POLAR TREC

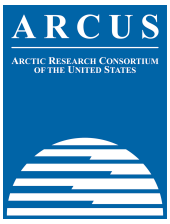
TEACHERS AND RESEARCHERS EXPLORING AND COLLABORATING

PolarTREC STEM Experience Report

Steve Kirsche

Dynamic Observations of the Microstructural Evolution of Firn

PolarTREC Expedition Page
https://www.polartrec.com/expeditions/dynamic-observations-of-the-microstructural-evolution-of-firn



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The Adventure of a Lifetime

Last December when I found out that I was fortunate enough to be selected for the PolarTREC program, I had only a vague idea of the adventure that awaited me. I knew that I would be given the opportunity to go to the Arctic and do actual hands-on fieldwork with a small science team from Dartmouth College. The actual experience has been that and so much more!

Teaching science to middle school students is a great job. I believe that every child has an innate yearning to understand how things work and why things do what they do. As a science teacher, it is my job to help foster this desire to understand. One of the tools I use frequently in my classroom to achieve this is sharing my own experiences to illustrate points. The PolarTREC program has given me a new perspective and a whole new set of experiences to pass along to my students. They will be fascinated to hear about what I did and what I learned.

The team prepares to leave Summit Station to set up their drilling site. (Photo by Steve Kirsche)

Before this experience, I felt as though I had a good grasp of the material that I teach. But, I was lacking the fieldwork experience that could help me understand first hand how data collection is done in a somewhat uncontrolled field environment. It is easy to teach the scientific method from a clinical, textbook point of view. Now, however, I can explain from experience how it is done. This will make me a better teacher and make my students' learning experiences more fulfilling.

I also believe that I will be better at teaching STEM (Science, Technology, Engineering, Math) rather than just science. Science is often viewed as a body of knowledge rather than a process. By incorporating the non-science aspects of STEM, my students will be better prepared to not just learn scientific principles, but to be able to apply them as well. This is where science education must go to make the scientists of tomorrow.

Dynamic Observations of the Microstructural Evolution of Firn

While in the Arctic, I worked with Dr. Ian Baker and Eric Wagner, both of Dartmouth College. The purpose of the project was to go to Summit Station, Greenland to collect firn samples to a depth of 80 meters. These samples will then be brought back to Dartmouth where they will be tested. What stages firn goes through as it transitions to ice is known from previous research. The intent of this project is to observe and then try to induce the actual change by subjecting samples to temperature gradients and/or compressive forces.

Prior to heading out to the Greenland, I visited with the team at Dartmouth College. I learned about the project and toured their facilities. This was very helpful in understanding the project once we arrived at Summit Station.

The Eclipse ice drill was used to collect the ice core samples near Summit Station. (Photo by Steve Kirsche)

What Did I Learn?

Before leaving on my expedition, I wrote that I hoped to learn about the Arctic, how scientists work in the field, how paleoclimatology is used, and how lab work backs up fieldwork. I feel as though I have learned a great deal about all of these topics.

The team takes a break from drilling to eat lunch in the field. (Photo by Steve Kirsche)

Spending most of a month living and working in the Arctic was incredible. There are many innate hardships that come with working and living there. While there, I tried very hard to work with our team while also meeting and spending time with as many other people as I could. My attitude was that I wanted to experience as much as I possibly could. Working with and talking to scientists from many different disciplines has given me a fairly broad understanding of Polar science.

Working with Dr. Ian Baker and Eric Wagner in the field was the highlight of my expedition. They spent quite a bit of time helping me understand the science behind our project and by helping me understand what I could do to help them. One of my personal goals going into this was to work very hard to be a productive member of our team. I loved the fact that our team was so small and that I could be a contributing member of it rather than an outside observer.

Talking with Dr. Baker and reading through various articles and books has helped me begin to understand the fascinating fields of ice science and paleoclimatology. I never realized that direct evidence of past environments is out there if you know where to look. I will be talking about this in my classroom as much as I can.

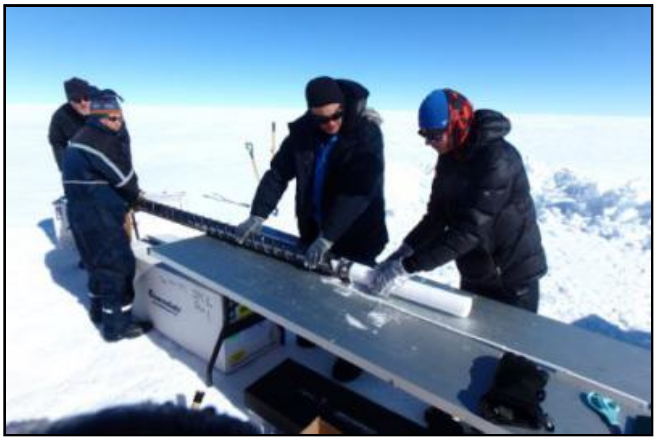
I also feel as though I understand how lab work can support and build on data collected in the field. I talked a lot with the team regarding the tests they are going to perform on the ice cores we collected. It's fascinating what they plan on doing with them. I am also looking forward to going up

to Dartmouth late this summer or early this fall to experience the actual lab portion of the project. I know this will be as enlightening as the rest of the experience.

In order to collect a remote stash of ice cores, a team flew on a Twin Otter airplane for 1.5 hours to a spot on the Greenland ice sheet and dug them up. (Photo by Steve Kirsche)

Bringing it back to the Classroom

As with any professional growth opportunity I take part in, the ultimate goal is to make me a better teacher for my students. I feel quite confident in stating that this whole experience will make me a much better science teacher. Every year, I teach the scientific method as part of our "Nature of Science" unit. I plan on teaching this in a whole new light this year. I want to make it more real and being able to relate it back to my Arctic experience will make this possible.



After the drillers collect the ice core, the science team logs and stores it for transport to Dartmouth College. (Photo by Steve Kirsche)

I also plan to incorporate Arctic regions into various lessons. I never really taught anything about the Arctic before because I didn't know much about it. Now, I feel as though I am beginning to understand the complexity and importance of this region. Given that I teach in Florida (about as opposite of the Arctic as you can get in the United States), it may seem odd to teach about the Arctic, but I believe that it is a great thing to do. Everyone needs to understand just how vital the Arctic ecosystem is to the rest of the planet - Florida included!

One other aspect of science that was reinforced for me through this experience was the need for critical thinking and problem solving skills. Just about every person I met with spoke of the need to make do with what you had when working in the field. They key to this is being creative. This is a skill every student needs to learn and practice.

Sharing it with Others

I learned a great deal throughout my expedition. I also went places and did things that I never dreamed I would. I can't wait to share this with as many people as possible. The fact that I went from Florida to the Arctic is a great icebreaker that gets people's attention and makes them want to learn more.

Besides my own classroom, I will be talking about my experience as frequently as possible. I already have a commitment to speak at a luncheon for the American Association of University Women. I have also applied to present at the Florida Association of Science Teachers conference this fall. I am hoping my proposal gets approved. Additionally, I am hoping to give a presentation to a senior living facility near my home.

Once school starts up in the fall, I am hoping to be able to share my experience with the elementary students in my own school. I am also planning to put together a presentation that I can share with teachers in my school and other schools in my district.

The residents of Summit Station were invited to the drilling site for a demonstration of the drill and to observe a back-lit snow pit. (Photo by Steve Kirsche)

The bottom line is that I went through an amazing adventure and I want to tell everyone about it! Very little is known about the Polar Regions where I live and I hope to be able to change that for as many people as possible. An overview video of my expedition can be viewed here.