

# Department of Environmental Science

Barnard College



## Save the Date: It's our 35th Anniversary!

We are excited to share with you that the Department of Environmental Science is preparing to celebrate our 35th anniversary this coming fall.

We will be bringing together alumnae, students, and faculty for a program celebrating environmental leadership and innovation, on November 14th from 1-7 PM. Workshops on creative approaches to research, technology, education, outreach, and advocacy and will be capped by a panel and a reception. The program is hosted by the Environmental Science Department in partnership with the Athena Center.

**We hope you can join us!**  
Formal Invitations to follow.



### Inside this issue

Stephanie Pfirman: Melting Sea Ice and Pollution .....2

EcoChains Honored.....3

Stay Current with LinkedIn .....4

Collette Kelly '17 Presents Senior Thesis Research .....4

Barnard Marches for Science..5

2017 Senior Theses.....6

Celebrating our Seniors.....7

From the Archives.....8

# Stephanie Pfirman Publishes Study Showing that as Climate Stirs Arctic Sea Ice Faster, Pollution Tags Along

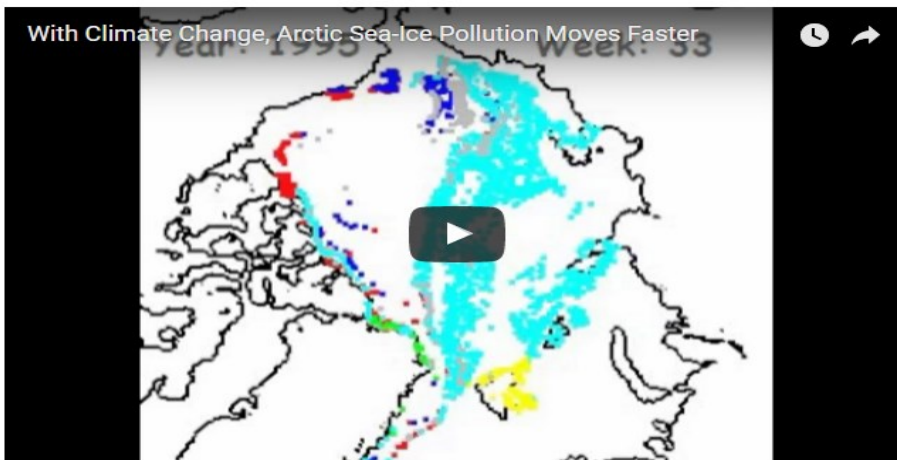
## Contaminants More Likely to Cross National Borders

Article by Kim Marineau, originally published in the [Earth Institute blog](#)

A warming climate is not just melting the Arctic's sea ice; it is stirring the remaining ice faster, increasing the odds that ice-rafted pollution will foul a neighboring country's waters, says [a new study](#).

Declining sea ice is opening more of the Arctic Ocean to industrial development and resource extraction, raising concerns that oil spills and other pollution could endanger the region. The new study, which maps the movement of sea ice in the region, underscores the risk of contaminated sea ice drifting from the economic zone of one country to another's. Eight nations have exclusive economic zones off their Arctic coasts.

In the study, published this week in the journal *Earth's Future*, researchers at Columbia and McGill universities find that faster moving sea ice is responsible for exporting 1 million square kilometers of ice — an area bigger than France and Germany combined — from one nation to another each year. That's about a fifth of all sea ice formed.



As Arctic sea ice thins and retreats, the winds are pushing it faster and farther, allowing year-old ice to escape the summer-melt front, even as the front advances north. Using satellite images and GPS-tagged ice buoys, between 1988 and 2014 the researchers tracked 239,000 parcels of ice from their formation to their eventual demise. Consistent with earlier findings, they confirmed that ice floes have picked up their pace by about 14 percent each decade.

Partly due to this acceleration, they calculate that 21 percent of all ice, covering 1 million square kilometers, drifted beyond

**Arctic sea ice is now drifting faster and farther than it used to, potentially transporting more pollution across national boundaries. This video shows ice traveling progressively farther afield between 1982 and 2012. Ice formed in Russian waters is light blue; Iceland, yellow; Greenland, green; Canada, red; United States, dark blue. (Robert Newton/Lamont-Doherty Earth Observatory) <https://youtu.be/sXaUOI0m-Vs>**

the exclusive economic zone, or EEZ, where it formed. The EEZ extends 200 miles off a country's coastline, but nations can extend their economic activities further if they can show that the sea bottom continues from their continental shelf.

Most Arctic sea ice forms in Russian waters, making Russia the region's top exporter of ice as well. Most Russian

ice drifts into waters off Norway and Greenland. The United States is the region's second largest exporter, offloading most of its ice on Russia. The U.S., in turn, receives most of its imported ice from Canada.

"These regions are all connected," said the study's lead author, Robert Newton, an oceanographer at Lamont-Doherty. "If you have oil spills off one continental shelf, the ice will move that pollution to other nations, and to any wildlife refuges that we may create. If you're planning for conservation and stewardship you need to take a pan-arctic view."

The Arctic Ocean is expected to lose much of its summer sea ice by the 2030s as the region continues to warm twice as fast as the rest of the planet. The United States and its seven Arctic neighbors are already planning for the coming resource rush. The U.S. Geological Survey estimates that 13 percent of the world's undiscovered oil, and 30 percent of its natural gas, lie beneath the Arctic seafloor. Open waters in the summer are also expected to bring an uptick in freight shipping and tourist cruise ships.

The consequences of a spill could be enormous. In a worst-case scenario modeled earlier this year by study coauthor Bruno Tremblay and his colleagues, an oil spill at the end of the summer drilling season could be carried by sea ice 4,000 kilometers away, polluting up to 2 million square kilometers of ocean. The cleanup would be hampered by months of cold and near-complete darkness. By the following summer the contamination would reach multiple countries, they found.

As shrinking sea ice alters the habitat of polar bears, seals, whales and other Arctic wildlife, environmental groups, including most recently the International Union for the Conservation of Nature, have recommended creating a series of protected areas off the coasts of Canada and Greenland, where ice is projected to persist. The current study shows just how vulnerable downstream wildlife may be.

"We all know that pollution in a watershed ends up in lakes and rivers downstream," said Tremblay, who holds joint appointments at McGill University and Lamont-Doherty. "But I don't think the concept of an 'iceshed' is fully appreciated. The countries around the Arctic are all connected, so therefore we need to develop agreements that protect coastal waters where ice is formed."



An understanding of drifting sea ice patterns may aid conservationists as they seek to establish wildlife refuge zones in the Arctic. (Margie Turrin/Lamont-Doherty)

## Stephanie Pfirman's Card Game Receives Honor

EcoChains: Arctic Crisis is a Parents' Choice Approved Award Winner!





## Stay Current!

- Department News & Events
- Connect with Fellow Alumnae
- Networking
- Job & Internship Opportunities



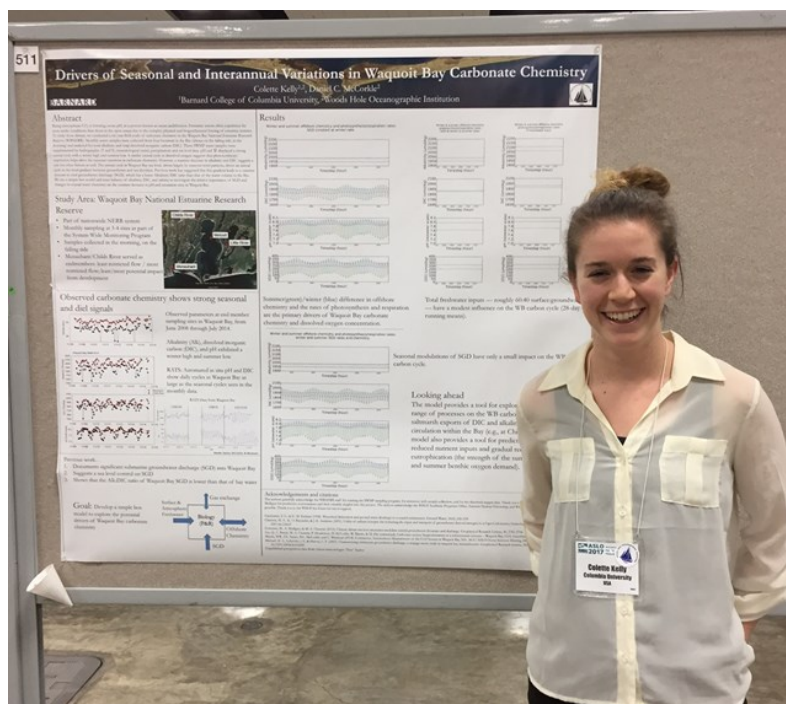
Or Search:  
"Barnard College  
Environmental  
Science Alumnae"

# Collette Kelly '17 Presents her Senior Thesis Research at the ASLO 2017 Aquatic Sciences Meeting

By Collette Kelly

This February, I had the opportunity to attend the Association for the Sciences of Limnology and Oceanography (ASLO) 2017 Aquatic Sciences Meeting in Honolulu, where I presented my environmental thesis work. My thesis was a continuation of my research as a Summer Student Fellow at Woods Hole Oceanographic Institution (WHOI; it wouldn't be science if I failed to include at least two acronyms), where I worked with senior scientist Dr. Daniel McCorkle to assess the representativeness of a six-year carbonate chemistry dataset and locate potential drivers of seasonal variation. During the academic year, I built a model using Python to assess the impact of the drivers that I identified over the summer, the results of which I presented at ASLO. This was a great opportunity to assess my work so far, meet other scientists in the field, and get asked difficult questions. It also gave me a sense of the breadth of research in oceanography: the conference was a week long, so when I was not presenting my poster, I attended talks and presentations on submarine groundwater discharge, ocean nutrient cycling, remote sensing, and many other topics. In addition, I met up with several of my peers from last summer, who were presenting their work as well. I was lucky enough to have funding through the NOAA-SeaGrant program, which funded my travel, and from WHOI, which funded my registration for the conference; I also benefitted from the mentorship of Dr. McCorkle while at the conference, since he attended as well.

Collette Kelly '17 with her poster at the ASLO Aquatic Sciences Meeting in Honolulu



## Barnard Marches for Science



On April 22nd over 30 Barnard community members made their way to Central Park West to the March For Science. The march was a nonpartisan group of scientist and science supporters calling for the use of scientific evidence in policy decision making. Professors Terryanne Maenza-Gmelch and Sedelia Rodriguez, and Program Manager Leslie Raucher marched with students, faculty, staff and alumnae.

Leslie Raucher and Olivia Williamson '17 share their reflections.

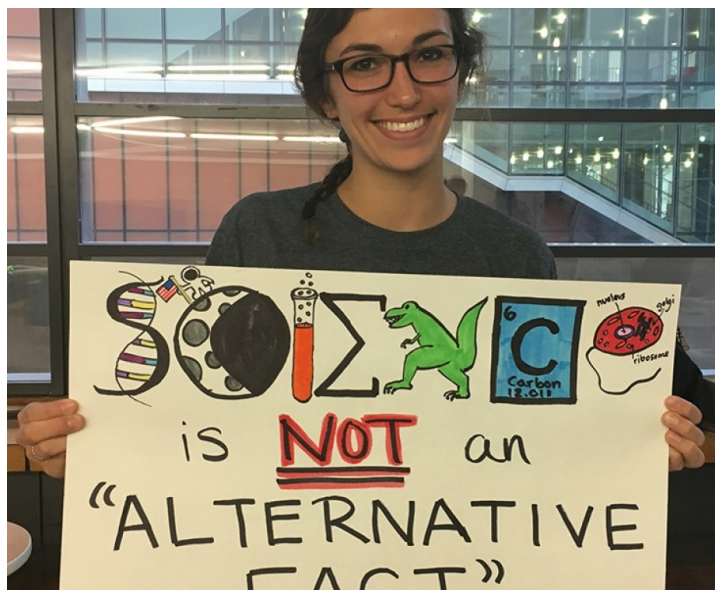
### Leslie Raucher, Program Manager

#### Department of Environmental Science

The Barnard education is not limited to within our gates. Today's march was part of learning about being a responsible citizen. It was also about ensuring that the sciences will always have a place at Barnard and that our students will have opportunities within their field of interest and be able to continue to contribute to society after graduation. It was incredible to take part with a group of passionate students



Professor Terryanne Maenza-Gmelch marching with Leslie Raucher



### Olivia Williamson '17

#### Environmental Science

I marched because I refuse to let politics silence science and jeopardize the lives and well-being of millions of people around the world. We need this march so our elected officials know we will not stand by while they ignore the truth. Barnard is an exceptional institution with exceptional women who are making advances in all kinds of fields, including science, and we need to make our voices heard as scholars and people who care about these issues.

Reflections from members of other departments can be found at

<https://barnard.edu/news/barnard-marched-science>

## 2016—2017 Senior Theses

**Brodsky, Olivia:** Soil Influence on Plant Water Conductance in New York City Green Infrastructure

**Buhler, Karina:** Using Macrofossils to Reconstruct the Paleoenvironmental History of Cedar Bog in High Point State Park, New Jersey

**Kelly, Colette:** Variation in Carbonate Chemistry of Waquoit Bay, MA

**Leshko, Shana:** Surprises Under the Ice: Carbonate Chemistry and 2016 Antarctic Sea Ice Anomaly

**Mayo, Evelyn:** Seafloor Changes in the Long Island Sound 1990-2013

**Myers, Kimberly:** A Spatiotemporal Analysis of land cover, precipitation and fire relationships in the Colombian Eastern Plains

**Pries, Christine:** Modeling Arsenic, Iron and Sulfur Cycling under Biologically Mediated Reduction

**Schank, Maya:** Ascertaining Patterns of Agrobiodiversity in Multistrata Agroforestry Systems of Southern Belize

**Siritzky, Meghan:** Paleomagnetic Excursion in Mono Lake, CA

**Secular, Deborah:** Low-temperature Serpentinization and Magnesium Leaching in Maryland Ultramafics

**Spierer, Hannah:** Quantifying Geomorphological Changes at Two Hydrothermal Vent Fields on the Lau Back-Arc Basin

**Taylor, Madalyn:** Community Composition and Island Biogeography of Mobile Fauna on Pelagic Sargassum in the Caribbean Sea, 2015-2016

**Vieira, Max:** Transport of Hydraulic Fracturing Chemicals Through Sandstone Cores to Identify Indicators of Groundwater Contamination and Implications for Potential Health Impacts

**Williamson, Olivia:** Effects of Elevated pCO<sub>2</sub> on growth rate and net H<sub>2</sub>O<sub>2</sub> production in Harmful Algal Bloom Species *Heterosigma akashiwo*

**Zucker, Cynthia:** What Are the Sources of High Ozone Contributing to High Pollution Events in Texas in 2011-2012

**Three of our 2017 graduates now have jobs thanks to our growing alumnae network!  
Feel free to let us know anytime you have an opening in your workplace.**



# Celebrating our Graduates!



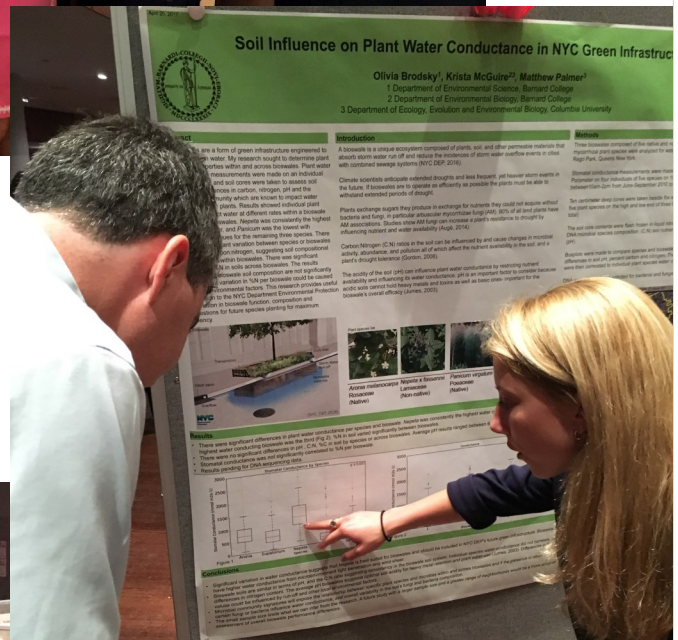
Above: Graduation Celebration

Top Row: Evelyn Mayo, Deborah Secular, Colette Kelly,  
Brian Mailloux, Catherine Cook

Bottom Row: Leslie Raucher, Cynthia Zucker, Olivia Brodsky,  
Cerentha Cook, Terryanne Maenza-Gmelch, Sedelia Rodriguez

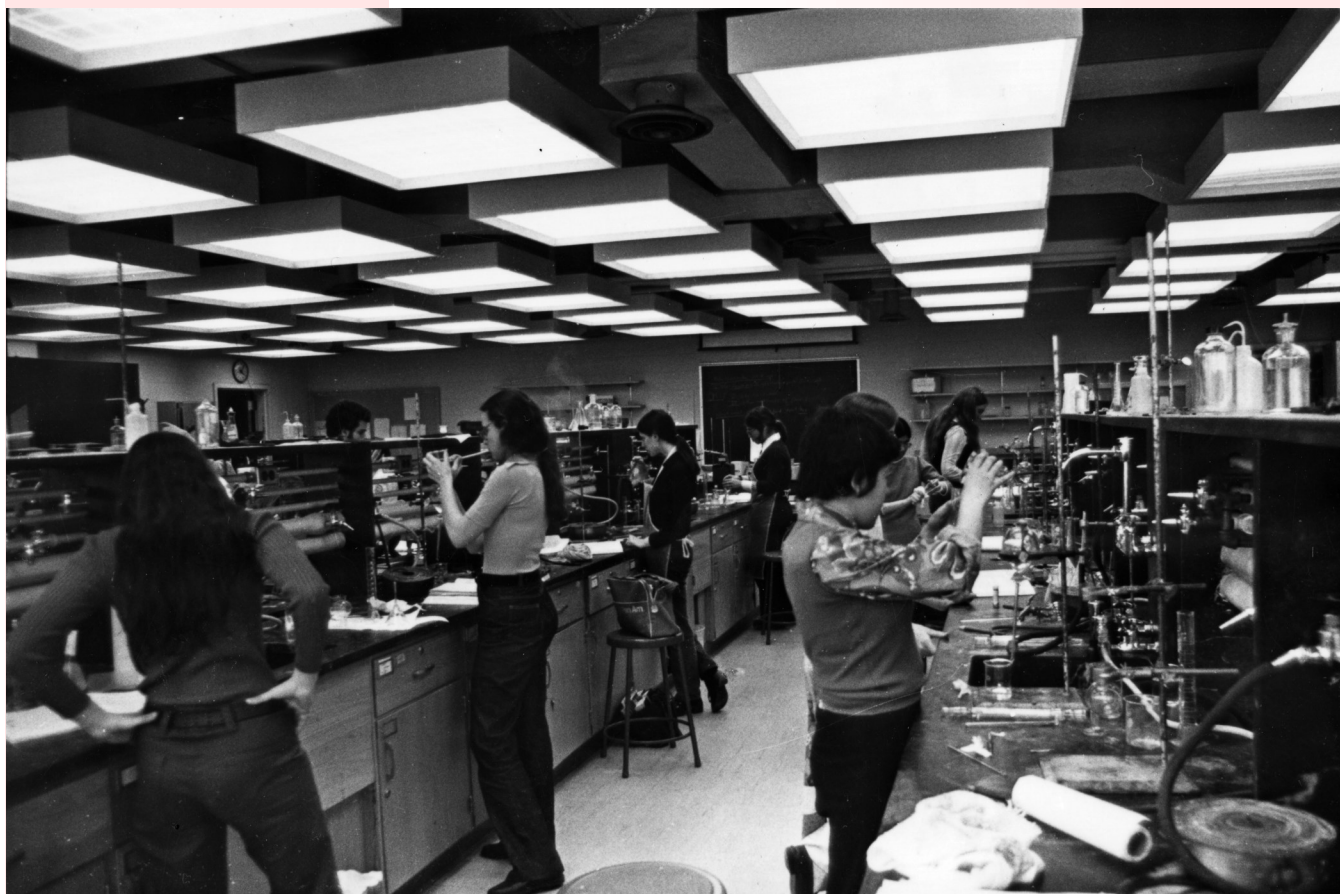
Right: Olivia Brodsky explaining her research to Brian Mailloux

Bottom: The Senior Seminar Poster Session in the Diana Event Oval



## From the Archives

Geology/Geography Soil Judging Contest,  
Chemistry Lab, Barnard College.  
circa 1975.



Do you have photos we can add to our collection?  
Email them to [LRaucher@barnard.edu](mailto:LRaucher@barnard.edu)

If you are interested in directly supporting our students' research projects  
please contact Beth Mauro in the Development Office  
at [bethmauro@barnard.edu](mailto:bethmauro@barnard.edu) or by calling [212-870-2535](tel:212-870-2535).