CATHERINE MITCHELL

Research Scientist

Bigelow Laboratory for Ocean Sciences
60 Bigelow Dr, East Boothbay, Maine 04544

cmitchell@bigelow.org
+1-207-315-2567 x402

EDUCATION

2015 PhD Physics, University of Strathclyde, Scotland
Thesis title: *Remote Sensing of Inherent and Apparent Optical Properties in Optically Complex Shelf Seas.*
Advisors: Prof Alex Cunningham, Dr David McKee

2011 MSci (Undergraduate Masters), Physics and Mathematics, University of Glasgow, Scotland

PROFESSIONAL APPOINTMENTS

2019-present Research Scientist, Bigelow Laboratory for Ocean Sciences
2015-present Research Scientist, Colby College
2015-2019 Postdoctoral Research Scientist, Bigelow Laboratory for Ocean Sciences

PUBLICATIONS

Lo Prejato, M., McKee, D., **Mitchell, C**. (2020). IOP-Reflectance relationships revisited, *Journal of Geophysical Research*. Submitted.

Mitchell, C., Bowler, B.C., Drapeau, D.T., Balch, W.M., (2020). Phytoplankton and stratification in shelf seas: insights from an 11-year glider time series. Limnology and Oceanography Submitted.

Balch, W.M., B. Bowler, D. Drapeau, L. Lubelczyk, E. Lyczkowski, **C. Mitchell**, and A. Wyeth. (2018). Coccolithophore distributions of the North and South Atlantic. Deep-Sea Research Part I, 151, 103066.

Mitchell, C., H. Gordon, B. Bowler, D. Drapeau & W. M. Balch, (2018). Optical inversions of the water column based on glider measurements. *Optics Express., 26(25),* https://doi.org/10.1364/OE.26.032824

Dall'Olmo, G., R. J. W. Brewin, F. Nencioli, E. Organelli, K. Lefering, D. McKee, R. Rottgers, **C. Mitchell,** E. Boss, A. Bricaud & G. Tilstone, (2017). Determination of the absorption coefficient of chromophoric dissolved organic matter from underway spectrophotometry. *Optics Express, 25*(24), A1079-A1095.

Mitchell, C., C. Hu, B. Bowler, D. Drapeau & W. M. Balch, (2017). Estimating particulate inorganic carbon concentration from ocean color data using a reflectance difference approach. J*ournal of Geophysical Research*. *122,* https://doi.org/10.1002/2017JC013146.

Balch, W. M., N. R. Bates, P. J. Lam, B. S. Twining, S. Z. Rosengard, D. T. Drapeau, B. C. Bowler, R. Garley, L. C. Lybelczyk, **C. Mitchell** and S. Rauschenberg (2016). Factors regulating the Great Calcite Belt in the Southern Ocean and its biogeochemical significance, *Global Biogeochem. Cycles., 30*, 1124-1144, doi:10.1002/2016GB005414.

Mitchell, C., & Cunningham, A., (2016). Derivation of the specific optical properties of suspended mineral particles and their contribution to the attenuation of solar irradiance in offshore waters by ocean colour remote sensing, *Journal of Geophysical Research*. 121, 104–117, doi:10.1002/2015JC011056.
*****featured in the Journal of Geophysical Research Journal Highlights and in the AGU EOS Buzz newsletter (February 2016)***

Mitchell, C., & Cunningham, A., (2015). Remote sensing of spatio-temporal relationships between the partitioned absorption coefficients of phytoplankton cells and mineral particles and euphotic zone depths in a partially mixed shelf sea, *Remote Sensing of Environment,* 160,193-205.

Mitchell, C., & Cunningham, A (2014). Determination of the absorption coefficients of phytoplankton and mineral particles from remote sensing reflectance, *Ocean Optics XXII Extended Abstract,* Portland, ME. ****Awarded Best Student Paper at Ocean Optics XXII***

Mitchell, C., Cunningham, A., & McKee, D. (2014). Remote sensing of particulate absorption coefficients and their biogeochemical interpretation: A case study in the Irish Sea, *Remote Sensing of Environment*, 152,74–82.

Mitchell, C., Cunningham, A., & McKee, D. (2014). Remote sensing of shelf sea optical properties: Evaluation of a quasi-analytical approach for the Irish Sea, *Remote Sensing of Environment*, 143,142–153.

Cresswell, A.J., Sanderson, D.C.W., Harrold, M., Kirley, B., **Mitchell, C.** and Weir, A. (2013). Demonstration of lightweight gamma spectrometry systems in urban environments. *Journal of Environmental Radioactivity*, 124, 22-28, doi:10.1016/j.jenvrad.2013.03.006

FUNDED RESEARCH

2020 Collaborative Conference: A Workshop to Explore Data Science in Oceanography. NSF Oceanography, Co-PI, $7,423.

2020 – 2022 Development of Unmanned Aerial System (UAS) survey methods for statewide mapping, classification, and biomass estimation of the intertidal seaweeds Ascophyllum nodosum and Fucus vesiculosus. Maine Economic Investment Fund Small Campus Initiative, Co-PI, $26,616.

2019 – 2022 Remote sensing methods to characterize, quantify and monitor carbon in a continental shelf sea. NASA Carbon Monitoring System, PI, $431,016.

FIELD WORK

SCALE (Southern oCean seasonal Experiment)*:* An interdisciplinary cruise in the Southern Ocean.
Main responsibilities: operating, maintaining and teaching a student how to use a flow-through bio-optical system. (August 2019)

Gliders in the Gulf of Maine*:* A complement to the GNATS measurements.
Main responsibilities: assistance in the planning of missions and the deployment and recovery of two autonomous underwater vehicles (gliders). (2016-present)

Atlantic Meridional Transect 25 (AMT25).
Solely responsible for the collection of samples for PIC, POC, cell count, BSi and SEM analysis, maintaining and operating both a flow-through bio-optical system and a solar tracking radiometric system. (October 2015)

GNATS (Gulf of Maine North Atlantic Time Series): Long-running time series to measure physical, optical and biogeochemical properties of the Gulf of Maine.
Main responsibilities: collecting samples for PIC, POC, cell counts, BSi and SEM analysis and monitoring the optical underway system. (2015-present)

West coast of Scotland: Submicron particle aggregation and bio-optical properties of different regimes in shelf seas.
Main responsibilities: collecting and running samples for absorption due to chlorophyll-*a*, total and inorganic suspended matter using the filter pad method and spectrophotometer and CDOM using a liquid waveguide. (June 2012)

TEACHING EXPERIENCE

2020	Course Instructor at Bigelow Laboratory's Sea Change Fall Semester Program
2020	Organizer for a virtual "Coding Hour" session for remote undergraduate interns.
2020	Instructor for the Maine School of Science and Math's J-term, a week long, immersive program hosted at Bigelow Laboratory
2019-	Scientific advisor to NGSX (Next Generation Science Exemplar) for the development of a climate science professional development pathway for middle school and high school educators.
2019	Guest lecture at Maine Maritime Academy
2019	Guest lecture at NASA Calibration & Validation for Ocean Color Remote Sensing School, Darling Marine Center, University of Maine
2018	Laboratory Instructor for The Ocean Environment course as part of the Changing Ocean semester for Colby College (held at Bigelow Laboratory) (2018)
2018-	Initiating and facilitating a Girls Who Code club for middle school girls, Damariscotta, ME
2017	Developing and running a "Learn Python Programming" semester long class for 5th grade students at Great Salt Bay School, Damariscotta, ME
2011-2013	Laboratory teaching assistant 1st year physics undergraduate

Mentor for undergraduate interns

Taylor Rouse, 2020: *"Evaluating the performance of standard ocean color algorithms for carbon in the Gulf of Maine"*
Halley Steinmetz, 2017: *"Multispectral, Hyperspectral, and Forel-Ule Data: Conversions using Colorimetry and Implications for Ocean Color Analysis"*
Clara Bird, 2016: *"Seasonal Gulf of Maine CDOM variability as determined by satellite and ships"*
Roseanne Clement, 2013: "*Seasonal variability of suspended sediment using ocean colour remote sensing"*

SERVICE

INSTITUTIONAL

Member of the Data Discovery Initiative ad-hoc committee

Postdoc representative on the Personnel Committee, at Senior Research Scientist meetings & on the Education Taskforce for Strategic Planning

Organiser of the Alternative Career Day held at Bigelow Laboratory for Ocean Sciences

Postgraduate representative on the Athena Swan Physics Self-Assessment Team at the University of Strathclyde.

PROFESSIONAL

Guest Editor for the Environmental Research Letters focus issue on Carbon Monitoring Systems Research and Applications (2020)

Member of the organizing committee for OceanHackWeek

Reviewer for NASA Postdoctoral Program (2019)

Reviewer for Remote Sensing of Environment, Deep-Sea Research - Part I, Frontiers in Marine Science, Estuarine, Coastal and Shelf Science, Journal of Sea Research, Journal of Marine Systems & Remote Sensing (2015 – present)

Proposal Panel Review member for NASA Ocean Biology and Biogeochemistry Program

Student volunteer at the Ocean Sciences Meeting (2014)

Member of The Oceanography Society, Association for the Sciences of Limnology and Oceanography, American Geophysical Union (2012 – present)

HONOURS AND AWARDS

Best student paper at Ocean Optics XXII, Portland ME (2014)

Travel support to attend the Ocean Optics conferences awarded by Ocean Carbon and Biogeochemistry program and NASA (2014, 2016, 2018).

Prize winner at the University Of Strathclyde Images Of Research Exhibition (2013).

Award for Distinction for "Community Engagement" at the University of Strathclyde (2013).

Dougall Prize for the most distinguished students in the Ordinary Class of Mathematics (2008, 2009).

Lorimer Bursay awarded by the Head of Department for excellent performance in exams (2007).

PUBLIC ENGAGEMENT AND OUTREACH

Organised the hands-on laboratory activities as part of Bigelow Laboratory Open Day (July 2018, 2017, 2016).

Judge at the Maine State Science Fair in the Environmental Sciences: Energy, Climate and Weather category (March 2017).

Mentoring 8 high school students on scientific programming, which involved the development and running of a 2 hour Python programming class (March 2017).

Presentation on ocean colour at Gizmo Garden Water Park (a 5-day STEM event for 6^{th}- 9^{th} graders on robotics) (February 2017).

Giving talks to visitors on tour at Bigelow Laboratory (June 2016-present).

Demonstrator at the hands-on laboratory activities as part of Bigelow Laboratory Open Day (July 2015).

Participation at the various primary school **Science Evenings** around Glasgow, where we ran a series of series of scientific activities for children aged 7 – 13 years (2014).

Participation in the **EU Explorathon**, where we ran a small workshop building spectroscopes (September 2014)

Invited speaker to Glasgow's Galilean Society, *"Ocean Colour from Space"* (February 2014)

Participation in the **University of Strathclyde Research Day** "Engaging the Public in Research", which had a special focus on schools engagement (June 2013).

Presentation to the Glasgow Association of University Women on *"Ocean Colour Remote Sensing"* (February 2013)

Organisation of "Science Busking" events as part of Glasgow Science Festival, where participants perform scientific demonstrations in the streets (June 2012, 2013).

Laboratory Demonstrator at the Glasgow Science Festival for 1st and 2nd year high school students (June 2010)

Presentation at the University of Glasgow Open Day, *"Why study Physics & Astronomy at the University of Glasgow?"* (September 2009)

COURSES

Personal sea survival techniques course (STCW95)

University of Strathclyde's "Becoming an Engaging Researcher" course, with selected modules on "Community Engagement" and "Developing Activities for the Public and Public Spaces"

ESA Earth Observation Summer School on Earth System Monitoring and Modelling (30th July – 10th August, 2012)

PROFESSIONAL PRESENTATIONS

2019 NASA Carbon Monitoring System Science Team Meeting, La Jolla, California
2018 Ocean Optics XXIV, Dubrovnik, Croatia
2018 Ocean Sciences Meeting, Portland, Oregon
2017 Bigelow Laboratory for Ocean Sciences Seminar Series
2017 Ocean Carbon and Biogeochemistry Workshop, Woods Hole Oceanographic Institute
2017 International Ocean Colour Science Meeting, Lisbon, Portugal
2016 Ocean Optics XXIII, Victoria, BC
2016 NASA Ocean Color Research Team Meeting, Silver Spring
2015 International Ocean Colour Science Meeting, San Francisco
2014 Ocean Optics XXII, Portland, Maine
2014 Challenger Society Biennial Meeting, Plymouth, UK
2014 Marine Alliance for Science and Technology for Scotland ASM, Edinburgh, UK
2014 EGU Annual Meeting, Vienna, Austria
2014 Ocean Sciences Meeting, Honolulu, Hawaii
2013 Challenger Society Marine Optics Special Interest Group Meeting, Plymouth, UK
2013 Marine Alliance for Science and Technology for Scotland ASM, Edinburgh, UK
2013 Wavelength Conference, Glasgow, UK
2012 Ocean Optics XXI, Glasgow, UK