

# Alison P. Chase

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## EDUCATION

Ph.D., Oceanography 2020

School of Marine Sciences, University of Maine, Orono, ME

Dissertation title: *Phytoplankton community composition in the surface ocean: methods for detection using optical measurements, pigment concentrations, and flow cytometry*. Co-advisors: Dr. Emmanuel Boss, Dr. Lee Karp-Boss

M.S., Oceanography 2014

School of Marine Sciences, University of Maine, Orono, ME

Thesis title: *An in situ optical method to detect phytoplankton pigments*. Advisor: Dr. Emmanuel Boss

Calibration and Validation for Ocean Color Remote Sensing 2011

NASA-funded summer course hosted at the Darling Marine Center, University of Maine, Walpole, ME

Instructors: Dr. Emmanuel Boss, Dr. Collin Roesler, Dr. Curtis Mobley, Dr. Jeremy Werdell, Dr. Mary Jane Perry, Dr. Ken Voss

B.A., Geology and Environmental Studies 2009

*Cum Laude* in Geology, Bowdoin College, Brunswick, ME

Honors thesis: *Spectral reflectance-based observation of diatoms and dinoflagellates in Harpswell Sound, ME*. Advisor: Dr. Collin Roesler

## PROFESSIONAL & RESEARCH EXPERIENCE

**University of Washington**, Applied Physics Laboratory, Seattle, WA

Washington Research Foundation Postdoctoral Fellow

Jul 2020 – current

Ongoing research focused on understanding large-scale distributions of phytoplankton community composition.

Development of algorithms that use in situ plankton imagery, bio-optical measurements, and phytoplankton pigments. Use of satellite remote sensing data, and collaboration with software engineers for open source code and tool development.

Selected participant in the Winter 2022 Data Science Incubator Program, to work one-on-one with a Data Scientist from the UW eScience Institute on the project: User-friendly Tools for Oceanic Plankton Image Analysis (UTOPIA). Ongoing collaboration to develop software that uses machine learning to identify categorical and taxonomic assignments of phytoplankton and particle images collected at sea using automated imaging-in-flow cytometry. Gaining skills in python coding, open source software and cloud computing, and machine learning.

**University of Maine**, School of Marine Sciences, Orono, ME

Doctoral Graduate Student

Jun 2014 – May 2020

Studied phytoplankton size and taxonomic communities using optical, remote sensing, and pigment proxy techniques. Led a group of undergraduate students and lab members in the assessment of phytoplankton imagery data obtained during the NAAMES expedition using automated imaging-in-flow cytometry. Collected bio-optical and spectral radiometry measurements during multiple research cruises, followed by data organization, processing, and analysis.

Masters Graduate Student

Aug 2012 – May 2014

Analyzed a global in situ dataset of spectral absorption measurements using an inversion method resulting in the estimation of phytoplankton accessory pigments. Collected bio-optical and flow cytometry measurements at sea during a portion of the Tara Ocean Polar Circle expedition, and analyzed and presented data from the entire expedition.

**Atmospheric and Environmental Research (AER)**, Lexington, MA

Research Associate, Radiation and Climate Group

Aug 2010 – Jun 2012

Updated and evaluated a line-by-line atmospheric radiative transfer model. Performed analysis of comparisons between ground level solar radiation measurements and radiative transfer model output. Compiled data and created figures for research projects pertaining to satellite-based measurements of precipitation.

**Bowdoin College**, Brunswick, ME

Maine Space Grant Consortium summer research fellow

Jun – Aug 2008

Developed a model for detecting the onset of harmful algal blooms using spectral reflectance. Collected in-situ and discrete water samples as well as optical data on phytoplankton accessory pigments, absorption by different constituents in the water, and spectral reflectance.

Rusack summer research fellow

Jun – Aug 2007

Compared backscatter sonar data to sediment samples in order to ground-truth sonar data. Collected sediment samples using a grab device, sieved samples in lab to separate by particle size, and dried and weighed samples.

## PEER-REVIEWED PUBLICATIONS

16. **Chase, A.**, E. Boss, N. Haëntjens, E. Culhane, C. Roesler, and L. Karp-Boss (2022), Plankton imagery data inform satellite-based estimates of diatom carbon. *Geophysical Research Letters*, doi: 10.1029/2022GL098076.
15. Haëntjens, N., E. Boss, J. Graff, **A. Chase**, and L. Karp-Boss (2022), Phytoplankton size distributions in the western North Atlantic and their seasonal variability. *Limnology and Oceanography*, doi: 10.1002/lno.12172.
14. Eveleth, R., D. M. Glover, M. C. Long, I. D. Lima, **A. P. Chase**, and S. C. Doney (2021), Assessing the skill of a high-resolution marine biophysical model using geostatistical analysis of mesoscale ocean chlorophyll variability from field observations and remote sensing. *Frontiers in Marine Science*, 8:612764. doi: 10.3389/fmars.2021.612764.
13. **Chase, A. P.**, S. J. Kramer, N. Haëntjens, E. S. Boss, L. Karp-Boss, M. Edmondson, and J. R. Graff (2020), Evaluation of diagnostic pigments to estimate phytoplankton size classes. *Limnology and Oceanography: Methods*, <https://doi.org/10.1002/lom3.10385>.
12. Cael, B. B., **A. Chase**, and E. Boss (2020), Information content of absorption spectra and implications for ocean color inversion. *Applied Optics*, 59 (13): 3971. <https://doi.org/10.1364/ao.389189>.
11. Fox, J., M. J. Behrenfeld, Nils Haëntjens, **A. Chase**, S. J. Kramer, E. Boss, L. Karp-boss, et al. (2020), Phytoplankton growth and productivity in the western North Atlantic: Observations of regional variability from the NAAMES field campaigns. *Frontiers in Marine Science*, 7 (24): 1–15. <https://doi.org/10.3389/fmars.2020.00024>.
10. Schulien, J. A., A. D. Penna, P. Gaube, **A. P. Chase**, N. Haëntjens, J. R. Graff, J. W. Hair, et al. (2020), Shifts in phytoplankton community structure across an anticyclonic eddy revealed from high spectral resolution lidar scattering measurements. *Frontiers in Marine Science*, 7 (June): 1–13. <https://doi.org/10.3389/fmars.2020.00493>.
9. Casey, K., C. Rousseaux, W. Gregg, E. Boss, **A. Chase**, S. Craig, C. Mouw, et al. (2019), A Global Compilation of in Situ Aquatic High Spectral Resolution Inherent and Apparent Optical Property Data for Remote Sensing Applications. *Earth System Science Data Discussions*, 902230: 1–29. <https://doi.org/10.5194/essd-2019-105>.
8. Gao, M., P-W Zhail, B. Franz, Y. Hu, K. Knobelspiesse, P. J. Werdell, A. Ibrahim, B. Cairns, **A. Chase** (2019), Inversion of multi-angular polarimetric measurements over open and coastal ocean waters: a joint retrieval algorithm for aerosol and water leaving radiance properties. *Atmospheric Measurement Techniques*, 1–31. <https://doi.org/10.5194/amt-2019-67>.

7. McKinna, L. I.W., I. Cetinić, **A. P. Chase**, P. J. Werdell (2019), Approach for propagating radiometric data uncertainties through NASA ocean color algorithms. *Frontiers in Marine Science*, 1–17.  
<https://doi.org/10.3389/feart.2019.00176>.
6. Liu, Y., E. Boss, **A. Chase**, H. Xi, X. Zhang, R. Röttgers, Y. Pan, A. Bracher (2019), Retrieval of phytoplankton pigments from underway spectrophotometry in the Fram Strait. *Remote Sensing*, 11(318).
5. **Chase, A.**, E. Boss, I. Cetinić, W. Slade (2017), Estimation of phytoplankton accessory pigments from hyperspectral reflectance spectra: Toward a global algorithm. *Journal of Geophysical Research: Oceans*, 122(12): 9725–9743. doi: 10.1002/2017JC012859.
4. Stamieszkin, K., M.A. May, and **A. Chase** (2016), Student-led retreats for graduate student cohesion and career success. *Oceanography*, 29(1): 80–81.
3. Villar, E., G. Farrant, M. Follows, L. Garczarek, S. Speich, S. Audic, L. Bittner, B. Blanke, J.R. Brum, C. Brunet, R. Casotti, **A. Chase**, J.R. Dolan, F. d’Ortenzio, J-P. Gattuso, N. Grima, L. Guidi, C.N. Hill, O. Jahn, J-L. Jamet, H. Le Goff, C. Lepoivre, S. Malviya, E. Pelletier, J-B. Romagnan, S. Roux, S. Santini, E. Scalco, S.M. Schwenck, A. Tanaka, P. Testor, T. Vannier, F. Vincent, A. Zingone, C. Dimier, M. Picheral, S. Searson, S. Kandel-Lewis, Tara Oceans Coordinators: S. G. Acinas, P. Bork, E. Boss, C. de Vargas, G. Gorsky, H. Ogata, S. Pesant, M.B. Sullivan, S. Sunagawa, P. Wincker, E. Karsenti, C. Bowler, F. Not, P. Hingamp, D. Iudicone (2015), Environmental Characteristics of Agulhas Rings Affect Interocean Plankton Transport. *Science*, 348 (6237):1–12.
2. **Chase, A.**, E. Boss, R. Zaneveld, A. Bricaud, H. Claustre, J. Ras, G. Dall’Olmo, T. Westberry (2013), Decomposition of in situ particulate absorption spectra. *Methods in Oceanography*, 7: 110-124.
1. Boss, E., M. Picheral, T. Leeuw, **A. Chase**, E. Karsenti, G. Gorsky, L. Taylor, W. Slade, J. Ras, H. Claustre (2013), The characteristics of particulate absorption, scattering and attenuation coefficients in the surface ocean; Contribution of the Tara Oceans expedition. *Methods in Oceanography*, 7: 52-62.

## AWARDS

### Funding

2022	Analysis of phytoplankton and environmental data in the Puget Sound, Washington Ocean Acidification Center (two months of salary in 2022)
2022	UW Data Science Postdoctoral Fellow: Research Funds, eScience Institute (\$2,500)
2022	UW Azure Cloud Computing Credits (up to \$10,000 as needed)
2021	UW Data Science Postdoctoral Fellow, eScience Institute (\$2,000)
2020 – 2023	<i>Going beyond chlorophyll-a: Developing phytoplankton community composition algorithms from hyperspectral remote sensing reflectances</i> . Science and Applications Team, NASA PACE Mission, PI P. Gaube, <b>Co-I A. Chase</b> (\$493,293)
2020 – 2023	Washington Research Foundation Postdoctoral Fellowship (\$217,500)
2019	Maine Space Grant Consortium (MSGC) Fellowship (\$6,000)
2018	PLOS ONE Early Career Travel Award in the Physical Sciences (\$500)
2018	Maine Space Grant Consortium (MSGC) Fellowship (\$6,000)
2014 – 2017	NASA Earth and Space Science Fellowship (NESSF) (\$90,000)
2008	MSGC Fellowship for undergraduate summer research (\$3,000)
2007	Rusack Fellowship for undergraduate summer research (\$3,000)

### Recognition

2018	Best Student Paper Honorable Mention, Ocean Optics Conference XXIV
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2013, 2014      NSF Graduate Research Fellowship Program Honorable Mention  
2009             Sarah and James Bowdoin Scholar, Bowdoin College  
2009             Arthur M. Hussey Award Recipient, Geology Department, Bowdoin College

### **TEACHING & MENTORING**

Advisor & mentor to H. Bhatti, an undergraduate researcher working on plankton image identification and deep learning (summer 2022)

Mentor, Society for Women in Marine Science mentorship program (2021-present)

Mentor, Athena Talaria program for women and non-binary high school students from low-income and under-resourced backgrounds (summer 2021)

Organized and mentored several undergraduate students on projects within the lab group, Maine In-situ Sound and Color (MISC) Lab, University of Maine (2017-2019)

Mentor, High School Upward Bound Math Science program (summer 2018)

Teaching Assistant, Calibration and Validation of Ocean Color Remote Sensing, University of Maine (summer 2015; summer 2013)

Teaching Assistant, Integrative Marine Science III: Oceanography, University of Maine (fall 2014; fall 2013)

Substitute Teacher K-12, Shaker Regional School District, Belmont, NH (2009-2010 school year)

Teaching Assistant, Introduction to Geology, Bowdoin College (fall 2007)

### **SERVICE & OUTREACH**

Panel participant: “Science at Sea”, Applied Physics Laboratory Seminar Series, University of Washington (2022)

Biogeochemical Sensor Working Group (Bio-optics subgroup), Ocean Observatories Initiative & Ocean Carbon & Biogeochemistry (May 2021 – current)

Member, committee to restart and organize the weekly seminar series, Applied Physics Laboratory, University of Washington (April 2021 – current)

Member, committee for Diversity, Equity, & Inclusion, Applied Physics Laboratory, University of Washington (Jul 2020 – current)

Presenter, Middle School Career Fair, United Technology Center, Bangor, ME (2018; 2015)

Graduate Senator Representative, School of Marine Sciences to the Graduate Student Government (2014 – 2015)

Grant reader, Graduate Student Government, University of Maine (2013 – 2015)

Moderator, Nor’easter Bowl, regional site of the High School National Ocean Sciences Bowl, Orono, ME (2015)

Co-founder, University of Maine Marine Science Professional Development Club (2014 – 2015)

Oceanography Student-Faculty liaison, School of Marine Sciences, University of Maine (2014 – 2015)

Presenter to middle school students, Graduate Students in the Classroom program, Center for Ocean Sciences Education Excellence (COSEE), Maine (2013-2014)

Manuscript reviewer: Biogeosciences, Deep-Sea Research Part I, Energies, Frontiers in Marine Science, Journal of Geophysical Research – Oceans, Journal of Oceanology and Limnology, Journal of Quantitative Spectroscopy & Radiative Transfer, Limnology & Oceanography, Limnology & Oceanography - Methods, Oceanography, Optics Express, Remote Sensing, Scientific Data (2014 – present)

## SEA-GOING EXPERIENCE

Oceanographic Engineer & Science Team Member, Tara Microbiomes Mission, R/V Tara  
South Atlantic Ocean crossing from Punta Arenas, Chile to Cape Town, South Africa Mar – Apr 2022 (50 days)

Oceanographic Engineer, Tara Microbiomes Mission, R/V Tara  
Amazon River mouth & Brazilian waters between Belem and Salvador, Brazil Sep – Oct 2021 (35 days)

Science Team Member, DoppScat Experiment, R/V Shana Rae  
Mid-California coastal waters Aug 2018 (5 days)

Science Team Member, North Atlantic Aerosols and Ecosystem Study (NAAMES) Expedition, R/V Atlantis  
North Atlantic; San Juan, PR to Woods Hole, MA Mar – Apr 2018 (24 days)

Science Team Member, Tara Pacific Expedition, R/V Tara  
Equatorial Pacific; Keelung, Taiwan to Lautoka, Fiji Apr – May 2017 (32 days)

Science Team Member, Ship-Aircraft Bio-Optical Research (SABOR), R/V Endeavor  
Northwest Atlantic Ocean Jul – Aug 2014 (20 days)

Optical Engineer, Tara Oceans Polar Circle Expedition, R/V Tara  
Norwegian Sea; Lorient, France to Tromsø, Norway May – Jun 2013 (25 days)

## PRESENTATIONS (\*Invited)

### 2021-2022

*Chasing open-ocean eddies and fronts using in-line optical measurements* (2022) Poster, Ocean Optics XXV Conference, Quy Nhon, Vietnam

*\*Beyond total biomass: Progress towards detecting phytoplankton communities from space* (2022) Invited lecture, NOAA NOCCG Seminar Series, virtual

*User-friendly Tools for Oceanic Plankton Image Analysis (UTOPIA)* (2022) UW Data Science Seminar, eScience Institute, University of Washington, Seattle, WA

*Leveraging big data and machine learning to shed light on complex ocean ecosystems* (2022) Washington Research Foundation 2022 Postdoctoral Fellows Symposium, Seattle, WA

*\*Using optical oceanography to explore phytoplankton communities* (2022) Invited lecture, Banse Early Career Scientist Seminar Series, School of Oceanography, University of Washington, virtual

*Exploring tiny ocean life on giant scales* (2021) 5 minute speed talk, College of the Environment Postdoc Pecha Kucha event, University of Washington, Seattle, WA

*\*Beyond Biomass: Phytoplankton Communities from Ocean Color* (2021) Oral Presentation, 2021 PACE Applications Water Quality & Resources Focus Session, NASA, virtual

### 2019-2020

*Quantitative imaging flow cytometry reveals pigment-based overestimation of diatoms and microplankton in the North Atlantic* (2020) Oral Presentation, Ocean Sciences Meeting, San Diego, CA

*Phytoplankton community composition in global ocean surface waters* (2020) Poster, Washington Research Foundation Postdoctoral Fellows Symposium, Seattle, WA

*Optical-based methods used to detect phytoplankton community composition in the North Atlantic Ocean* (2019) Poster, Hyperspectral Data Needs for Algal Bloom Detection Workshop, Ostend, Belgium

*Influence of small-scale frontal features on phytoplankton community composition in the North Atlantic Ocean* (2019) Oral presentation, ASLO Ocean Sciences Meeting, San Juan, PR

## **2017-2018**

*Deploying the Imaging FlowCytobot in the Western North Atlantic from a research vessel* (2018) Oral presentation, McLane Labs IFCB Workshop, Woods Hole, MA

*Spectral absorption-based estimates of phytoplankton community composition in the North Atlantic Ocean* (2018) Oral presentation, Ocean Optics XXIV Meeting, Dubrovnik, Croatia

*\*Improved Estimates of Phytoplankton Community Size Structure with Application to the North Atlantic Ocean* (2018) Invited lecture, Maine Space Grant Consortium annual meeting, Augusta, ME

*Phytoplankton Community Size Structure in the North Atlantic and Arctic Oceans: Comparing Multiple Analysis Approaches and Relationships with Physical Parameters* (2018) Poster, Ocean Sciences Meeting, Portland, OR

*\*Phytoplankton in the Ocean: Collecting and Interpreting Optical and Imagery Data* (2017) Invited lecture, Undergraduate Oceanography course at Unity College, Unity, ME

*Using Automated Imagery to Investigate Phytoplankton Size Structure and Community Composition in the North Atlantic* (2017) Poster, High Throughput Imagery and Molecular Methods Meeting, Hannover, Germany

*\*Current efforts and goals in ocean color remote sensing and optical oceanography* (2017) Invited lecture, Atmospheric and Environmental Research, Lexington, MA

## **2010-2016**

*Exploring the capability for estimation of phytoplankton accessory pigments from hyperspectral reflectance spectra* (2016) Poster, Ocean Optics XXIII Meeting, Victoria, BC

*Using optics to investigate global marine phytoplankton composition* (2015) Poster, NASA Biodiversity and Ecological Forecasting Team Meeting, College Park, MD

*Optical size proxies and their relationship to phytoplankton size in the Arctic Ocean* (2014) Poster, Ocean Optics XXII Meeting, Portland, ME

*Mapping phytoplankton types using in situ absorption spectra and linking results to future hyperspectral ocean color satellites* (2014) Poster, Ocean Sciences Meeting, Honolulu, HI

*Decomposition of in-situ particulate absorption spectra* (2012) Poster, Ocean Optics XXI Meeting, Glasgow, Scotland

*Obtaining quality ac-s meter spectra: a method for temperature and residual scattering corrections* (2012) Poster, Ocean Sciences Meeting, Salt Lake City, UT

*A reflectance ratio algorithm for detecting the springtime diatom-to- dinoflagellate transition in a coastal Maine*

*sound: an early warning of Alexandrium fundyense* (2010) Poster, Ocean Optics XX Meeting, Anchorage, AK