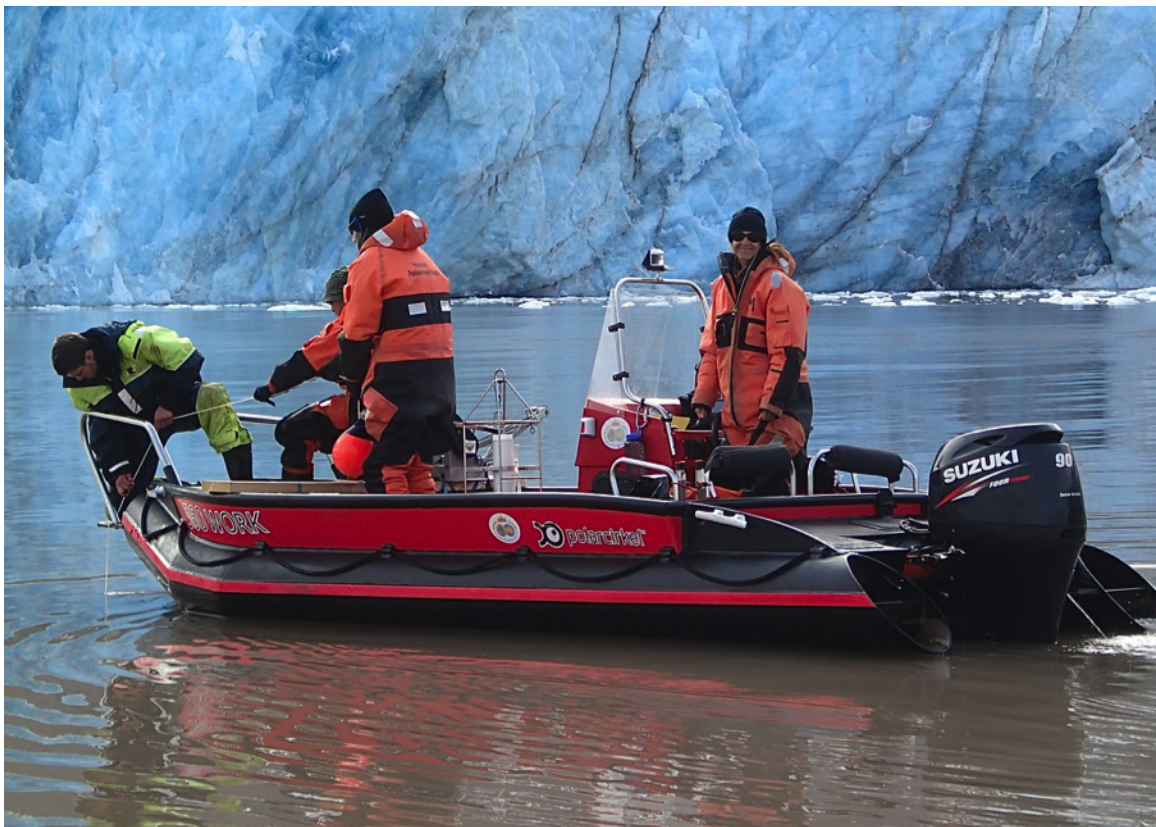




**PolarTREC Public Science Report
Peggy McNeal
High Arctic Change 2014/Svalbard REU
Svalbard, Norway**





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During the summer of 2014, I prepared to leave my warm, sunny home and join a science team in the Arctic. The title of the research, “*High Arctic Change 2014*” hinted at the type of expedition in which I was about to embark. It turned out to be one of the most powerful, exciting and education rich opportunities of my life.

For 14 years, I taught middle school science. Everyday I faced 150 fourteen year olds with the daunting proposition of teaching them about something like density. Or how to define an isotope. Or how to calculate and graph speed. These are topics of interest to me, but convincing a fourteen year old that science class is going to be fun today, with an objective like that is an uphill battle. My blossoming teenage students sometimes view science as just another class to get through. They may feel disconnected to science and uninterested. Science is something that old guys do in distant labs somewhere far from where they live their lives. I wanted to connect them to science even more, have them learn about cutting-edge research and work with authentic data and real science.



Middle school students analyzing mock core samples.

I currently teach undergraduate elementary education majors a course about the atmosphere. Here I encounter some of the same feelings. Many are apprehensive about taking a science class. Some chose education because of perceived weaknesses in science and math. Again, the course is something to get through, check off their list and move on. They may have little interest in learning about something like albedo. They can be disconnected from science, but as future educators, I want them to be excited by science and pass that excitement on to the next generation.



Making blubber gloves with Girl Scouts.

Science is my passion. I love to teach and share science and my students get excited with me as a result. My participation in “*High Arctic Change 2014*” heightened this excitement. Science became a little more real for my students because they knew someone (me!) who was actually going out and participating in real science research. My experiences in the Arctic now infuse my lessons. Instead of learning about isotopes out of context, students can share in Jessica’s experience in the Arctic. Jessica, an undergraduate student with us, is only five years older than my middle school students. She collected sediment samples and is using them to trace isotopes and determine the age and composition of the bedrock under

the glaciers. Students are introduced to Ryan and use authentic data that he collected from water in the fjord to calculate properties like density. After watching a video of Dominique

deploying a drogue, they use her data to calculate current speeds. My undergraduate students are similarly inspired by my experiences. Through lessons based on our Arctic research, they are learning to teach science using an inquiry approach. By modeling light reflection and absorption on light and dark surfaces, they construct knowledge from data and relate this to changes in the Arctic. Investigation, both in the lab and in the field is emphasized. They will eventually pass on to their students these connections and “ways of knowing”.

I count many others as “my students”. My friends and family, civic groups that I speak to, youth groups that I work with and schools that I visit also benefit from my involvement. Science educators, by nature, are good communicators. We connect people to science and make it more accessible. By including science educators in real science research, dissemination of the information is broadened and enhanced. In an era when science skepticism has invaded public perception, communication of reliable and pertinent science to the lay public is critical and science educators are uniquely capable of accomplishing this effectively.



Speaking to the Naval Academy Alumni Association about climate research.

Underlying all of this is the issue of our changing climate. By incorporating Arctic science into my lessons, students learn about climate research. It is here that I hope to have the greatest impact. By connecting students to this narrative, increasing their awareness and compelling them to act, I hope to be an agent of change. Science educators have a powerful and important obligation to inform our students and our communities about climate research in an accurate and rational way.

To elaborate more about the actual expedition, we were a group of nine. Six were undergraduate geoscience students collecting data as part of their senior research theses. Two principle investigators led our group. The ninth member of the group was me, a middle school science teacher. Over the course of two weeks, every day, we set out in small boats, heading up the fjord to the terminus of the glacier and spent all day collecting data. The pictures may give you a small glimpse of the jaw-dropping, incredible beauty, but no picture can do this justice. The glacier is immense and working right next to it gives one the sense of nature’s incredible and majestic power. Glaciers make ear-splitting noises that sound like thunder and pierce the serenity. A glacier calving is one of the most amazing things witnessed on Earth. Calving events often triggered a cascade of heaving ice that we gawked at from our Lilliputian boats. Enormous, blue and white hulking icebergs towered stories above our heads and silently floated by. This was the theater that we worked



Ryan with his equipment, next to an iceberg.

in, all day, every day. Add to this a polar bear encounter and the experience exceeded my grandest expectations of the adventure. I want to share this experience with everyone I meet, grab them and tell them, “*We must do everything that we can to save this*”.



With Dr. Ross Powell in the dining hall in the research station at Svalbard.

I delighted in time spent with the students and scientists, both those on our team and those that I met at the science research station. Participating in discussions about video monitoring the glacier, changing dynamics of intraglacial streams and depositional changes in the fjord increased my science knowledge. While assisting with the students' research, I operated scientific instruments, shared their data and discussed its interpretation. The opportunity to be in the research environment, collaborate in hands-on science and converse with scientists from all over the world was invaluable to me as a science educator and an experience that was rich in learning.

We worked in a harsh environment and the days were long, hard and cold. Before going out in the boats, we were trained to use a rifle and how to protect ourselves against polar bears. We were outfitted in bright orange, bulky dry suits and then tested how well we could swim by plunging into the icy Arctic water. We practiced radio communication and how to navigate by GPS. We hauled heavy equipment and large containers of gas to the docks. Additionally, it was my job to pilot one of the boats and get students to their data collection sites. So, there I was, a middle school teacher, driving a boat through, literally, ice choked water in the Arctic, with a few twenty year olds. Our only contact with anyone was through radio. There was a steep learning curve and no time to have one. It was challenging and it was fantastic! My greatest lesson from the experience is to always stay a little bit outside of my comfort zone because it is only here that I can expand my horizons and grow. This lesson extends to my plans for climate change education. It is imperative that I reach outside my classroom to educate and inform the public about climate research.

Gallup polls show that less than forty percent of Americans are “concerned believers” of



Dr. Julie Brigham-Grette and students living life outside the comfort zone.

climate change. Americans are hungry for credible sources of information. But credibility comes from a combination of expertise and trust. Working in the trenches of American schools are science educators. Science educators work with children, sit in meetings with parents, are visible in the community and people know us. We are your neighbor, sister or brother, person you chat with at the grocery and sit next to at church. What we have to say matters and people trust us. *Science educators are uniquely positioned to rebuild trust with the American public on the subject of climate research.* Participation in science research greatly increases our expertise and by extension, our

credibility. My Arctic research experience has connected me to hundreds of people that see me as a reliable and authentic source of information on science and climate. This is a big responsibility and one that I do not take lightly. Christa McAuliffe said, *"I touch the future. I teach."* Our touch has expanded to include the future of the planet.



Kronebreen Glacier, Svalbard, Norway.