

JESSICA Y. LUO

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EDUCATION

Ph.D.	University of Miami , Miami, FL Rosenstiel School of Marine & Atmospheric Sciences Division of Marine Biology and Fisheries Major Professor: Robert K. Cowen	2015
M.S.	Stanford University , Stanford, CA Department of Geological and Environmental Sciences Major Professor: Adina Paytan	2007
B.A.	Stanford University , Stanford, CA Program in Human Biology	2007

PROFESSIONAL EXPERIENCE

Research Oceanographer (ZP-03) Geophysical Fluid Dynamics Laboratory (GFDL) National Oceanic and Atmospheric Administration	2019 - present
Postdoctoral Fellow National Center for Atmospheric Research (NCAR) Climate and Global Dynamics Division, Oceanography Section Postdoctoral supervisor: Matthew Long	2016 – 2019
Postdoctoral Scholar Oregon State University, Hatfield Marine Science Center, Plankton Ecology Lab Postdoctoral supervisors: Robert K. Cowen and Su Sponaugle	2016
Graduate Research Assistant University of Miami, Rosenstiel School of Marine and Atmospheric Sciences	2010 – 2015
Ocean Education and Outreach Coordinator National Park Service, Point Reyes National Seashore	2008 – 2010
Research Assistant Stanford University, Department of Geological and Environmental Sciences	2005 – 2007

PUBLICATIONS

Manuscripts in preparation or in review

1. Drenkard EJ, John JG, Stock CA, Lim HG, Dunne JP, Ginoux P, **Luo JY**. Modeled Impact of Dynamic Dust Deposition on Pacific Ocean Biogeochemistry. *Geophysical Research Letters*, in revision.

2. **Luo JY**, Stock CA, Dunne JP, Saba GK, Cook L. Ocean biogeochemical fingerprints of fast sinking tunicate and fish detritus. *Geophysical Research Letters*, **in prep.**
3. Panaïotis T, Biard T, Caray-Couin L, Faillettaz R, **Luo JY**, Guigand CM, Cowen RK, Irisson J-O. High throughput in situ imaging reveals complex ecological behavior of giant mixotrophic protists. *Proceedings of the National Academy of Sciences*, **in prep.**
4. Negrete-Garcia G, **Luo JY**, Long MC, Stock CA, Petrik CM, Manizza M, Barton AG. Changes in plankton community structure and trophic dynamics on seasonal to interannual timescales throughout the Arctic Ocean. *Biogeosciences*, **in prep.**
5. Hagstrom GI, Stock CA, **Luo JY**, Levin SA. Impact of dynamic phytoplankton stoichiometry on global scale patterns of nutrient limitation, nitrogen fixation, and carbon export. *Global Biogeochemical Cycles*, **in prep.**

Peer-reviewed publications

1. Millette NC, Gast R, **Luo JY**, Moeller H, Stamieszkin K, Andersen KH, Brownlee E, Cohen N, Duhamel S, Dutkiewicz S, Glibert P, Johnson M, Leles SG, Maloney A, McManus G, Poulton N, Princiotta S, Sanders R, Wilken S. (2023) Mixoplankton and Mixotrophy: Future Research Priorities. *Journal of Plankton Research*, **45**, 576-596. <https://doi.org/10.1093/plankt/fbad020>
2. Greer AT, Schmid MS, Duffy PI, Robinson KL, Genung MA, **Luo JY**, Panaïotis T, Briseño-Avena C, Frischer M, Sponaugle S, Cowen RK. (2022) In situ imaging across ecosystems to resolve the fine-scale oceanographic drivers of a globally significant planktonic grazer. *Limnology and Oceanography*, **68**, 192-207. <https://doi.org/10.1002/lno.12259>
3. Petrik CM, **Luo JY**, Heneghan RF, Everett JD, Harrison CS, Richardson AJ. (2022) Assessment of mesozooplankton in CMIP6 Earth system models and their climate change constraining relationship with chlorophyll. *Global Biogeochemical Cycles*, **36**, e2022GB007367. <https://doi.org/10.1029/2022GB007367>
4. Negrete-Garcia G*†, **Luo JY**†, Long MC, Lindsay K, Levy M, Barton AG. (2022) Plankton energy flows using a global size-structured and trait-based model. *Progress in Oceanography*, **209**, 102898. <https://doi.org/10.1016/j.pocean.2022.102898>
†authors contributed equally to this manuscript.
*graduate student mentee
5. **Luo JY**, Stock CA, Henschke N, Dunne JP, O'Brien TD. (2022) Global ecological and biogeochemical impacts of pelagic tunicates. *Progress in Oceanography*, **205**, 102822. <https://doi.org/10.1016/j.pocean.2022.102822>
6. Long MC, Moore JK, Lindsay K, Levy M, Doney SC, **Luo JY**, Krumhardt KM, Letscher RT, Grover M, and Sylvester ZT. (2021) Simulations with the Marine Biogeochemistry Library (MARBL). *Journal of Advances in Modeling Earth Systems*, **13**, e2021MS002647, <https://doi.org/10.1029/2021MS002647>
7. Robinson KL, Sponaugle S, **Luo JY**, Gleiber M, and Cowen RK. (2021) Fine- to coarse- scale patches are more frequent and larger in continental than oceanic waters across plankton phyla. *Science Advances*, **7**:47, eabk2904, <https://doi.org/10.1126/sciadv.abk2904>
8. Kearney KA, Bograd S, Drenkard E, Gomez F, Haltuch M, Hermann A, Holsman K, Jacox M, Kaplan I, Koenigstein S, **Luo JY**, Masi M, Muhling B, Pozo Buil M, and Woodworth-Jefcoats PA. (2021) Using global-scale earth system models for regional fisheries applications. *Frontiers in Marine Science*, **8**:622206. <https://doi.org/10.3389/fmars.2021.622206>
9. Harrison CS, **Luo JY**, Putman N, Li Q, Sheevam P, Krumhardt K, Stevens J, and Long MC. (2021) Identifying global favourable habitat for early juvenile loggerhead sea turtles. *Journal of the Royal Society Interface*, **18**: 20200799. <https://doi.org/10.1098/rsif.2020.0799>

10. **Luo JY**, Condon RH, Stock CA, Duarte CM, Lucas CH, Pitt KA, and Cowen RK. (2020) Gelatinous zooplankton facilitate substantial carbon export in the global oceans: a modeling study. *Global Biogeochemical Cycles*, 34, e2020GB006704. <https://doi.org/10.1029/2020GB006704> *Journal cover
11. S  f  rian, R, Berthet S, Yool A, Palmi  ri J, Bopp L, Tagliabue A, Kwiatkowski L, Aumont O, Christian J, Dunne J, Gehlen M, Ilyina T, John JG, Li H, Long MC, **Luo JY**, Nakano H, Romanou A, Schwinger J, Stock C, Santana-Falc  n Y, Takano Y, Tjiputra J, Tsujino H, Watanabe M, Wu T, Wu F, and Yamamoto A. (2020) Tracking improvement in simulated marine biogeochemistry between CMIP5 and CMIP6. *Current Climate Change Reports*. 6:95-119. <https://doi.org/10.1007/s40641-020-00160-0>
12. Krumhardt, KM, Lovenduski NS, Long MC, **Luo JY**, Lindsay K, Yeager S, and Harrison C. (2020) Potential predictability of net primary productivity in the ocean. *Global Biogeochemical Cycles*, 34, e2020GB006531. <https://doi.org/10.1029/2020GB006531> *Journal cover
13. Schimd MS, Cowen RK, Robinson K, **Luo JY**, Brise  o-Avena C, and Sponaugle S. (2020) Prey and predator overlap at the edge of a mesoscale eddy: fine-scale, in-situ distributions to inform our understanding of oceanographic processes. *Scientific Reports*, 10:921, <https://doi.org/10.1038/s41598-020-57879-x>
14. Cordero-Quir  s N, Miller A, Subramanian AC, **Luo JY**, and Capotondi A. (2019) Composite physical-biological El Ni  o and La Ni  a conditions in the California Current System in CESM1-POP2-BEC. *Ocean Modelling*, 142:101439, <https://doi.org/10.1016/j.ocemod.2019.101439>
15. **Luo JY**, Irisson J-O, Graham B, Guigand C, Sarafraz A, Mader C, and Cowen RK. (2018) Automated plankton image analysis using convolutional neural networks. *Limnology and Oceanography: Methods*, 16(12):814-827. <https://doi.org/10.1002/lom3.10285>
16. Durden J, **Luo JY**, Alexander H, Grossman L, and Flanagan A. (2017) Integrating Big Data into aquatic ecology: Challenges and opportunities. *Limnology and Oceanography Bulletin*, 26(4):101-108. <https://doi.org/10.1002/lob.10213>
17. Greer AT, Chiaverano L, **Luo JY**, Cowen RK, and Graham M. (2017) Ecology and behaviour of holoplanktonic scyphomedusae and their interactions with larval and juvenile fishes in the northern Gulf of Mexico. *ICES Journal of Marine Science*, 75(2):751-763. <https://doi.org/10.1093/icesjms/fsx168>
18. Robinson KL, **Luo JY**, Sponaugle S, Guigand C, and Cowen RK. (2017) A tale of two crowds: Public engagement in plankton classification. *Frontiers in Marine Science*, 4:82. <https://doi.org/10.3389/fmars.2017.00082>
19. Faillettaz R, Picheral M, **Luo JY**, Guigand C, Cowen RK, and Irisson J-O. (2016) Imperfect automatic image classification successfully describes plankton distribution patterns. *Methods in Oceanography*, 15-16:60-77. <https://doi.org/10.1016/j.mio.2016.04.003>
20. **Luo JY**, Grassian B**, Tang D, Irisson J-O, Greer AT, Guigand CG, and Cowen RK. (2014) Environmental drivers of fine-scale distributions of the gelatinous zooplankton community across a mesoscale front. *Marine Ecology Progress Series*, 510:129-149. <https://doi.org/10.3354/meps10908>.
21. McClatchie S, Cowen R, Nieto K, Greer A, **Luo JY**, Guigand C, Demer D, Griffith D, and Rudnick D. (2012) Resolution of fine biological structure including small narcomedusae across a front in the Southern California Bight. *Journal of Geophysical Research*, 117, C04020, <https://doi.org/10.1029/2011JC007565>.

*graduate student mentee; **undergraduate mentee

Datasets, Software, and Non-referred publications

1. Schmid MS, Daprano D, Jacobson KM, Sullivan C, Briseño-Avena C, **Luo JY**, and Cowen RK. (2021). A Convolutional Neural Network based high-throughput image classification pipeline - code and documentation to process plankton underwater imagery using local HPC infrastructure and NSF's XSEDE (1.0.0). *Zenodo*. <https://doi.org/10.5281/zenodo.4641158>
2. Kelly PT, Bell T, and others (2017) Ecological Dissertations in the Aquatic Sciences (Eco-DAS): An effective networking and professional development opportunity for early career aquatic sciences. *Limnology and Oceanography Bulletin*, 26: 25–30. <https://doi.org/10.1002/lob.10180>
3. Cowen RK, Sponaugle S, Robinson KL, **Luo JY**. (2015) PlanktonSet 1.0: Plankton imagery data collected from F.G. Walton Smith in Straits of Florida from 2014-06-03 to 2014-06-06 and used in the 2015 National Data Science Bowl (NCEI Accession 0127422). NOAA National Centers for Environmental Information. Dataset. <https://doi.org/10.7289/v5d21vjd>

INVITED TALKS

1. UCLA, Ocean Biogeochemistry and Ecosystems Group Seminar. 2023
2. Plenary, Ocean Carbon and Biogeochemistry (OCB), *Fish, Fisheries, and Carbon workshop*. 2023.
3. University of Maryland Center for Environmental Science (UMCES) Horn Point Laboratory, *Fall Seminar Series*. 2022.
4. Rutgers University, Department of Marine and Coastal Sciences, *Fall Seminar Series*. 2022.
5. Ecological and biogeochemical constraints on pelagic tunicate carbon export, Ocean Carbon and Biogeochemistry (OCB), *Summer Workshop*. 2022.
6. Scripps Institute of Oceanography, *Scripps Ecology Seminar*. 2022.
7. Northern Arizona University, *Ecoinformatics Seminar Series*. 2022.
8. Keynote, *2nd Early Career Symposium on Marine Biogeochemical Modeling*. 2021.
9. Developing PSSdb: a Pelagic Size Structure database to support biogeochemical modeling. *ASLO Aquatic Sciences Meeting*. 2021
10. Joint Exploration of the Twilight Zone Ocean Network (JETZON) webinar series, 2020.
11. Princeton University, Department of Geosciences, *Climate Seminar Series*. 2019
12. Integrating plankton observations and models: implications for ecological forecasting. *U.S. CLIVAR Summit*, 2019.
13. NOAA Geophysical Fluid Dynamics Laboratory. 2018.
14. University of Colorado - Boulder, Ecology and Evolutionary Biology, *Brown Bag Seminar Series*. 2016
15. Oregon State University, *Integrative Biology Fall Seminar Series*, 2015
16. Imaging Jellyfish in the Oceans. Sharing the Coast conference. *Oregon Sea Grant*. 2015.

CONTRIBUTED TALKS (SELECTED)

1. **Luo JY**, Stock CA, Dunne JP, Henschke N, O'Brien TD. Global scale ecological and biogeochemical impacts of pelagic tunicates. *5th Workshop on Trait-based Approaches to Marine Life*. Knoxville, TN. 2022.
2. **Luo JY**, Stock CA, Dunne JP. Global ecological and biogeochemical impacts of pelagic tunicates: a modeling study. *Ocean Sciences Meeting*. San Diego, CA. 2020.

3. **Luo JY**, Long MC, Lindsay K, Levy MN. Investigating marine food-web dynamics in the Community Earth System Model (CESM). *4th International Symposium on the Effects of Climate Change on the World's Oceans*. Washington, D.C. 2018.
4. **Luo JY**, Long MC, Lindsay K, Levy MN. Size-structured and trait-based plankton modeling in the Community Earth System Model (CESM). *Ocean Sciences Meeting*. Portland, OR. 2018.
5. **Luo JY**, Grassian B, Tang D, Irisson J-O, Greer AT, Guigand CM, McClatchie S, Cowen RK. Environmental drivers of the fine-scale distribution of a gelatinous zooplankton community across a mesoscale front. *International Council for the Exploration of the Seas (ICES) Annual Science Meeting*. A Coruña, Spain. 2014. ****Won Best Oral Presentation by an Early Career Scientist**
6. **Luo JY**, Grassian B, Greer AT, Guigand C, Irisson J-O, McClatchie S, Cowen RK. Fine scale distribution of gelatinous zooplankton across a front in the Southern California Bight. *4th International Jellyfish Blooms Symposium*. Hiroshima, Japan. 2013.

SELECTED POSTERS

1. **Luo JY**, Robinson KL, Sponaugle S, Cowen RK. Development of a mesozooplankton community along a dynamic current: insights from a Lagrangian towed plankton imager. *Ocean Sciences Meeting*. 2018.
2. **Luo JY** and Long MC. Modeling oxygen-driven shifts in ecosystem composition. *Trait-based approaches to marine life*. 2017.
3. **Luo JY**, Condon RH, Cowen RK. Gelatinous animals facilitate carbon export in the global oceans. *Ocean Sciences Meeting*. 2016.
4. **Luo, JY**, Grassian B, Tang D, Irisson J-O, Greer AT, Guigand CM, McClatchie S, Cowen RK. Environmental drivers of the fine-scale distribution of a gelatinous zooplankton community across a small-scale front. *Ocean Sciences Meeting*. 2014.
5. **Luo J**, Paytan A, Al-Najjar, T. Using Carbon and Nitrogen Stable Isotopes and Trace Metal Concentrations in Zooplankton to Determine Seasonal and Anthropogenic Influences in the Gulf of Aqaba, Red Sea. *AGU Fall Meeting*. 2007.

HONORS AND AWARDS

- Eco-DAS XII (Ecological Dissertations in the Aquatic Sciences), invited participant
- Best Oral Presentation by an Early Career Scientist
International Council for the Exploration of the Seas (ICES) 2014 Annual Science Meeting
- National Science Foundation (NSF) Graduate Research Fellowship
- University of Miami Robert C. Maytag Fellowship

GRANTS, PROPOSALS, and FELLOWSHIPS

(Total: \$2.442M)

1. "Developing a coupled benthic-pelagic biogeochemical model to evaluate the effectiveness of mCDR interventions," NOAA NOPP/Ocean Acidification Program. 2024-2028. Co-lead PI: Luo
2. Benthic Ecosystems and Carbon Synthesis (BECS) working group, Ocean Carbon and Biogeochemistry (OCB) Program. 2022-2025. Co-lead PI: Luo
3. "Developing PSSdb: a Pelagic Size Structure database to support biogeochemical modeling," NOAA Climate Program Office, 2021-2024, Lead PI: Luo
4. Mixotrophs and Mixotrophy Working Group, Ocean Carbon and Biogeochemistry (OCB) Program, 2020-2023. Co-lead PI: Luo

5. “Dynamic Elemental Stoichiometry in COBALT,” Cooperative Institute for Modeling the Earth System, Princeton University, 2020-2021, PI George Hagstrom (Luo: Co-PI)
6. “Eddy effects on the ocean biological pump,” National Science Foundation, 2020-2023, PI Laure Resplandy. (Luo: Collaborator and Proposal Co-writer)
7. “Dynamic Nutrient Stoichiometry in COBALT,” Cooperative Institute for Modeling the Earth System, Princeton University, 2019-2020, PI George Hagstrom (Luo: Co-PI)
8. National Science Foundation (NSF) Graduate Research Fellowship. 2010-2015.
9. Robert E. Maytag Fellowship, University of Miami. 2010-2015.
10. Data Science for Social Good: 1st Annual National Data Science Bowl. Prize sponsorship and competition support. Booz Allen Hamilton. 2014-2015.
11. International Council for the Exploration of the Seas (ICES) Annual Science Meeting, Conference Travel and Best Oral Presentation Award. 2014.
12. Partner University Fund, coursework and research support at the University of Pierre and Marie Curie (UPMC), Villefranche-sur-Mer, France. 2013.
13. Ten grants funding aquatic sciences education and outreach at Point Reyes National Seashore, National Park Service, 2008 – 2010. (\$310,000)
14. “Assessing Anthropogenic Influences on Phytoplankton Nutrient Dynamics using Zooplankton Tows in the Gulf of Aqaba, Red Sea.” Stanford University McGee grant. 2006.
15. Five research grants / fellowships, Stanford University. 2004-2006.

PROFESSIONAL ACTIVITIES

Conference session convening:

- *New insights into submesoscale ocean biogeochemistry*
2022 Ocean Sciences Meeting 2022
- *Advances in Coupled Physical-Biogeochemical Modeling: Regional to Global Scales* (Primary chair)
2020 Ocean Sciences Meeting, San Diego CA. 2020
- *(Sub)mesoscale Physical/Biogeochemical Interactions*
2020 Ocean Sciences Meeting, San Diego CA. 2020
- *Physical-biogeochemical interactions across scales: From microscale to mesoscale.*
2018 Ocean Sciences Meeting, Portland OR. 2018
- *Machine learning in biological oceanography.*
2018 Ocean Sciences Meeting, Portland OR. 2018
- *Big data in marine ecology* (Primary chair).
2016 Ocean Sciences Meeting, New Orleans LA. 2016

Professional committees:

- Scientific Steering Committee, Ocean Carbon and Biogeochemistry (OCB), 2023-present
- Benthic Ecosystems and Carbon Synthesis (BECS) co-chair, Ocean Carbon and Biogeochemistry, 2023-present
- Mixotrophs and Mixotrophy Working Group co-chair, Ocean Carbon and Biogeochemistry, 2020-2023
- Steering Committee, 37th Annual Larval Fish Conference, Miami, FL. 2013.

Reviewer for Atmosphere, Global Biogeochemical Cycles, Global Change Biology, Hydrobiologica, ICES Journal of Marine Science, JGR – Biogeosciences, Journal of Marine Systems, Limnology &

Oceanography, Limnology & Oceanography Methods, Marine Ecology Progress Series, Nature, Nature Geoscience, Scientia Marina. NOAA B-WET Program, NSF Biological Oceanography.

Review panelist member for NASA FINESST Program.

EDUCATION AND OUTREACH

Research Supervision and Mentorship

- Marco Corrales, Postdoctoral scholar, Princeton University 2022-present
- Jessica Carriere-Garwood, Postdoctoral scholar, Princeton University 2021-2022

- Mathieu Poupon, Ph.D. student, Princeton University 2022-present
- Gabriele Negrete-Garcia, Ph.D. student, Scripps Institute of Oceanography 2020-present

- Evren Arif, AGILE intern, Tufts University 2023-present
- Isabela Rios, Hollings Scholar, NOAA/GFDL 2020
- Quiana Berry, CIMES summer intern, Princeton University 2020
- Jamin Rader, SOARS summer intern, UCAR 2017 – 2018
- Chase Cobb, Summer REU internship, Oregon State University 2014
- Ben Grassian, Senior Thesis, University of Miami 2012 – 2014
- Jenna Binstein, Senior Thesis, University of Miami 2012 – 2013

- Interns and research techs (6), Oregon State University & University of Miami 2011 – 2016
- Science communication interns (5), National Park Service 2008-2010

Plankton Portal

2012 – 2017

- Co-developed online citizen science website (www.planktonportal.org) through Zooniverse.org for crowd-sourcing plankton image identification. Organized volunteer communication and outreach.

Guest Lectures and Labs

- Primary productivity in the ocean, University of Colorado Boulder 2018
- Plankton ecology and biological oceanography, Oregon State University 2014 – 2016
- Larval fish ecology and identification, University of Miami 2012
- Marine mammal conservation and management, University of Miami 2011

Aquatic & Marine Sciences Field Seminar, Point Reyes National Seashore, CA 2008 - 2010

- Developed and taught five field-seminars of varying lengths (2 weeks intensive, 1 week intensive, 6 week) for high school students on field techniques in the marine and aquatic sciences.

Teachers Professional Development Seminars, 2013-2015

Numerous public articles and newsletters, 2008-2016

SKILLS AND CERTIFICATIONS

AAUS Science Diver, NAUI advanced open water, EANx