

## CURRICULUM VITAE

### PROFESSIONAL SUMMARY

Daniel Koestner is a meticulous and enthusiastic scientist whose work in **Ocean Optics** intersects marine biology, chemistry, physics, and technology. He values scientific rigor and collaboration, working closely with international colleagues in USA, UK, Poland, and Norway. He is highly personable and believes in the power of active listening to stimulate inclusivity, synergy, and creativity. His strengths stem from diverse expertise in scientific writing, instrumentation, data science, laboratory analyses, field work, and outreach.

### EDUCATION

2019

**Ph.D. Oceanography**, Conferred date: *September 7, 2019*

Scripps Institution of Oceanography, University of California San Diego, USA.

Supervisor: Dariusz Stramski



#### Measurements of angle-resolved polarized light scattering by seawater as a tool to characterize natural assemblages of marine particles

1. Thoroughly characterized and calibrated new instrument for measuring angle-resolved polarized light scattering; published in *Applied Sciences*
2. Assessed the roles of particle size and composition in light scattering with specially designed comprehensive laboratory experiments with analyses on size-fractionated seawater samples; published in *Limnology and Oceanography*
3. Quantitatively identified dominant particulate characteristics impacting linearly polarized light associated with scattering by marine particles; published in *Applied Optics*

2015

**M.S. Oceanography**

Scripps Institution of Oceanography, University of California San Diego, USA

2012

**B.S. Environmental Engineering**

Civil and Environmental Engineering, Rensselaer Polytechnic Institute, USA

### ACADEMIC POSITIONS

2022–current

**SEAS Postdoctoral Research Fellow** – *Supervisors: Camilla Sætre & Børge Hamre*  
Department of Physics and Technology, University of Bergen, Norway

2020–2022

**Postdoctoral Associate, NRC RAP Fellow** – *Supervisor: Steven Ackleson*  
Remote Sensing Division, Naval Research Laboratory, USA

2019–2020

**Postdoctoral Researcher** – *Supervisor: Dariusz Stramski*  
Scripps Institution of Oceanography, University of California San Diego, USA.

2012–2019

**Graduate Student Researcher**– *Supervisor: Dariusz Stramski*  
Scripps Institution of Oceanography, University of California San Diego, USA.

### LANGUAGES

English

**Native proficiency**

Norwegian

**A2** (course ongoing, completion in June 2024)

### TRACK RECORD SUMMARY

RESEARCH	TEACHING	INNOVATION	OUTREACH
12 journal articles (8 as 1 <sup>st</sup> author)	Undergraduate & Master's supervision	Innovative methods	Popular science article
Contributions to 7+ projects	PhD guidance & support	Laboratory & field protocols	Volunteer STEM representative for youth
3 fellowships captured & 2 proposals in review	17 Lectures/Conference presentations	Advanced algorithms	2 Science outreach projects in development
Article/proposal reviews	Leadership experience	Novel dataset	Music composer

## RESEARCH

### SELECTED PROJECTS

2022– current	<p><b>Examining vertical structure of biogeochemical variables in the Lofoten Basin</b> <i>SEAS Project, Supervisors Camilla Sætre and Børge Hamre, UiB – Postdoctoral Research Fellow</i></p> <ul style="list-style-type: none"> <li>- Participated in a research cruise in Nordic Seas on R/V Johan Hjort May 14 – June 4, 2023 to deploy Argo floats and gliders, and collect optical measurements of light scattering and absorption</li> <li>- Developed advanced approaches to estimate particulate organic carbon concentration from available optical measurements on BGC-Argo floats [11]</li> <li>- Developing data pipeline protocols and visualizations for BGC-Argo floats to examine carbon export</li> </ul>
2022– current	<p><b>Influence of particle size on optical properties in fjords of Spitsbergen</b> <i>PIs Sławomir B. Woźniak, IOPAN and Dariusz Stramski, SIO – Postdoctoral Research Fellow</i></p> <ul style="list-style-type: none"> <li>- Participated in AREX22 field campaign on R/V Oceania August 21–27, 2022</li> <li>- Supported particle fractionation experiments and performed measurements of light scattering properties of unfractionated and size-fractionated samples</li> </ul>
2022– current	<p><b>The importance of particle disaggregation on biogeochemical flux predictions</b> <i>NSF Chemical Oceanography Program, PI Matthew Rau, GWU – Postdoctoral Associate</i></p> <ul style="list-style-type: none"> <li>- Participated in planning and field work from NY Bight to George’s Bank on R/V Sharp April 20 – May 3, 2022 to study physical and biogeochemical factors influencing particle disaggregation</li> <li>- Collected in situ optical measurements, retrieved discrete water samples for bulk analysis of particulate characteristics including phytoplankton composition, and processed data for further analysis</li> </ul>
2021– current	<p><b>Remote sensing of environmental change in Arctic coastal aquatic ecosystems</b> <i>NASA Ocean Biology and Biogeochemistry Program, PI Wesley Moses, NRL – Postdoctoral Associate</i></p> <ul style="list-style-type: none"> <li>- Helped write proposal, organized logistics for and participated in field work in Beaufort Sea on R/V Ukpik August 10–15, 2021</li> <li>- Established laboratory protocols for collection and processing of samples for analysis of suspended particulate matter including mass concentration, phytoplankton and nonphytoplankton absorption coefficients, organic carbon concentration, and light scattering properties</li> </ul>
2021– current	<p><b>Assessment of the effects of marine debris on Ocean Color signals</b> <i>NASA Ocean Biology and Biogeochemistry Program, PI Robert Foster, NRL – Postdoctoral Associate</i></p> <ul style="list-style-type: none"> <li>- Developed laboratory methods for producing and measuring optical properties of microplastic suspensions</li> <li>- Working to develop methods to identify optical fingerprints of microplastics based on scattering and polarization properties, including satellite remote sensing using radiative transfer simulations</li> <li>- Four conference presentations and two peer-reviewed publications [7, 12]</li> </ul>
2017– 2020	<p><b>Riverine carbon contributions to Alaskan Arctic coastal margins</b> <i>NASA Carbon Cycle Science Program, PIs Dariusz Stramski, SIO and Samuel Laney, WHOI – Graduate Student Researcher</i></p> <ul style="list-style-type: none"> <li>- Participated in field work in Beaufort Sea on R/V Ukpik to deploy nearshore moorings equipped with bio-optical sensors; August 11–14, 2017; September 7–12, 2018; August 8–15, 2019</li> <li>- Collected in situ optical measurements, retrieved discrete water samples for bulk analysis of particulate characteristics, and processed all data for further analysis in two publications [4, 8]</li> </ul>
2014– 2017	<p><b>Quantifying the contributions of different particle size classes to optical backscattering and assessing the implications to Ocean Color Remote Sensing</b> <i>NASA Earth and Space Science Fellowship, PI Dariusz Stramski, SIO – Graduate Student Researcher</i></p> <ul style="list-style-type: none"> <li>- Helped write successful proposal and design laboratory experiments to quantify backscattering contributions from three size fractions (&lt; 5 <math>\mu\text{m}</math>, 5–20 <math>\mu\text{m}</math>, and &gt;20 <math>\mu\text{m}</math>) of natural assemblages of marine particles</li> <li>- Lead sampling and laboratory efforts with a team of two undergraduate researchers and one PhD student</li> <li>- The dataset acquired led to three publications [1, 2, 3] and three conference presentations.</li> </ul>

## PUBLICATIONS

Contributed to 12 peer-reviewed publications (8 as first author, 3 as second or third author) since 2018 with 107 citations and h-index of 5.

- [12] **Koestner, D.**, Foster, R., El-Habashi, A., and Cheatham, S. (2024). Measurements of the inherent optical properties of aqueous suspensions of microplastics. *Limnology and Oceanography Letters*, *In Press*, *accepted 9 March 2024*. <https://doi.org/10.1002/lol2.10387>
- [11] **Koestner, D.**, Stramski, D., and Reynolds, R. A. (2024). Improved multivariable empirical algorithms for estimating oceanic particulate organic carbon concentration from optical backscattering and chlorophyll-a measurements. *Frontiers in Marine Science*, *10*, 1197953. <https://doi.org/10.3389/fmars.2023.1197953>
- [10] Ugulen, H. S., **Koestner, D.**, Sandven, H., Hamre, B., Kristoffersen, A. S., and Sætre, C. (2023). Neural network approach for correction of multiple scattering errors in the LISST-VSF instrument. *Optics Express*, *31*(20), 32737-32751. <https://doi.org/10.1364/OE.495523>
- [9] Santos, J., **Koestner, D.**, Chen, Y. -C., Rodrigo, P. J., Peteresen, P. M., Hamre, B., and Pedersen, C. (2023). Underwater remote volumetric imaging with a high-resolution confocal LiDAR. OCEANS 2023 - Limerick, Limerick, Ireland, 2023, 1–10. <https://doi.org/10.1109/OCEANSLimerick52467.2023.10244361> \*Conference Proceeding
- [8] Catipovic, L., Longecker, K., Okkonen, S., **Koestner, D.**, and Laney, S. (2023). Optical insight into riverine influences on dissolved and particulate organic carbon in a coastal Arctic lagoon system. *Journal of Geophysical Research: Oceans*, e2022JC019453. <https://doi.org/10.1029/2022JC019453>
- [7] **Koestner, D.**, Foster, R., and El-Habashi, A. (2023). On the potential for optical detection of microplastics in the ocean. In *Frontiers in Ocean Observing: Emerging Technologies for Understanding and Managing a Changing Ocean*. Oceanography 36 (Supplement 1). <https://doi.org/10.5670/oceanog.2023.s1.15>
- [6] **Koestner, D.**, Stramski, D., and Reynolds, R. A. (2022). A multivariable empirical algorithm for estimating particulate organic carbon concentration in marine environments from optical backscattering and chlorophyll-a measurements. *Frontiers in Marine Science*, *9*, 941950. <https://doi.org/10.3389/fmars.2022.941950>
- [5] Foster, R., Gray D. J., **Koestner, D.**, El-Habashi, A., and Bowles, J. (2022). Hydrosol scattering matrix inversion across a Fresnel boundary. *Frontiers in Remote Sensing*, *2*, 791048. <https://doi.org/10.3389/frsen.2021.791048>
- [4] **Koestner, D.**, Stramski, D., and Reynolds, R. A. (2021). Characterization of suspended particulate matter in contrasting coastal marine environments with angle-resolved polarized light scattering measurements. *Applied Optics*, *60*, 11161–11179. <https://doi.org/10.1364/AO.441226> \*Editor's Pick
- [3] **Koestner, D.**, Stramski, D., and Reynolds, R. A. (2020). Polarized light scattering measurements as a means to characterize particle size and composition of natural assemblages of marine particles. *Applied Optics*, *59*, 8314–8334. <https://doi.org/10.1364/AO.396709> \*Editor's Pick
- [2] **Koestner, D.**, Stramski, D., and Reynolds, R. A. (2020). Assessing the effects of particle size and composition on light scattering through measurements of size-fractionated seawater samples. *Limnology and Oceanography*, *65*, 173–190. <https://doi.org/10.1002/lno.11259>
- [1] **Koestner, D.**, Stramski, D., and Reynolds, R. A. (2018). Measurements of the volume scattering function and the degree of linear polarization of light scattered by contrasting natural assemblages of marine particles. *Applied Sciences*, *8*, 2690. <https://doi.org/10.3390/app8122690>
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- [13] **Koestner, D.**, Foster, R., El-Habashi, A., Cheatham, S., Stramski, D., Reynolds, R. (2024). Measurements of the inherent optical properties of aqueous suspensions of microplastics and contrasting seawater samples. *SEANOE*. <https://doi.org/10.17882/98404> \*Dataset
- [14] **Koestner, D.**, Tessin, E., and Kristoffersen, A. (2023). Why do some Norwegian fjords turn green? *ScienceNorway.no*. <https://sciencenorway.no/fjords-researchers-zone-satellites/why-do-some-norwegian-fjords-turn-green/2138016> \*Popular Science Article, not peer-reviewed

## JOURNAL MANUSCRIPT AND PROPOSAL REVIEWS

2024	Optics Express	2021	Journal of Marine Systems
2023	NASA Review Panel (Proposals)	2021	IEEE Journal of Ocean Engineering
2022	NASA Review Panel (Proposals)	2021	Journal of Geophysical Research Oceans
2022	Limnology and Oceanography	2020	Journal of Geophysical Research Oceans
2021	Limnology and Oceanography	2020	National Science Foundation (Proposal)

## FELLOWSHIPS AND AWARDS

2024–2027 (pending)	<b>Research Council of Norway, FRIPRO Early Career – 8 million NOK</b> <i>Carbon Optical Systems for Moored OperationS under Arctic sea ice (COSMOS)</i> Submitted as PI (100%) 10 January, 2024.
2025–2028 (pending)	<b>Research Council of Norway, Researcher Project (Climate) Early Career – 8 million NOK</b> <i>Changing Arctic primary production and carbon export (newChapter)</i> Project partner (20 %). Submitted by PI C. Yumruktepe (NERSC) 6 March, 2024.
2024	<b>University of Bergen Meltzer’s fund award – 47 kNOK</b> <i>The development of robust optical algorithms for estimating POC in the Arctic Ocean</i> The Meltzer’s fund is a competitive pool of money available to exceptional students and researchers. Up to 100 kNOK is available for research equipment and travel contingent on successful evaluation.
2023	<b>University of Bergen Meltzer’s fund award – 88 kNOK</b> <i>Improving the capabilities of autonomous platforms in marine science with optical sensors</i>
2022–2025	<b>Shaping European Research Leaders for Marine Sustainability Postdoctoral Fellowship</b> SEAS is a career and mobility fellowship program for 37 postdoctoral research fellows within marine sustainability managed by the University of Bergen to facilitate international mobility of experienced researchers. This is a competitive program requiring evaluation of applicant and research proposal.
2020–2022	<b>National Research Council Research Associateship Programs Postdoctoral Fellowship</b> The NRC Research Associateship Programs promote excellence in scientific and technological research conducted by the U.S. government. Prospective applicants submit a complete proposal for a research project to be conducted with a supervisor at a host National Laboratory.
2014–2017	<b>National Aeronautics and Space Administration Earth and Space Science Fellowship</b> The purpose of the NASA NESSF program is to ensure continued training of a highly qualified workforce in disciplines needed to achieve NASA’s scientific goals by performing research projects. This competitive fellowship provides funding for a graduate student researcher.

## TEACHING

### SUPERVISION AND TEACHING EXPERIENCE

2024– current	Ocean Technology Master’s Student Supervision <b>DEPARTMENT OF PHYSICS AND TECHNOLOGY, UNIVERSITY OF BERGEN, BERGEN, NORWAY</b> <i>Counting and sizing of marine snow using remotely operated vehicles</i> In this project, I am supervising a Master's student to develop real-time systems to count and size marine snow particles using available technology on Remotely Operated Vehicles which explore the Deep Sea. This technology has potential to be used to understand spatial distributions of marine snow which are currently rarely counted and sized.
2022– current	Guidance and Support of Ph.D. students <b>DEPARTMENT OF PHYSICS AND TECHNOLOGY, UNIVERSITY OF BERGEN, BERGEN, NORWAY</b> Supporting doctoral students with scientific writing, data processing and visualization, laboratory analyses, field training and general guidance. I have used these opportunities to serve as an attentive educator and collaborator, yielding ongoing collaborations and publication results with Håvard Ugulen (Ph.D. defended 2023, UiB) [10], Joaquim Santos (Ph.D. submitted 2024, DTU) [9], Shea Cheatham (Ph.D. candidate, UiB) [12, 13], Elinor Tessin (Ph.D. candidate, UiB) [14], and Luka Catipovic (Ph.D. defended 2023, WHOI) [8].

2020	<p>HBCU/MSI Summer Internship Program  <b>REMOTE SENSING DIVISION, NAVAL RESEARCH LABORATORY, WASHINGTON, D.C., USA</b>  <i>Summer 2020</i></p> <p>Undergraduate research supervision and mentorship for the Department of Navy/Naval Research Lab's Historically Black Colleges and Universities and Minority Serving Institutions Summer Internship Program. I developed a research plan with co-supervisor Wesley Moses for an undergraduate student to assess satellite remote sensing of Chlorophyll-a and suspended particulate matter in coastal Arctic waters. I supported the student with biweekly meetings and guidance.</p>
2014–2018	<p>Marine Physical Laboratory Summer Internship Program  <b>SCRIPPS INSTITUTION OF OCEANOGRAPHY, UNIVERSITY OF CALIFORNIA SAN DIEGO, LA JOLLA, CA, USA</b>  <i>Summers 2014–2018</i></p> <p>Undergraduate research supervision and mentorship for the Marine Physical Laboratory's Summer Internship Program. I co-advised up to two undergraduate students hosted by the Ocean Optics Research Laboratory at SIO for a 10-week summer program. I developed research projects with professor Dariusz Stramski, helped students with research tasks, trained students in measurement techniques, and provided support and guidance. I also wrote letters of recommendation for students in their successful pursuit of graduate education.</p>
2017	<p>Introduction to Environmental Systems – <b>Teaching Assistant</b>  <b>EARTH SCIENCE DEPARTMENT, UNIVERSITY OF CALIFORNIA SAN DIEGO, LA JOLLA, CA, USA</b>  <i>Autumn 2017</i></p> <p>Led a weekly discussion session, graded homework and exams, and supported development of teaching materials and exams.</p>

## LECTURES AND CONFERENCE PRESENTATIONS

- Koestner, D.** (2024) Examining marine particle size with optics. Presented at Useful Arctic Knowledge workshop at Aanderaa, Bergen, Norway. *\*Invited Speaker*
- Koestner, D.** (2023). Robots, lasers, and the future of ocean observing: Improving the capabilities of autonomous platforms in marine science with optical sensors. Presented at SEAS Annual Meeting, 15–17 Nov, Bergen, Norway.
- Koestner, D.** (2023). Examining vertical structure of particulate organic carbon in the Lofoten Basin using optical sensors on BGC-Argo floats. Presented at Workshop on BGC-Argo, 1–2 Nov, Bergen, Norway. *\*Invited Speaker*
- Cheatham, S., **Koestner, D.**, Foster, R., and Hamre, B. (2023). Simulating the remote sensing reflectance signal of marine microplastics using measurements of spectral and angular scattering properties. Presented at Remote Sensing of Marine Litter Workshop at ESA-ESTEC, 2023 Oct 16–17, Noordwijk, Netherlands.
- Koestner, D.**, Mork, K. A., Brakstad, A., Soiland, H., and Fer, I. (2023). Examining vertical structure of particulate organic carbon in the Lofoten Basin using optical sensors on BGC-Argo floats and gliders. Presented at 10<sup>th</sup> Annual EuroGOOS International Conference, 2023 Oct 3–5, Galway, Ireland. *\*Awarded Best Early Career Poster Presentation*
- Koestner, D.** (2023) Towards the development of simple optical proxies which characterize particulate assemblages in marine environments. Presented at SFI Smart Ocean Seminar Series, 24 Feb, Bergen, Norway. *\*Invited Speaker*
- Koestner, D.**, Stramski, D., Reynolds, R. A. (2022) Optical Estimates of Particulate Organic Carbon. Flash Talk at 7<sup>th</sup> Argo Science Workshop, 11–13 Oct, Brussels, Belgium.
- Koestner, D.**, Foster, R., El-Habashi, A. (2022). Measurements of the inherent optical properties of microplastic assemblages. Abstract 678 presented at Ocean Optics XX, 2022 Oct 2–7, Quy Nhon, Vietnam.
- Koestner, D.**, Stramski, D., Reynolds, R. A. (2022) A Multivariable Model for Estimating Particulate Organic Carbon Concentration in Marine Environments Using Optical Backscattering and Chlorophyll-a Measurements. Abstract 114 presented at ESA Ocean Carbon from Space 2022, 14–18 Feb, Virtual.
- Koestner, D.** (2021) Some perspectives on Ocean Optics. Presentation and panel discussion for American Geographical Society, Into the Deep: The sensors, science and algorithms securing our Oceans in 4D, 16 Jun, Virtual. *\*Invited Speaker*
- Koestner, D.** (2021) Light scattering approaches for characterizing particulate assemblages in coastal waters. Presented at Annual Sigma Xi Postdoctoral Associate Symposium, 27 Jan, Virtual.
- Koestner, D.**, Stramski, D., Reynolds, R. A. (2020) Assessing the effects of particle size and composition on light scattering through measurements of size-fractionated seawater samples. Abstract OB34C-0582 presented at 2020 Ocean Sciences Meeting, San Diego CA 16-21 Feb.

- Koestner, D.** (2019) Measurements of angle-resolved polarized light scattering by seawater as a tool to characterize natural assemblages of marine particles. Presented at City College of New York monthly seminar series, 31 Oct, Manhattan, New York, USA. *\*Invited Speaker*
- Koestner, D.**, Stramski, D., Reynolds, R. A. (2018) Characterization of the degree of linear polarization of scattered light for seawater samples of contrasting particle size distribution and composition. Abstract OS11D-1436 presented at 2018 AGU Fall Meeting, Washington D.C. 10-14 Dec.
- Koestner, D.**, Stramski, D., Reynolds R. A. (2018). Calibration and validation of a new instrument for measuring the angular light scattering properties of seawater. Poster presented at: Ocean Optics XXIV; 2018 Oct 7–12; Dubrovnik, Croatia.
- Koestner, D.** (2017) Unraveling the Ocean's Color: Understanding the sources of visible light scattered by particles in seawater. Presentation and panel discussion for the Annual Scripps Fellowship Brunch, 26 Mar, La Jolla, California, USA. *\*Invited Speaker*
- Koestner, D.**, Stramski, D., Reynolds R. A. (2016). Experimental estimates of the contributions of different particle size classes to optical scattering. Poster presented at: Ocean Optics XXIII; 2016 Oct 23–28; Victoria, British Columbia, Canada.

## OTHER RELEVANT LEADERSHIP EXPERIENCE

2022–current	<p>Clam up and dive in – <b>Group Leader</b>  <b>UNIVERSITY OF BERGEN, BERGEN, NORWAY</b></p> <p>Facilitating a weekly 2-hour writing session with a diverse group of postdoctoral researchers from social and natural sciences. Each session includes 15 minutes of intention and goal setting, silent writing for 90 minutes, and then a short recap about the experience from each group member. The group serves as a community for accountability and learning from each other's experience.</p>
2023	<p>GO-BGC Float Data Workshop 2023 – <b>Group Leader</b>  <b>UNIVERSITY OF MASSACHUSETTS BOSTON, BOSTON, MA, USA</b>  <i>August 21–23, 2023</i></p> <p>Led a small group for a data-thon to examine BGC-Argo float data in the Lofoten basin. Established a project idea, participated in virtual meetings with facilitators before workshop, and led virtual group meetings with a multidisciplinary team of 8 members spanning master's to associate professor level. Preliminary analyses were presented at workshop and AGU Ocean Sciences Meeting 2024.</p>

## PEDAGOGICAL CERTIFICATES

Survival Skills for TAs

Autumn 2017

Center for Integrated Teaching, University of California San Diego

## INNOVATION

### SUMMARY OF INNOVATIONS AND CONTRIBUTIONS

<b>Innovative Methods</b>	<ul style="list-style-type: none"> <li>◇ Establishing potential for satellite remote sensing of marine microplastics with novel approach involving direct measurements of inherent optical properties and radiative transfer simulations. <ul style="list-style-type: none"> <li>▪ Developed innovative approach to generate microplastic suspensions in laboratory</li> <li>▪ Publication in high-impact <i>Limnology and Oceanography Letters</i> [12]</li> </ul> </li> <li>◇ Non-parametric statistical method to reveal particle size distribution as dominant driver of changes in the depolarization of linearly polarized light scattered near 90° <ul style="list-style-type: none"> <li>▪ Publication in <i>Applied Optics</i> chosen as “Editor's Pick” [3]</li> </ul> </li> <li>◇ Innovative corrections for multiple scattering errors in <i>in situ</i> optical measurements <ul style="list-style-type: none"> <li>▪ Both experimental [4] and theoretical [10] approaches for LISST-VSF instrument</li> </ul> </li> </ul>
<b>Laboratory &amp; Field Protocols</b>	<ul style="list-style-type: none"> <li>◇ Development of experimental approach to address contributions of different size-classes to light scattering by natural assemblages of marine particles <ul style="list-style-type: none"> <li>▪ Assessment of size-fractionation and design of comprehensive laboratory experiments</li> <li>▪ Most cited article (32 citations since 2020) [2]</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>◇ Design of calibration and validation protocols for novel commercialized angular-scattering meter, LISST-VSF <ul style="list-style-type: none"> <li>▪ Identified necessary calibration corrections and published first independent validation of LISST-VSF in 2018 [1], influencing future instrument users.</li> </ul> </li> <li>◇ Establishment of thorough protocols for field and laboratory analyses of suspended particulate matter, including mass concentration, phytoplankton and nonphytoplankton absorption coefficients, organic carbon concentration, and light scattering properties <ul style="list-style-type: none"> <li>▪ Protocols have been adopted by researchers at NRL and UiB</li> </ul> </li> </ul>
<b>Advanced Algorithms</b>	<ul style="list-style-type: none"> <li>◇ Progressing algorithms to estimate particulate organic carbon concentration from optical backscattering with inclusion of particle composition as an independent variable <ul style="list-style-type: none"> <li>▪ First-of-its-kind adaptive algorithm which has potential use globally with sensors on BGC-Argo floats, gliders, and moorings.</li> <li>▪ Introduction of approach in [6] with further improvements in [11]</li> </ul> </li> <li>◇ Identification of novel and robust optical proxy for particle composition leveraging knowledge of polarization and angular scattering properties <ul style="list-style-type: none"> <li>▪ First identified in [3], and validated for contrasting marine environments in [4]</li> <li>▪ Future efforts include development of new low-cost instrument to replace typical single-angle backscattering sensors</li> </ul> </li> </ul>
<b>Novel Dataset</b>	<ul style="list-style-type: none"> <li>◇ A novel quality-controlled dataset of nearly complete set of inherent optical properties for advancing radiative transfer simulations of marine environments <ul style="list-style-type: none"> <li>▪ Includes the rarely measured volume scattering function and will support LiDAR and remote sensing reflectance development</li> <li>▪ Also includes measurements of microplastic suspensions [13]</li> </ul> </li> </ul>

## OUTREACH

### OUTREACH PARTICIPATION AND PROJECTS

2024–	<p><b>Meditations on the Deep Sea – Project leader and composer</b></p> <p>Public-facing portrayals of the Deep Sea are few and far between; as a result, many people feel disconnected or even fearful of deep-sea environments. In this ongoing audio-visual outreach project, we are dedicated to the creation of immersive intimate experiences, connecting us with this unique environment through the narrative power of music and minimally processed footage collected in collaboration with <a href="#">OceanX</a>. I have been awarded a 2-month postdoctoral extension by the Faculty of Mathematics and Natural Sciences at UiB and submitted a proposal for 100 kNOK to the <i>Fond for lyd og bilde</i> to support development of this project. Preliminary works can be found <a href="#">here</a> and <a href="#">here</a>.</p>
2024–	<p><b>Journey into the Ocean's Color! – Project leader</b></p> <p>This outreach project focuses on the development of an interactive audio-visual experience using real input of optical information from BGC-Argo floats to generate unique sound- and light-scapes to approximate what it is like to sink deep into the ocean as a marine plankton. <a href="#">Here</a> is an example of early analysis using a float profile from early spring in the South Atlantic Ocean.</p>
2018–2019	<p><b>Beach Science – Participant</b></p> <p>Beach Science brought ocean STEM education to sixth grade students living in historically underrepresented areas of San Diego. The program brings ocean science into sixth grade classrooms through lessons, classroom visits by educators, and visits to the Scripps Pier. As a participant, I spoke about my science to groups of middle schoolers on the Scripps Pier.</p>
2018	<p><b>Exploring Ocean STEM Careers Night at Birch Aquarium – Participant</b></p> <p>As a participant, I volunteered as a scientist to discuss my research and career paths informally with middle and high school students at the Birch Aquarium which was opened at night especially for this event. I set up a booth with optical instruments and had informal conversations with many young minds, encouraging patience, perseverance, and excitement about careers in science.</p>

## OTHER RELEVANT EXPERIENCE

2023	<p><b>BGC-Argo Delayed Mode Quality Control Workshop – Participant</b></p> <p>The first BGC-Argo DMQC Workshop was held 23 – 26 January 2023 in Villefranche-sur-Mer, France and focused on education and training regarding delayed mode quality control of biogeochemical variables oxygen, nitrate, pH, PAR, chlorophyll-a, and backscattering measured by BGC-Argo floats.</p>
2022	<p><b>Polar Sounds – Contributing Artist</b></p> <p><u>Polar Sounds</u> is a unique union of art and science asking artists to reimagine some of the little-heard sounds of the Arctic and Antarctic regions, reflecting on climate change and the evolving sounds of the polar seascapes. I submitted a <u>musical piece inspired by and involving bowhead whale recordings</u> which was selected for the album compiling the highlights from the project.</p>
2021	<p><b>Outlaw Ocean Music Project – Contributing Artist</b></p> <p><u>The Outlaw Ocean Music Project</u> connects musicians with Ian Urbina, a journalist, who works on reporting of lawlessness on the open seas. The project attracts musicians to make music inspired by his reporting and, in turn, generates interest from a global audience. I contributed a <u>short album</u> inspired by Ian Urbina's reporting on the many ways in which people exploit the lawlessness at sea.</p>
2019	<p><b>Holyfield and Harmony <u>Concert</u> and <u>Workshop</u> – Facilitator, Educator, and Performer</b></p> <p>Organized and facilitated a multi-disciplinary collaboration between <u>Art of Élan</u> and the San Diego Art Institute to explore creativity, deep listening, and mindfulness. Myself and collaborator Ramel Wallace educated and supported youth who composed music for professional musicians with <u>Young Artists in Harmony</u>. We expanded the project to include Hip Hop, a special performance, and facilitated a mindfulness meditation and music composition workshop.</p>
2014– current	<p><b>Composer and Soundtrack Designer</b></p> <p>Led the soundtrack development for Apple's 2018 iPhone Game of the Year <i>Donut County</i> and the 2021 documentary movie <i>Squads</i>.</p>

## RELEVANT OUTREACH ARTICLES

**Koestner, D.,** Tessin, E., and Kristoffersen, A. (2023). Why do some Norwegian fjords turn green? *ScienceNorway.no*. <https://sciencenorway.no/fjords-researchers-zone-satellites/why-do-some-norwegian-fjords-turn-green/2138016> \*Popular Science Article, not peer-reviewed

**Koestner, D.,** Foster, R., and El-Habashi, A. (2023). On the potential for optical detection of microplastics in the ocean. In *Frontiers in Ocean Observing: Emerging Technologies for Understanding and Managing a Changing Ocean*. Oceanography 36 (Supplement 1). <https://doi.org/10.5670/oceanog.2023.s1.15>