



PolarTREC Public Science Report
Regina Brinker
Arctic Sunlight and Microbial Interactions 2014
Toolik Field Station, Alaska, 2014





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My participation in the PolarTREC program began in February, 2014. Teachers in the next section group were brought to Fairbanks, Alaska to meet with PolarTREC staff and alumni for training. We learned safety protocols for the field, became familiar with equipment we might be using, learned effective use of media resources, saw examples of lessons and outreach programs to use in the classroom and in public presentations, and were outfitted with appropriate clothing and gear for the field.

During June and July, I was at Toolik Field Station in northern Alaska. Toolik is year-round base for international research groups. Rose Cory, PhD and George Kling, PhD, University of Michigan, are the principal investigators for the research project I am involved with, Arctic Sunlight and Microbial Interactions.

Working as part of the research team, I participated in collection and documentation of water samples at various sites and preparation of materials in the lab. I was able to observe cutting edge science research in action. Seeing the attention to detail in planning and data collection, collaboration among of team members and among various research groups gives me an appreciation of what needs to be done to do world-class science.



Regina Brinker: C-OPS to measure light waves

As Toolik is an international field station, I was able to meet researchers from around the world and learn about their projects. Passion and curiosity are common traits among the scientists. Seeing them go about their work inspires me to work with students to find and pursue their passions.

Being in the field in northern Alaska gave me an appreciation for the grandeur and fragility of Arctic ecosystems, along with an appreciation of the scale of impact that climate change has in this region. Reading about the thawing permafrost and release of carbon dioxide is one thing. Driving for ten hours and seeing nothing but open space, land changing as temperatures warm, made me appreciate the magnitude of climate change's impact in the Arctic.

Even before I left Toolik, I was sharing my experiences and insights with others. I posted a lesson Join Me in the Arctic on the Skype for Education website, and had a good response. I connected live with over 300 students from ten countries, including the Netherlands, Chile, Korea, China, India, Australia, the United States, Ireland, and the United Kingdom. Students ranged from kindergarten to college level. All audiences paid close attention to my story, and were interested in the impact climate change has on polar regions, and how this change affects other regions.

I will share my experiences in the science classroom, with colleagues, and at public outreach programs.

My field experience adds to my science teaching in four primary ways. Students need to know how to make and record accurate data collections; Students need to be able to work collaboratively; Students need to be open to learning new things and working outside of their discipline; students need to understand the impacts of climate change.

The first three points can be reinforced throughout science curriculum.

Scientists in the field keep lab notebooks. Seeing the detail with which the notebooks are kept encouraged me to pay more attention to how students take note and record data. I could see the result keeping a good lab book, and need to convey this message to students.

I observed scientists working seamlessly together, anticipating needs of other groups, and helping out as needed. Sometimes the scientists collected data that would be shared, sometimes they were just lending a hand. The point is that the groups worked together, even if they weren't from the same organization. Students need to become more comfortable working with others that are outside of their immediate group, and work together cooperatively. As a science teacher, I need to find more ways to facilitate this skill.

While I try to encourage students' passions, I also need to remind students that jobs they will be working in may not even exist today. They need to be ready to adapt to changes and to learn new skills. One example of working outside of one's area of training was seen when the geologist was working on DNA samples. Some may think that biology and geology are opposing sciences, but both were important in the research being done, and the scientists needed to have a working knowledge of both.

While I have always encouraged students to be able to work with other groups, being able to share my stories about how this skill is used in real life makes a difference. The stories and experiences from my PolarTREC expedition make a difference. They capture students' attention.

I have already shared these observations with colleagues at the California STEM Symposium and local staff development. Like the students, teachers also seem to better appreciate why we need to include practical focuses (i.e. collecting accurate data) into lessons. Again, stories from the field work make a strong impression.

The experiences bring authenticity to what I am teaching, both for students and education professionals.



Field work at Toolik

I am including polar science activities in my science lessons. Polar science is applied for lessons on history of earth, past climates, ecosystems, biomes, Earth's energy transfer, weather and climate, ocean currents, and climate change. Enhancing the lessons, especially climate change lessons, with my experiences from the field, brings added depth and understanding to learning.



Regina Brinker outreach activity.

I encourage students to observe our local environments, and find the connections between local environments and activities to global systems. Students need to understand that events (air pollution, for example) have an impact beyond the local ecosystem. Students are encouraged to conduct their own independent science research and participate in local and regional science fairs. Also, students have applied to participate in student field research programs (Girls on Ice) after learning about my experiences in the Arctic.

I am currently planning lessons for the International Baccalaureate (IB) program that will begin at our school in two years. The IB program focuses on student use of authentic data. Polar science will play a large role in the data used for lessons.

Since returning from the PolarTREC expedition, I have been able to share my experiences with a wide range of audiences, including a poster presentation at the American Geophysical Union meeting, the California STEM Symposium, a San Francisco Girl Scout career exploration event for over 1,000 participants, and local school and business groups. I will continue this outreach work. My goals are to publish articles in science teacher journals, present at science teacher conferences, and other public events.

If I had not gone on a field expedition through PolarTREC, I would still be teaching about climate change and conducting good science research. However, the passion brought to those lessons would not be the same. Students notice passion, and hopefully students will be inspired to continue studying a science and technology field to bring their passions to the world.