

Student Spotlight

EMILY GAUB

**M.S. student
Civil and Environmental Engineering**

This summer, I completed a three-month internship with the Atlantic State Legal Foundation (ASLF). ASLF is a not-for-profit based in Syracuse that provides legal support for a variety of environmental issues, including the Onondaga Lake cleanup. As an intern, my tasks varied day-to-day, depending on the needs of ASLF.

One of the major projects I worked on was CEDARS, which is a program to build green infrastructure in Syracuse. To help address Syracuse's combined sewer overflow, ASLF built pilot rain gardens in vacant lots. For this project, I conducted infiltration tests on the vacant lots and worked on community outreach. Christa Kelleher, Ph.D., from the Earth sciences department, was also gathering data from the lots and I acted as liaison on behalf of ASLF. I often accompanied Professor Kelleher as she worked with her students on the vacant lot sites, taking records for ASLF. I also assisted in research for potential future sites, visiting multiple locations to assess suitability. With construction to start in the fall, community outreach is becoming increasingly important. ASLF has already established a good relationship with neighbors adjacent to rain garden locations, but outreach will continue to expand to the entire neighborhood. I found other local community organizations for ASLF to contact and designed an informational flier for community members.



Work at a not-for-profit comes with challenges, yet I found the work to be rewarding. I believed in ASLF's goals for improving the environment and protecting communities from environmental degradation. This aligns with my future desire to work in environmental restoration for the benefit of community development and restoring local habitat.

ROBIN GLAS

Ph.D. student, Earth Sciences

Last year I was awarded a grant supplement from the National Science Foundation to intern for the US Geological Survey at the New York Water Science Center in Troy, N.Y. Under the mentorship of Douglas Burns, Ph.D., a prominent researcher in the fields of biogeochemistry and hydrology, we developed a project to examine trends in streamflow and weather-related variables in New York State over the past six decades.

Climate change affects our streams and rivers across the country, contributing to changing flood and drought patterns that vary geographically. Because the United States is so large, climate change effects on streamflow need to be studied at the state and local levels. New York is one of the

first states to sign into law the Community Risk and Resiliency Act, which aims at requiring state agencies to consider climate change-associated risks and extreme weather events in regulatory decision-making. This is important for the construction of bridges, culverts, and highways, which need to withstand the strength of flooding rivers and powerful weather events. This project allowed me to learn how to code and manage big data sets, and sharpened my map analysis skills in ArcGIS. We are finding some interesting results so far. For example, across the state and surrounding areas, the spring snowmelt is occurring earlier each year, and average flow rates for streams and rivers are increasing, particularly in the Catskill and Adirondack regions.

Now having completed my internship at the USGS, I am back at Syracuse University finishing up the analysis on my own, and will be presenting the results at the Geological Society of America conference in Seattle this fall. I aim to publish the study in a peer-reviewed journal, and add the work to my Ph.D. dissertation. This career pathways experience was an incredible opportunity to branch out and explore new questions and skillsets, while allowing me to work alongside talented governmental scientists at the USGS. This project would not have been possible without the support of Syracuse University's EMPOWER NRT program.



Robin Glas

Syracuse University
EMPOWER

Education Model Program on Water-Energy Research

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LEADERSHIP TEAM

Earth Sciences

Christopher Junium, Organic Geochemistry
Laura Lautz, Hydrology

Christopher Scholz, Sedimentary Basin Analysis

Donald Siegel, Hydrogeology

Civil and Environmental Engineering

Charles Driscoll, Environmental Engineering

Chris Johnson, Environmental Chemistry

Chemistry

Tara Kahan, Environmental & Atmospheric Chemistry

Maxwell School of Citizenship and Public Affairs

Peter Wilcoxon, Energy Economics

S.I. Newhouse School of Public Communications

Donald Torrance, Science Communication

CONTACT

Visit empower.syr.edu for our calendar of events, full news stories, and the latest program information.

For more information about the program, contact

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News from

EMPOWER

FALL 2017

EMPOWER Experiences:

Professional Training Beyond the Classroom



From the Director

In July of this year, Sara Alesi successfully defended her M.S. thesis and became the first official graduate of EMPOWER. As part of her experience, Sara participated in the Water-Energy Seminar during three of her four semesters at Syracuse, and was an integral part of the EMPOWER community. She was our first student to take a course in the College of Law, and used an EMPOWER seed grant to attend the AAAS Annual Meeting this past spring. She regularly took advantage of professional development opportunities, such as the peer mentoring and Myers-Briggs Type Indicator workshops. She was also the first student to complete a capstone Career Pathways Experience by interning at Plumley Engineering for a summer. In recognition, Sara received the EMPOWER Director's Citation for Excellence.



Sara Alesi receives "Director's Citation for Excellence."

Sara exemplifies the experience that we hope all EMPOWER students have. It has been exciting to watch our current cohort grow their professional network and find opportunities to fulfill their capstone Career Pathways Experience. Elsewhere in this newsletter, you can read about the awards our students recently received from the National Science Foundation (NSF), which increasingly recognizes the importance of career preparation for STEM graduate students. The awards support research internship experiences with government agencies and not-for-profits. In our Student Spotlights, you can read about two students who recently completed their Career Pathways Experiences, which is a signature component of our program. Robin Glas interned with the USGS and Emily Gaub interned with the not-for-profit Atlantic States Legal Foundation. Robin and Emily also participated in the summer field class, which I co-taught with several EMPOWER faculty, including Chris Junium, who is featured in our Faculty Spotlight.

At the same time that we see our first students complete their capstone experiences and graduate, we welcome a new cohort of trainees who are coming together this semester for the first time in the foundational Water-Energy Seminar. There is much more to come!

—LAURA LAUTZ, Director, EMPOWER

ON THE COVER: New and returning trainees gather at EMPOWER's orientation in September 2017. Photograph courtesy of Steve Sartori.

EMPOWER Students Take to the Field

Calcareous "concretions" form within sediments on the ocean floor when bacteria eat away at organic matter and produce the chemical compounds that are the building blocks for the mineral calcite. These spherical concretions, which can be as small as golf balls or as large beach balls, are sprinkled throughout the Marcellus Shale in Upstate New York.

EMPOWER students learned about this, and much more, during EMPOWER's domestic summer field class. Throughout the two week class, participants worked collaboratively to design research questions, execute a field campaign, analyze water samples in the laboratory, and interpret their findings at several regional sites, including Fayetteville Green Lake and Hubbard Brook Long-term Ecological Research Site.

Led by EMPOWER faculty members Chris Junium and Laura Lautz, students learned that the same conditions that formed the concretions in the Marcellus Shale can be found at the bottom of Fayetteville Green Lake. Through self-designed research projects, students brought



EMPOWER trainees participate in summer field course.

complimentary expertise in field work, analytical chemistry, public speaking, and data analysis to their experiences at Green Lake.

The second week of the field class, held at Hubbard Brook, N.H., was directed by EMPOWER faculty members Charley Driscoll and Chris Johnson. At Hubbard Brook, students designed experiments to investigate greenhouse gas emissions and rates of carbon cycling in streams.

Such experience working on collaborative, interdisciplinary projects is an important component of our professional development training. Next summer, EMPOWER will have its international field course in Rwanda to see a shale gas basin in the process of formation, and to explore unique energy systems of the developing world.

Students Awarded NSF Grants for Professional Internships

The EMPOWER NRT program recently received \$100,000 in funding from the National Science Foundation's INTERN program to support professional internships for students in EMPOWER.

The funding, awarded through a competitive grant program, provides stipend, tuition, and travel support for M.S. and Ph.D. students to intern with professional organizations. Internships are relatively rare for students in research-based

STEM graduate degree programs, but a critical component of career preparation. EMPOWER has three students who will be doing internships through this award:

- **Nathaniel Chien** (M.S. student, Earth sciences) is interning with The Nature Conservancy of Wyoming, a not-for-profit environmental agency that works on land and water conservation.

Faculty Spotlight

CHRIS JUNIUM

assistant professor of Earth sciences in the College of Arts and Sciences

Nitrogen, an essential element in all living organisms, is responsible for the formation of proteins, amino acids, DNA, and RNA. According to EMPOWER NRT Co-PI Chris Junium, "Understanding the nitrogen cycle through the Earth's history is important because it [nitrogen] controls global primary productivity, which, in turn, regulates climate, weathering, and the amount of oxygen at the Earth's surface."

Working with ancient sedimentary rock cores from South Africa, Junium and his colleagues recorded environmental conditions during the "Great Oxidation Event" (GOE). They found that the first occurrence of widespread nitrate coincided with the initial appearance of oxygen in the atmosphere. This discovery, which is described in an article recently published in *Nature*, not only illuminates how life evolved alongside changes in the chemistry of the Earth's surface, but also fills in a 400-million-year gap in geochemical records.

"We've captured, for the first time, the response of the nitrogen cycle through this major transition in the Earth's surface environment," says Junium, pointing out that the GOE was not an instantaneous event, but took hundreds of millions of years.



The prevailing notion is these events would have triggered the rapid diversification of organisms reliant on atmospheric oxygen. Instead, more than a billion years passed before oxygen levels were high enough for evolution of more complex organisms. Why the delay?

"It remains an item of intense interest amongst the geochemical community, a question that we are actively seeking to answer," according to Junium.

Junium's work was funded by the National Science Foundation, and involved researchers from St. Andrews, the University of Leeds, and the University of California, Riverside.

Visit nature.com to access the article. For the full story, please see news.syr.edu.



Q&A

with External Advisor Aisha Morris

EMPOWER is supported by an **External Advisory Committee** (EAC), which is comprised of professionals in non-academic careers, including energy, advocacy, government research, environmental consulting, and STEM education. The EAC provides guidance for programming to ensure high-level performance of EMPOWER graduates in the workplace.

Q Tell us a little bit about your current position.

A I am an education specialist and director of the Research Experiences in Solid Earth Science for Students (RESESS) internship program, managed by UNAVCO. In that position, I craft strategies for recruiting, training, and retaining the geoscience workforce of the future. I am also responsible for UNAVCO's Geo-Workforce Development Initiative, including managing undergraduate and graduate student internship programs and supporting early career professionals as they transition into the geoscience workforce.



Q What sparked your interest in participating in the EMPOWER NRT team?

A My interest in EMPOWER is driven by the NSF's program goals to prepare graduate students for careers beyond the typical academic track, including industry, nonprofit, and governmental positions. It is critical that we provide students with the skills, experience, and preparation to successfully pursue opportunities in a diversity of workforce sectors.

Q What do you hope to see as outcomes for the EMPOWER program?

A I think one important outcome of the EMPOWER program will be to produce graduates who are equipped to successfully pursue careers in the range of workforce sectors that employ well-trained scientists. Another important outcome will be dissemination of information to higher education professionals about effective strategies that prepare graduate (and undergraduate) students to enter the workforce.

Q As a Ph.D. scientist yourself, what advice would you give our EMPOWER trainees?

A I encourage the EMPOWER trainees to really think about the problems or challenges they are interested in addressing or solving, but try not to limit the approach they think they need to use. They should be open to looking at things unconventionally, even from fields that may not have an obvious connection to the specific challenges they want to address—that can make for really interesting and unique work.

Q What do you do for fun?

A My entertainment and relaxation varies from attending performances at the Denver Center for Performing Arts (where I am a subscriber—think season tickets) to camping, hiking, and eating! Also, as a serious beach lover I never thought I would say this, but I am now a huge skiing fanatic!

Aisha Morris is the education and community engagement specialist and director of the RESESS Program at UNAVCO.