John R. Casey

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Education

— Ph.D. Oceanography (May 2017). Dept. of Oceanography, School of Ocean and Earth Science and Technology, University of Hawai‘i at Mānoa, Honolulu, HI.

— B.S. Marine Biology, B.A. Spanish Language (May 2007). College of Charleston, Charleston, SC.

Research Experience and Positions Held

— Postdoctoral Researcher (September 2022 – present). Biochemical and Biophysical Group, Lawrence Livermore National Laboratory, Livermore, CA.

— Advisory Committee Member (June 2022 – present). CyanoCyc/BioCyc, SRI International, Menlo Park, CA.

— Postdoctoral Researcher (June 2020 – September 2022). Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA.

— Simons Postdoctoral Scholar (May 2019 – May 2020). Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA.

— Research Affiliate Faculty (August 2018 – present). School of Ocean and Earth Science and Technology, University of Hawai’i at Mānoa, HI.

— Simons Postdoctoral Scholar (July 2017 – May 2019). Center for Microbial Oceanography: Research and Education, University of Hawai’i at Mānoa, HI.

— Research Technician II, III (May 2007 – July 2010). Core Flow Cytometry Facility, Marine Particle Imaging Lab, Bermuda Institute of Ocean Sciences, St. Georges, Bermuda.

— Intern (August 2005 – January 2006). Research Experience for Undergraduates, Bermuda Biological Station for Research, St. Georges, Bermuda.

— Intern (June 2004 – July 2004). Transects Program, Skidaway Institute of Oceanography/College of Charleston, Charleston, SC.

— Research Assistant I (October 2003 – March 2004). Dept. of Microbiology, College of Charleston, Charleston, SC.

Refereed Scientific Publications (*Citations: 1201, H-index: 17, i10-index 18*)
ORCID: 0000-0002-8630-0551

1. Kim, H., Brisson, V.L., Casey, J.R., Swink, C, Rolison, K.A., Golini, A.N., Northen, T.R., Weber, P.K., Veličković, D., Buie, C.R., Mayali, X., Stuart, R.K., 2025. Spatially structured competition and cooperation alters algal carbon flow to bacteria. *The ISME Journal* wraf096.

2. Casey, J.R., Bennion, B.J., D'haeseleer, P., Kimbrel, J.A., Marschmann, G.L., Navid, A., 2024. Transporter annotations are holding up progress in metabolic modeling. *Frontiers in Systems Biology* 4:1394084

3. Beckett, S.J., Demory, D., Coenen, A.R., Casey, J.R., Dugenne, M., Follett, C.L., Connell, P., Carlson, M.C.G., Hu, S.K., Wilson, S.T., Muratore, D., Rodriguez-Gonzalez, R.A., Peng, S., Becker, K.W., Mende, D.R., Armbrust, E.V., Caron, D.A., Lindell, D., White, A.E., Ribalet, F., Weitz, J.S., 2024. Disentangling top-down drivers of mortality underlying diel population dynamics of *Prochlorococcus* in the North Pacific Subtropical Gyre. *Nature Communications* 15: 2105.

4. Moore, L.R., Caspi, R., Campbell, D.A., Casey, J.R., Crevecoeur, S., Lea-Smith, D.J., Long, B., Omar, N.M., Paley, S.M., Schmelling, N.M., Torrado, A., Zehr, J.P., Karp, P.D., 2024. CyanoCyc cyanobacterial web portal. *Frontiers in Microbiology* 15:1340413.

5. Smyth, T., Moffat, D., Tarran, G., Sathyendranath, S., Ribalet, F., Casey, J.R., 2023. Determining drivers of phytoplankton carbon to chlorophyll ratio at Atlantic Basin Scale. *Frontiers in Marine Science* 10:1191216.

6. Casey, J.R., Boiteau, R.M., Engqvist, M.K.M., Finkel, Z.V., Li, G., Liefer, J., Müller, C.L., Muñoz, N., Follows, M.J., 2022. Basin-scale biogeography of marine phytoplankton reflects cellular-scale optimization of metabolism and physiology. *Science Advances* 8:eabl4930.

7. Muratore, D., Boysen, A.K., Harke, M.J., Becker, K.W., Casey, J.R., Coesel, S.N., Mende, D.R., Wilson, S.T., Aylward, F.O., Eppley, J.M., Vislova, A., Peng, S., Rodriguez-Gonzalez, R. A., Beckett, S.J., Armbrust, E.V., DeLong, E.F., Karl, D.M., White, A.E., Zehr, J.P., Van Mooy, B.A.S., Dyhrman, S.T., Ingalls, A.E., Weitz, J.S., 2022. Complex marine microbial communities partition metabolism of scarce resources over the diel cycle. *Nature Ecology and Evolution* 6, 218-229.

8. Mattern, J.P., Glauninger, K., Britten, G.L., Casey, J.R., Hyun, S., Wu, Z., Armbrust, E.V., Harchaoui, Z., Ribalet, F., 2022. A Bayesian approach to modeling phytoplankton population dynamics from size distribution time series. *PLoS Computational Biology* 18:e1009733.

9. Casey, J.R., Follows, M.J., 2020. A steady-state model of microbial acclimation to substrate limitation. *PLoS Computational Biology* 16(8), e1008140.

10. Wilson, S.T., Hawko, N.J., Armbrust, E.V., Barone, B., Björkman, K.M., Boysen, A.K., Burgos, M., Burrell, T.J., Casey, J.R., DeLong, E.F., Dugenne, M., Dutkiewicz, S., Dyhrman, S.T., Ferrón, S., Follows, M.J., Foreman, R.K., Funkey, C.P., Harke, M.J., Henke, B.A., Hill, C.N., Hynes, A.M., Ingalls, A.E., Jahn, O., Kelly, R.L., Knapp, A.N., Letelier, R.M., Ribalet, F., Shimabukuro E.M., Tabata, R.K.S., Turk-Kubo, K.A., White, A.E., Zehr, J.P., John, S., Karl, D.M., 2019

Kilauea lava fuels phytoplankton bloom in the North Pacific Ocean. *Science* 365, 1040-1044.

11. Sosa, O.A., Casey, J.R., Karl, D.M., 2019. Methylphosphonate oxidation in *Prochlorococcus* supports phosphate acquisition, formate secretion, and carbon assimilation into purine nucleotides. *Applied and Environmental Microbiology* 85, e000289-19.
12. Casey, J.R., Björkman, K.M., Ferrón, S., Karl, D.M., 2019. Size-dependence of metabolism within marine picoplankton populations. *Limnology and Oceanography* 64, 1819-1827.
13. Casey, J.R., Ferrón, S., Karl, D.M., 2017. Light-enhanced microbial organic carbon yield. *Frontiers in Microbiology* 8, 2157.
14. Wilson, S.T., Aylward, F.O., Ribalet, F., Barone, B., Casey, J.R., Connell, P.E., Eppley, J.A., Ferrón, S., Romano, A.E., Turk-Kubo, K.A., Vislova, A., Armbrust, V., Caron, D.A., Church, M.J., Zehr, J.P., Karl, D.M., DeLong, E.F., 2017. Coordinated regulation of growth, activity, and transcription in natural populations of the unicellular nitrogen-fixing cyanobacterium *Crocosphaera*. *Nature Microbiology* 2, 17118.
15. Casey, J.R., Mardinoglu, A., Nielsen, J., Karl, D.M., 2016. Adaptive evolution of phosphorus metabolism in *Prochlorococcus*. *mSystems* 1, e00065–16.
16. Casey, J.R., Falkowski, P.G., Karl, D.M., 2015. Substrate selection for heterotrophic bacterial growth in the sea. *Marine Chemistry* 177, 349-356.
17. Durham, B.P., Grote, J., Whittaker, K.A., Bender, S.J., Luo, H., Grim, S.L., Brown, J.M., Casey, J.R., Dron, A., Florez-Leiva, L., Krupke, A., Luria, C.M., Mine, A.H., Nigro, O.D., Pather, S., Talarmin, A., Wear, E.K., Weber, T.S., 4. Wilson, J.M., Church, M.J., DeLong, E.F., Karl, D.M., Steward, G.F., Eppley, J.M., Krypides, N.C., Schuster, S., Rappé, M.S., 2014. Draft genome sequence of marine alphaproteobacterial strain HIMB11, the first cultivated representative of a unique lineage within the *Roseobacter* clade possessing an unusually small genome. *Standards in Genomic Sciences* 9, 632.
18. Wallhead, P.J., Garçon, V.C., Casey, J.R., Lomas, M.W., 2014. Long-term variability of phytoplankton carbon biomass in the Sargasso Sea. *Global Biogeochemical Cycles* 28, 825-841.
19. Casey, J.R., Aucan, J.P., Goldberg, S.R., Lomas, M.W., 2013. Changes in partitioning of carbon among photosynthetic pico- and nanoplankton in the Sargasso Sea in response to changes in the North Atlantic Oscillation. *Deep Sea Research II: Topical Studies in Oceanography* 93, 58-70.
20. Mackey, K., Buck, K.N., Casey, J.R., Cid, A., Lomas, M.W., Sohrin, Y., Paytan, A., 2012. Phytoplankton responses to atmospheric metal deposition in the coastal and open-ocean Sargasso Sea. *Frontiers in Microbiology* 3, 1–15.
21. Lomas, M.W., Moran, S.B., Casey, J.R., Bell, D.W., Tiahlo, M., Whitefield, J., Kelly, R.P., Mathis, J.T., Cokelet, E.D., 2012. Spatial and seasonal variability of primary production on the Eastern Bering Sea shelf. *Deep Sea Research Part II: Topical Studies in Oceanography* 1–15.

22. Fawcett, S.E., Lomas, M.W., Casey, J.R., Ward, B.B., Sigman, D.M., 2011. Assimilation of upwelled nitrate by small eukaryotes in the Sargasso Sea. *Nature Geoscience* 4, 1–6.

23. Casey, J.R., Lomas, M.W., Michelou, V.K., Dyhrman, S.T., Ammerman, J.W., Sylvan, J.B., 2009. Taxon-specific orthophosphate and ATP utilization in the western Sargasso Sea. *Aquatic Microbial Ecology* 58, 31-44.

24. Casey, J.R., Lomas, M.W., Mandecki, J., Walker, D.E., 2007. *Prochlorococcus* contributes to new production in the Sargasso Sea deep chlorophyll maximum. *Geophysical Research Letters* 34, L10604.

Grants and Awards

- U.S. Department of Energy (#61333): *Context dependent mycorrhizal resource exchange and N sustainability for bioenergy grasses* (2024-2027).
- Scholar – Simons Foundation (#549894): *Simons Collaboration on Computational Biogeochemical Modeling of Marine Ecosystems* (2017-2020). 341,521 USD
- Fellow – Swedish Research Council/National Science Foundation: *Graduate Research Opportunities Worldwide* (2013-2014). 21,000 USD
- Fellow – National Science Foundation: *Graduate Research Fellowship Program* (2010-2013). 134,000 USD
- Fellow – National Science Foundation: *Research Experience for Undergraduates* (2005).

Invited Seminars

- Casey, J.R., Genome-scale constraint-based simulations of microbial metabolism and physiology. (Ocean Carbon Biogeochemistry Scoping Workshop: Laying the foundation for a potential future BioGeoSCAPES program, 2021, remote)
- Casey, J.R., Müller, C.L., Bien, J., Nielsen, J., Karl, D.M., Follows, M.J., Simulating marine microbial growth and metabolism. (MicroBiospheres Scientific Focus Area Meeting, Lawrence Livermore National Laboratory, 2019, Livermore, CA)
- Casey, J.R., Falkowski, P.J., Karl, D.M., Substrate selection for heterotrophic growth. (The Ocean and the Evolution of Earth's Biogeochemical Cycles 2016, Rutgers University, New Brunswick, NJ)

Research Interests

Microbial ecology, biogeochemical cycles, ecological stoichiometry, biological thermodynamics, modeling microbial metabolism and physiology.

I am interested in the coordination and optimization of cellular scale processes, how objectives - like fitness or entropy production - are influenced by the streams of information between tiers of biological organization, and how all this complexity is imprinted in the genetic code. I enjoy thinking about these layers of biological complexity as they relate to the ecology and biogeochemistry of the oceans.

Core Competencies

Programming languages: Python, Unix/Linux, MATLAB, Julia; developing experience with C/C++, Fortran, Java, Rust.
Numerical methods: Metabolic modeling including reaction-diffusion, genome-scale modeling, optimization, network analysis, stochastic modeling, ODE/PDE; developing experience with bioinformatics, agent/individual based modeling, some informal Machine Learning and Reinforcement Learning courses.

Peer Review

- *Applied and Environmental Microbiology*
- *Aquatic Microbial Ecology*
- *Continental Shelf Research*
- *Deep Sea Research*
- *eLife*
- *Environmental Monitoring and Assessment*
- Flanders Research Foundation (Fonds Wetenschappelijk Onderzoek)
- *Frontiers in Marine Science*
- *Geophysical Research Letters*
- *ISME Journal*
- *Journal of Geophysical Research: Oceans*
- *Journal of Marine Systems*
- *Journal of Plankton Research*
- *Limnology and Oceanography*
- *Marine Biology*
- *mSystems*
- National Science Foundation – Biological Oceanography
- *Nature Communications*
- *Nature Geochemistry*
- *npj Microbiome*
- *Proceedings of the National Academy of Sciences of the United States of America*
- *Progress in Oceanography*
- *Science Advances*
- *Spectrum*

Professional Societies

- American Society of Limnology and Oceanography
- American Society of Microbiology

Security Clearance

- U.S. Department of Energy (DOE), Q Clearance (active)