carbon Flux from Bio-Optical Profiling Floats: A Side-by-Side Comparison to Neutrally-Buoyant Sediment Traps." Cornell University Biological Field Station seminar series, Bridgeport NY, June 2014.

Estapa, M.L., C.A. Durkin, J. Valdes, K.O. Buesseler, "Interpretation of particulate carbon flux data from bio-optical profiling floats at BATS." Ocean Sciences Meeting, Honolulu, HI, February 2014.

Estapa, M. L., "Carbon Flux from Bio-Optical Profiling Floats: A Side-by-Side Comparison to Neutrally-Buoyant Sediment Traps." Bermuda Institute for Ocean Science seminar series, St. George, Bermuda, October 2013.

Estapa, M.L., K. Buesseler, E. Boss, G. Gerbi. "Rapid, autonomous particle flux observations in the oligotrophic ocean." ASLO Aquatic Sciences Meeting, New Orleans, LA, February 2013.

Estapa, M. L., "Autonomous, high resolution particle flux observations in the oligotrophic ocean." School of Marine Sciences, University of Massachusetts, Dartmouth, New Bedford, MA, December 2012.

Estapa, M.L., "An exploration of photochemistry in the coastal ocean" (*invited*), Skidmore College, Departments of Chemistry and Geosciences, March 2012.

Estapa, M.L., E. Boss, C.S. Roesler, B.A. Schaeffer. "Suspended sediment concentration and optical property observations of mixed-turbidity, coastal waters through multispectral ocean color inversion." Ocean Sciences Meeting, Salt Lake City, UT, February 2012.

Estapa, M. L., "Photochemical reactions of particulate organic carbon - implications for coastal carbon cycling." Woods Hole Oceanographic Institution, Marine Chemistry and Geochemistry departmental seminar, January 2012.

Estapa. M.L., L.M. Mayer, E. Boss. "Photochemical generation of DOC from suspended sediments in Louisiana" (*invited*). ASLO Aquatic Sciences Meeting, San Juan, PR, February 2011.

Estapa, M.L., "Filling the gaps in regional carbon budgets" (*invited*), Bates College, Departments of Chemistry and Geology, November 2010.

Estapa, M.L. "Photochemical reactions of marine particulate organic carbon". Dissertations in Chemical Oceanography Symposium, Honolulu, HI, October 2010.

Estapa, M.L., E. Boss, L.M. Mayer. "Role of iron in mass-specific absorption of particulate matter from Louisiana coastal waters". Ocean Optics Conference, Anchorage, AK, September 2010. Awarded Honorable Mention for Best Student Paper.

Estapa, M.L., E. Boss, L.M. Mayer, 2010. "An optical model for predicting rates of particle-hosted photoreactions". NASA Ocean Color Research Team Meeting, New Orleans, LA, May 2010.

Estapa, M.L., L.M. Mayer, E. Boss, 2010. "Photochemical POC dissolution in coastal Louisiana: A framework for estimation of in-situ rates". Ocean Sciences Meeting, Portland OR, February 2010.

Estapa, M.L., L.M. Mayer, E. Boss, 2009. "POC photodissolution: Apparent quantum yield and temperature dependence". Gordon Conference in Chemical Oceanography, Tilton, NH, August 2009

Estapa, M.L. "Inherent optical properties of suspended sediments in rivers and coastal margins: Towards modeling turbid-water photochemistry from space". NASA Ocean Color Research Team Meeting, New York City, NY, May 2009.

Estapa, M.L., L.M. Mayer, E. Boss, 2008. "The Role of Organic Carbon in Absorption Properties of Louisiana Shelf Suspended Particulate Matter". American Geophysical Union fall meeting, San Francisco, CA, December 2008.

Estapa, M.L., L.M. Mayer, E. Boss, 2008. "Photoremineralization of particulate organic carbon." Ocean Sciences Meeting, Orlando FL, March 2008.

Estapa, M.L., L.M. Mayer, E. Boss, 2007. "Oxygen and the Photodissolution of Shallow Coastal Suspended Sediments and Phytoplankton Detritus". Gordon Conference in Chemical Oceanography, Tilton, NH, August 2007.

Estapa, M.L., E.S. Boss, L.M. Mayer, 2006. "Absorption Changes Associated with CDOM Repartitioning in a Sediment-River Water Suspension". Ocean Optics Conference, Montreal, Quebec, October 2006. Awarded Honorable Mention for Best Student Paper.

STUDENT PRESENTATIONS (lead presenter is a student advisee)

Clark, M. and **M.L. Estapa.** "The Biological Carbon Pump's Contribution to the Vertical Transport of Microplastics". Chemical Oceanography Gordon Research Conference, Manchester, NH, July 2023.

Pelham, K., **M.L. Estapa,** C.A. Baker, R.S. Lampitt, K.O. Buesseler. "A method-to-method comparison for direct determination of particulate inorganic carbon fluxes in sediment trap samples". Ocean Sciences Meeting, San Diego, CA, February 2020.

CRUISE EXPERIENCE

Coastal Maine estuaries, R/V *Ira C. Darling*, bio-optical properties, radiometry, CTD casts, net tows. July 2011, August 2021, July 2023, Fall 2022-2023 (>10 days)

Northeast Atlantic (Porcupine Abyssal Plain observatory), RRS *James Cook*, deployments of neutrally-buoyant and surface-tethered sediment traps, optical and chemical characterization of sinking particles, May 2021 (31 days)

Subarctic North Pacific, R/V *Revelle*, deployments of neutrally-buoyant and surface-tethered sediment traps, optical and chemical characterization of sinking particles, August-September 2018 (33 days)

Northeast Atlantic (Porcupine Abyssal Plain observatory), RRS *Discovery*, deployments of neutrally-buoyant sediment traps and optical characterization of sinking particles, April 2017 (18 days)

New England shelf/slope, R/V *Endeavor*, deployments of neutrally-buoyant sediment traps and optical characterization of sinking particles, November 2015, June 2016, March 2018 (15 days total)

Sargasso Sea, R/V *Atlantic Explorer,* deployments of autonomous profiling floats and neutrally-buoyant sediment traps, July-October 2013, March 2014, January 2018 (34 days total)

Subtropical North Pacific, R/V *Falkor*, deployments of neutrally-buoyant sediment traps and optical characterizaton of sinking particles, January-February 2017 (26 days)

Mid-Cayman Rise, R/V *Falkor*, characterization of optical properties of hydrothermal plume particles, June 2013 (19 days)

Sargasso Sea, R/V *Atlantic Explorer*, biogeochemical characterization of particles and export at submesoscales, September-October 2012 and September-October 2013 (40 days total)

Sargasso Sea, R/V *Atlantic Explorer,* measurements of particle size-property relationships, June and July 2012 (10 days total)

Sargasso Sea, R/V *Atlantic Explorer*, biogeochemical characterization of particles and export at submesoscales, September-October 2011 (23 days)

Coastal Louisiana, R/V *Pelican* and *Acadiana*, bio-optical properties, carbon, and total suspended mass measurements, March 2008 (8 days)

Coastal Louisiana, R/V *Pelican* and *Acadiana*, bio-optical properties, carbon, and total suspended mass measurements, February 2008 (8 days)

Subtropical N. Atlantic, Caribbean, Tropical Pacific, SSV *Westward, Corwith Cramer, and Robert C. Seamans*, CTDs, nutrient and chlorophyll analysis, zooplankton sampling, June 2001-August 2005 (over 600 days).

PROFESSIONAL AFFILIATIONS

Association for the Sciences of Limnology and Oceanography, American Geophysical Union