

Collin P. Ward

Current Address

Woods Hole Oceanographic Institution
Marine Chemistry & Geochemistry
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Education

University of Michigan <i>Earth and Environmental Sciences, PhD</i> ▪ Advisor: Dr. Rose Cory	Ann Arbor, MI	2015
The Ohio State University <i>Master of Science in Environmental Science</i> ▪ Advisor: Dr. Yu-Ping Chin	Columbus, OH	2010
The Ohio State University <i>Bachelor of Science in Environmental Science</i>	Columbus, OH	2008

Professional Positions

- June 1, 2018 Assistant Scientist
Woods Hole Oceanographic Institution, Woods Hole, MA
Marine Chemistry and Geochemistry
- 2016 – 2017 Visiting Scientist
Northeastern University, Nahant, MA
Department of Marine and Environmental Sciences
- 2016 – present Postdoctoral Investigator
Advisor: Dr. Christopher Reddy
Woods Hole Oceanographic Institution, Woods Hole, MA
Marine Chemistry and Geochemistry
- 2015 – 2016 Camille and Henry Dreyfus Postdoctoral Fellow
Advisor: Dr. Rose Cory
University of Michigan, Ann Arbor, MI
Earth and Environmental Sciences

Publications

In Review or Revision

- Aeppli, C., Swarthout, R., O'Neil, G., Katz, S., **Ward, C.P.**, Nelson, R., Sharpless, C., & Reddy, C.M.. How persistent and bioavailable are oxygenated Deepwater Horizon oil transformation products? **In Revision** at *Environmental Science & Technology*.
- Collins, J. R., Fredricks, H. F., Diaz, J. M., Bowman, J. S., **Ward, C. P.**, Moreno, C. M., Longnecker, K., Marchetti, A., Hansel, C. M., Ducklow, H. W., & Van Mooy, B. A. S. The diverse products and biogeochemical significance of lipid photooxidation in coastal surface waters of West Antarctica. **In Revision** at *Geochimica et Cosmochimica Acta*.

Published or In Press

- **Ward, C. P.**, Armstrong, C. J., Conmy, R. N., French-McCay, D. P., & Reddy, C. M. Photochemical Oxidation of Oil Reduced the Effectiveness of Aerial Dispersants Applied in Response to the Deepwater Horizon Spill. 2018. *Environmental Science & Technology Letters*. ACS Editor's choice selection and will be the cover of May 1, 2018 issue.

- **Ward, C.P.**, Sharpless, C.M., Aeppli, C., French-McCay, D.P., Valentine, D.L., Rodgers, R. P., Gosselin, K.M., Nelson, R.K., & Reddy, C.M. Partial photochemical oxidation was a dominant fate of *Deepwater Horizon* surface oil. 2018. *Environmental Science & Technology*, **52** (4), 1797-1805.
- **Ward, C. P.**, Nalven, S.G., Crump, B. C., Kling, G. W., & Cory, R. M. Photochemical alteration of dissolved organic carbon draining permafrost soils shifts microbial metabolic pathways and stimulates respiration. 2017. *Nature Communications*, **8**, 1-8.
 - Highlighted by [the University of Michigan](#), [Phys.org](#), and [DOE-EMSL](#)
- **Ward, C. P.** & Cory, R. M. Complete and partial photo-oxidation of dissolved organic matter draining permafrost soils. 2016. *Environmental Science & Technology*, **50**, 3545-3553.
- **Ward, C. P.** & Cory, R. M. Chemical composition of dissolved organic matter draining permafrost soils. 2015. *Geochemica et Cosmochimica Acta*, **167**, 63-79.
 - Highlighted by [DOE-EMSL](#)
- Cory, R. M., **Ward, C. P.**, Crump, B. C., & Kling, G. W. Sunlight controls water column processing of carbon in arctic fresh waters. 2014. *Science*, **345**, 925-928.
 - Highlighted in [Science Perspective](#)
- **Ward, C. P.**, Sleighter, R. L., Hatcher, P. G., & Cory, R. M. Insights into the complete and partial photooxidation of black carbon in surface waters. 2014. *Environmental Science: Processes & Impacts*, **16**, 721-731.
 - Featured as front cover article of aquatic photochemistry special issue
- Hakala, J. A., Fimmen, R. L., Chin, Y. P., Agrawal, S. G., & **Ward, C. P.** Assessment of the geochemical reactivity of Fe-DOM complexes in wetland sediment pore waters using a nitroaromatic probe compound. 2014. *Geochimica et Cosmochimica Acta*, **73**, 1382-1393.

Invited Presentations

- **Ward, C.P.** (2017) Rethinking the impact sunlight has on the fate of oil spilled into aquatic ecosystems and the tools we use to clean it up. Haverford College, Haverford, PA.
- **Ward, C.P.** (2017) Reevaluating the role of photochemical oxidation in oil spill fate models and response approaches. Massachusetts Institute of Technology, Boston, MA.
- **Ward, C.P.** (2017) Linking organic matter chemistry to its degradation by sunlight in aquatic ecosystems. Old Dominion University, Norfolk, VA.
- **Ward, C.P.** (2017) Linking organic matter chemistry to its degradation by sunlight in aquatic ecosystems. Woods Hole Oceanographic Institution, Woods Hole, MA.
- **Ward, C.P.** (2017) Mechanistic controls of the abiotic and biotic degradation of dissolved organic matter draining permafrost soils. Marine Biological Laboratories, Woods Hole, MA.

Presentations

*Student Mentee

- *Armstrong, C.J., **Ward, C.P.**, Conmy, R. N., French-McCay, D. P., & Reddy, C.M. (2018) Characterizing how sunlight impacts the efficacy of current oil spill response tools. ACS, New Orleans, LA. Poster Presentation.
- Sharpless, C.M, **Ward, C.P.**, & Reddy, C.M (2018) Apparent Quantum Yields of Singlet Oxygen and Photochemical Oxygen Consumption for Crude Oils. ACS, New Orleans, LA. Poster Presentation.
- **Ward, C.P.**, Reddy C.M., & Cory, R.M. (2018) Evaluating the magnitude of partial photo-oxidation of organic carbon in sunlit surface waters. ACS, New Orleans, LA. Oral Presentation.
- Reddy, C.M. & **Ward, C.P.** (2018) The production of spillphatenes following the 2010 Deepwater Horizon disaster. ACS, New Orleans, LA. Oral Presentation.
- **Ward, C.P.** & Cory, R.M. (2018) Molecular level evidence that the magnitude of partial photochemical oxidation of dissolved organic carbon in arctic surface waters is likely underestimated. Arctic LTER Annual Meeting, Woods Hole, MA. Poster Presentation.

- **Ward, C. P.**, *Armstrong, C. J., Conmy, R. N., French-McCay, D. P., & Reddy, C. M. (2018) Photochemical oxidation reduces the efficacy of aerial dispersants applied in response to oil spills. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Oral Presentation.
- **Ward, C.P.**, Sharpless, C.M., Aeppli, C., French-McCay, D.P., Valentine, D.L., Rodgers, R. P., Gosselin, K.M., Nelson, R.K., & Reddy, C.M. (2018) Partial photochemical oxidation was a dominant fate of *Deepwater Horizon* surface oil. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Oral Presentation.
- **Ward, C.P.** (2017) Oil spill response plans should consider weathering by sunlight. WHOI Postdoctoral Symposium, Woods Hole, MA. Oral Presentation.
- *Armstrong, C.J., **Ward, C.P.**, & Reddy, C.M. (2017) Characterizing how sunlight impacts the efficacy of current oil spill response tools. Woods Hole Oceanographic Institution, Woods Hole, MA. Poster Presentation.
- **Ward, C.P.** & Reddy, C.M. (2017) Characterizing the role of photochemical processes in the oxidation of hydrocarbons released during the Deepwater Horizon disaster. ACS, San Francisco, CA. Oral Presentation.
- Cory, R. M., **Ward, C. P.**, Bowen, J., Trusiak, A., and Treibergs, L. (2017) Watershed tea in arctic lakes: Comparing carbon chemistry and cycling in red zinger vs. chamomile waters. ACS, San Francisco, CA. Oral Presentation.
- **Ward, C.P.** & Reddy, C.M. (2017) Assessing the contribution of photochemical processes to the formation of oxidized hydrocarbons following the Deepwater Horizon oil spill: Insights from preliminary laboratory experiments. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Oral Presentation.
- **Ward, C.P.**, Nalven, S.G., Crump, B.C., Kling, G.W., Cory, R.M. (2017) Photochemical alteration of dissolved organic carbon draining permafrost soils shifts key microbial metabolic pathways and stimulates respiration to carbon dioxide. Arctic LTER Annual Meeting, Woods Hole, MA. Poster Presentation.
- **Ward, C.P.** (2016) Controls on the processing of dissolved organic carbon draining permafrost soils in the Alaskan Arctic. WHOI Postdoctoral Symposium, Woods Hole, MA. Oral Presentation.
- Cory, R. M., **Ward, C. P.**, Crump, B. C., Kling, G. W. (2016) Photodegradation of dissolved organic carbon in arctic inland waters. ASLO, Santa Fe, NM. Oral Presentation.
- Nalven, S.G., Crump, B.C., **Ward, C.P.**, Cory, R.M., Kling, G.W. (2015) How does exposing permafrost C to light alter bacterial DOC degradation? AGU, San Francisco, CA. Poster Presentation.
- **Ward, C. P.** & Cory, R. M. (2015) Relating the chemical composition of DOM draining permafrost soils to its photochemical degradation in arctic surface waters. AGU, San Francisco, CA. Poster Presentation.
- **Ward, C. P.** & Cory, R. M. (2015) Relating the chemical composition of dissolved organic matter draining permafrost soils to its photochemical degradation in arctic surface waters. LTER All Scientists Meeting, Estes Park, CO. Poster Presentation.
- Cory, R. M., Neilson, B.T., Harrold, K.H., **Ward, C.P.**, Kling, G.W. (2015) Controls on dissolved organic matter (DOM) degradation in a headwater stream: the influence of photochemical and hydrological conditions. LTER All Scientists Meeting, Estes Park, CO. Poster Presentation.
- **Ward, C. P.** & Cory, R. M. (2015) The effect of carbon source on the degradation of dissolved organic matter draining permafrost soils. Michigan Geophysical Union, Ann Arbor, MI. Poster Presentation - received 2nd place award
- **Ward, C. P.** & Cory, R. M. (2015) How will the fate of dissolved organic matter (DOM) in arctic surface waters change as permafrost sources to the DOM pool increase? Arctic LTER Annual Meeting, Woods Hole, MA. Poster Presentation.
- Cory, R. M., **Ward, C. P.**, Crump, B. C., Kling, G. W. (2014) Sunlight controls water column processing of carbon in arctic fresh waters. AGU, San Francisco, CA. Oral Presentation.

- **Ward, C. P.** & Cory, R. M. (2014) Linking chemical composition of dissolved organic matter from arctic soils to its complete and partial photo-oxidation in surface waters. ASLO Joint Aquatic Sciences Meeting, Portland, OR. Oral Presentation.
- **Ward, C. P.** & Cory, R. M. (2014) The fate of newly exposed carbon in the Arctic - photochemical controls on release to the atmosphere and transport to the ocean. Michigan Geophysical Union, Ann Arbor, MI. Poster Presentation - received 1st place award.
- Kling, G.W., Dobkowski, J.A., **Ward, C. P.**, Crump, B. C., Neilson, B. T., Cory, R. M. (2013) The fate of carbon draining permafrost soils is controlled by photochemical reactions in addition to microbial degradation in arctic surface waters. AGU, San Francisco, CA. Oral Presentation.
- **Ward, C. P.** & Cory, R. M. (2013) Photochemical transformations of black carbon in arctic surface waters. Arctic LTER Annual Meeting, Woods Hole, MA. Poster Presentation.
- **Ward, C. P.** & Chin, Y. P. (2010) The photo-fate of synthetic musk fragrances in surface waters. OSU Environmental Science Graduate Program Seminar Series. Oral Presentation.
- **Ward, C.P.** & Chin, Y. P. (2009) The influence of dissolved organic matter on the photo-fate of synthetic fragrances. ACS, Washington, D.C. Poster Presentation.
- Hakala J, Fimmen R. L., Chin, Y.P., Agrawal, S. G., **Ward, C.P.** (2007) Assessing the geochemical reactivity of Fe-DOM Complexes in lacustrine sediments using nitroaromatic probe compounds. AGU, San Francisco, CA. Oral Presentation.

Workshops

- Exploring the potential of ramp pyrolysis oxidation to study the global carbon cycle. National Ocean Sciences Accelerator Mass Spectrometry Facility (NOSAMS), Woods Hole, MA (2016).
- SERC Earth Educators Rendezvous: Preparing for an Academic Career in the Geosciences. The University of Wisconsin, Madison, WI (2016).
- Preparing Future Faculty: Rackham Graduate School. The University of Michigan, Ann Arbor, MI (2015).

Field Research Experience

- Gulf of Mexico: Multiple trips to collect *Deepwater Horizon* oil residues from (2016- 2018)
- Lake Erie, OH: 3 day cruises with NOAA (2014)
- Toolik Lake, Alaska: 3-month field campaigns (2011 - 2013)
- McMurdo Station, Antarctica: 3-month field campaign (2009-2010)
- Stoneville, Mississippi: 1-week field campaign (2008)
- Old Woman Creek, OH: >5 day trips (2006-2010)

Teaching

- Guest Lecturer - Environmental Geology (5,7-April-2016)
- Teaching assistant - Global Change: The Science of Sustainability (Fall 2014)
- Teaching assistant - Environmental Geology (Spring 2014)
- Teaching assistant - Introduction to Environmental Sciences (Fall 2013)
- Teaching assistant - Environmental Health (Fall 2010, Spring 2011)

Service

- Reviewer for: *Environmental Science & Technology*, *Geochimica et Cosmochimica Acta*, *Organic Geochemistry*, *Aquatic Sciences*, and *Hydrobiologia*

Professional Associations

- Coastal and Estuarine Research Federation (2017 - present)
- American Chemical Society (2008 - present)
- American Geophysical Union (2008 - present)
- Association for Sciences of Limnology and Oceanography (2013 -present)

Mentoring and Outreach

- I am committed to improving retention rates of students majoring in science, technology, engineering, and mathematics disciplines, especially underrepresented minorities. I have mentored several underrepresented minority students in the classroom, field, and laboratory, and place a strong emphasis on building ties with these students in the local community.
- Mentoring experience:
 - Julia Jackson – Dartmouth undergraduate visiting WHOI (Jan - Mar 2018)
 - Abigail Eckland – Tulane undergraduate (Feb 2018)
 - Cassia Armstrong – Trinity College undergraduate visiting WHOI (Jun - Jul 2017)
 - Alexandra Morrison – Haverford College undergraduate visiting WHOI (Jun - Jul 2017)
 - Chalique Umasangaji - visiting graduate student visiting WHOI (Oct - Dec 2016)
 - Hilary Green – UNC Chapel Hill undergraduate visiting WHOI (Aug 2016)
 - Noah Attal - undergraduate student at UM (Nov 2014 - Sept 2015)
 - Anna Klinger - undergraduate student at UM (Jun - Aug 2013)
 - Yvonne Nguyen - undergraduate student at UNC (Jan - Apr 2013)
 - Brittany Papworth - undergraduate student at UNC (Jun - Aug 2012)
 - Zack McKenzie - undergraduate student at UNC (2011-2012)
 - Kelly Gagnon - undergraduate student at UNC (2011-2012)
 - Reece Lonsert - undergraduate student at OSU (Aug 2009 - May 2010)
- Sampled the Mississippi in coordination with the Global Rivers Observatory. Mentored one undergraduate student enrolled in the Tulane University ByWater Institute, Abigail Eckland, during the sampling campaign.
- Presented to the Army Youth Leadership Forum on the many roles of sunlight on Earth, including impacting oil spills, degrading pollutants, and bleaching organic matter in surface waters (August 2017). The group was comprised of ~20 middle-school students from US Army families across the world.
- Field sampling with [Florida State University High School](#) students. Coordinated and led a diverse group of 25 high school students on a field sampling trip to Fort Morgan, AL. (May 2017)
- Coordinating efforts with Michael Sullivan, the Director of Science at [John D. O'Bryant School of Mathematics and Science](#) in Boston, to host WHOI scientists in a day of engagement with students. Nearly 90% of the junior-high and high school students at John D. O'Bryant are underrepresented in STEM disciplines. (Jan 2017 – present)
- [Partnership Education Program \(PEP\)](#) - applied to advise an underrepresented minority summer student intern for six weeks in the field and laboratory. (June - July 2017)
- [Tidmarsh Farms](#) - volunteered to help facilitate the largest cranberry bog restoration project in the country. (Sept 2016 - present)
- Environmental and cultural opportunities for girls in urban southeast Michigan ([ECO girls](#)). (November 2013) Coordinated laboratory demonstrations and discussions about freshwater quantity and quality, as well as a tour of different Earth Science laboratories on the UM campus.
- Collaborated with [Frontier Scientists](#) to create several videos focused on the impact of photochemical processes on carbon cycling in arctic surface waters. Segments of these videos were screened in 2015 on PBS-Alaska. (June 2013)
- [Hillandale Elementary School](#) - Science Day. (March 2013) Presented to over one-hundred 5th grade students about “Energy and the Environment.”
- Investigating stream microbes and their role in the carbon cycle – UNC Institute for the Environment. (November 2012) Co-wrote a high-school lesson plan on freshwater carbon cycling.
- [Laurel School for the Girls](#). (May 2010) Discussed carbon cycling research with dozens of 6th grade science students.
- [West Broad Elementary School](#) - Career Day. (September 2009) Led laboratory demonstrations and discussions about freshwater quantity and quality to over one-hundred 3rd and 4th grade students.

- Research Experience to Enhance Learning ([REEL](#)). (March - June 2008) Served as a mentor to two undergraduate analytical chemistry classes, assisting with the chemical analysis of soil and water samples.
- Future Engineer's Summer Camp (FESC). (July 2007) Led activities and discussions about water quantity and quality with dozens of middle-school aged girls.