

PolarTREC Researcher Orientation



5 February 2020

2020-2021 Researchers



If you need reminders...

These items were covered in the Meet & Greet Webinar for educators and researchers. Archive is available.

- Program Staff Introduction
- ARCUS basics
- Funding basics
- 2020-2021 Expedition Introductions
- Overview of Participation
- How to Succeed

Award number: OPP 1918637



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Orientation Agenda

Program from the Researcher Perspective

- Benefits of Participation
- New Program Components
 - Informal Educators
- Next Generation Science Standards
 - 'Data & Research' Product Focus
 - Expectations
- Educator Expectations and Role in the Team
- Researcher Expectations & Requirements
 - Logistics Support
 - Question and Answer

Evaluation

- To better understand the immediate impacts of the program on teachers, students and researchers
- To explore collaborations and networking of the program on teachers' professional experiences
- Variety of evaluation tools used pre-, during, and post-expedition.
- Conducted by third-party evaluators at Goldstream Group in Fairbanks, AK





Educator's reactions to professional development experiences



Knowledge and skills gained from professional development experiences



Educator's use of their new knowledge and skills



Impacts on students



Impacts on researchers

Researcher Satisfaction

Areas of Program Satisfaction

Wants to Repeat the Experience

Positive Relationship with the Teacher

Positively Impacted the Project Outreach
Activities

ARCUS Support is Essential

Benefits the Scientific Process

New – Informal Educators

- Only about 5% of an American's lifetime is spent in the classroom and only a small fraction of that is dedicated to science instruction. (Falk and Dierking, 2010.)
- Directive to increase the public understanding of science in all settings.
- Formal classroom teachers rely on resources and training offered at informal institutions.



New – Next Generation Science Standards (NGSS)

- Instead of learning about science, students practice science
- Learning is student-driven vs. teacher-directed
- Student ask questions vs. being told what they need to know
- Performance Expectations include Practices, Concepts, & Core Ideas

Anatomy and Architecture of a NGSS Performance Expectation

H1

Scientific and Engineering Practices

The 8 scientific and engineering practices are the major practices that scientists employ as they investigate and build models and theories about the world, and that engineers use as they design and build systems

Crosscutting Concepts

The 7 crosscutting concepts are concepts that bridge disciplinary boundaries, thus have explanatory value throughout much of science and engineering

Disciplinary Core Ideas

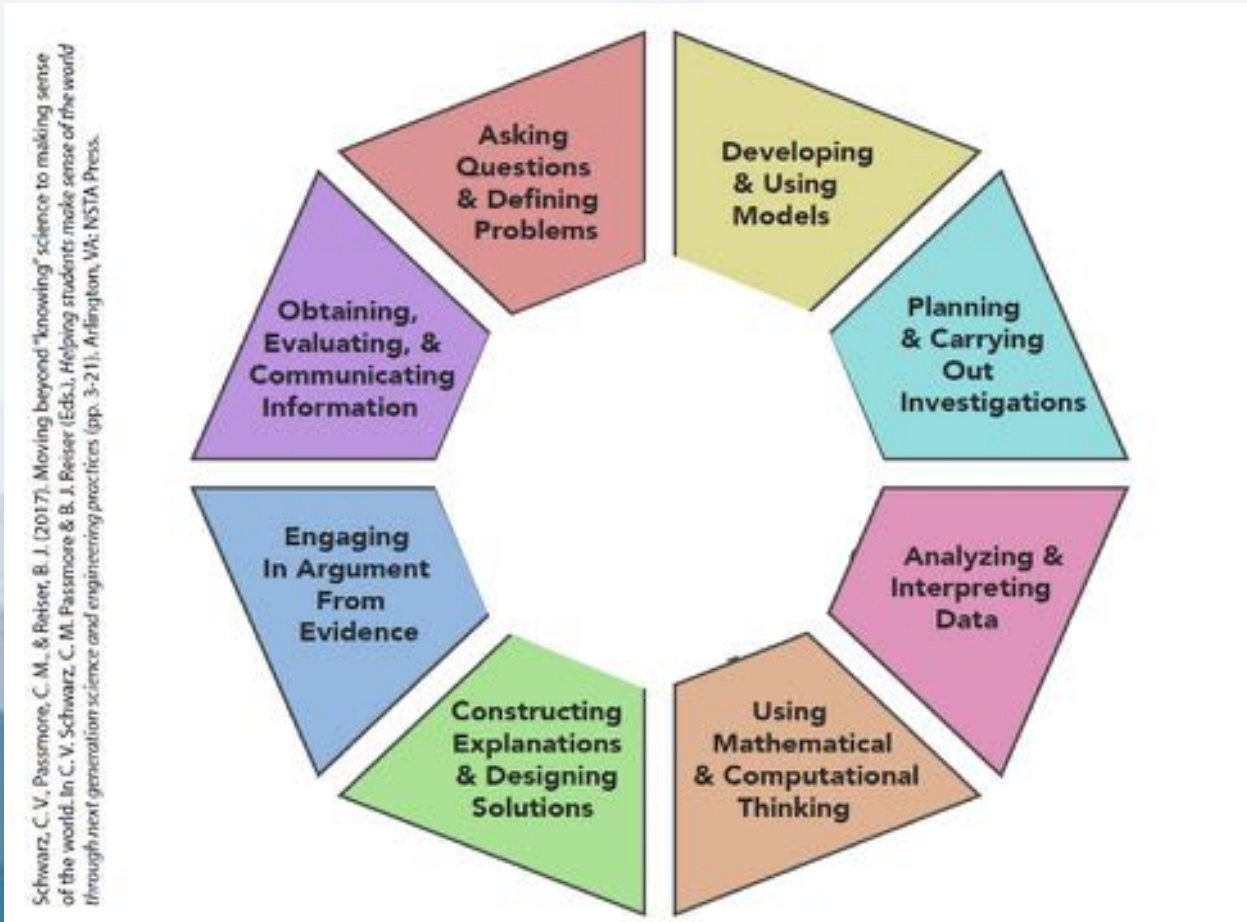
The disciplinary core ideas have broad importance across multiple sciences or engineering disciplines or are a key organizing concept of a single discipline. These core ideas span the areas of Life Sciences, Physical Science, Earth and Space Sciences, and Engineering, Technology, and Applications of Science

MS-PS2-2.

↑
Grade Band
↑
DCI
↑
PE#

Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. [Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.] [Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of

Science and Engineering Practices



Crosscutting Concepts

Patterns

Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

Cause and effect

Events have causes, sometimes simple, sometimes multifaceted. Disciphering causal relationships and the mechanisms by which they are mediated, is a major activity of science and engineering.

Scale, proportion, and quantity

In considering phenomena, it is critical to recognize what is relevant at different rates, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

Systems and system models

A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

Energy and matter

Tracking energy and matter flows, into, out of, and within systems helps one understand their overall behavior.

Structure and function

The way an object is shaped or structured determines many of its properties and functions.

Stability and change

For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.

Disciplinary Core Ideas

Life Science	Physical Science
<p>LS1: From Molecules to Organisms: Structures and Processes</p> <p>LS2: Ecosystems: Interactions, Energy, and Dynamics</p> <p>LS3: Heredity: Inheritance and Variation of Traits</p> <p>LS4: Biological Evolution: Unity and Diversity</p>	<p>PS1: Matter and Its Interactions</p> <p>PS2: Motion and Stability: Forces and Interactions</p> <p>PS3: Energy</p> <p>PS4: Waves and Their Applications in Technologies for Information Transfer</p>
Earth & Space Science	Engineering & Technology
<p>ESS1: Earth's Place in the Universe</p> <p>ESS2: Earth's Systems</p> <p>ESS3: Earth and Human Activity</p>	<p>ETS1: Engineering Design</p> <p>ETS2: Links Among Engineering, Technology, Science, and Society</p>

PolarTREC Products and NGSS

Exploring NASA's Operation IceBridge Data Sets Through National Snow and Ice Data Center's Data Portal to Visualize Changes in Polar Ice

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Description

Overview

NASA's Operation IceBridge (OIB) flies airborne missions each year over both Polar Regions, collecting ice thickness and extent data on glaciers, ice caps, ice shelves and sea ice. This data is useful to many disciplines studying climate, weather, ocean circulation, sea level and many related fields. The National Snow and Ice Data Center (NSIDC) houses and organizes the data collected and has a portal to this data which is free and available to the public. By exploring this data, students can gain an understanding of how scientists gather data, get some experience graphing and interpreting information from large data sets, observe changes over time and compare the northern and southern Polar Regions. This lesson will guide both teacher and student through the steps necessary to access the NSIDC OIB Portal and offers suggestions on ways to utilize the data to meet a variety of objectives.

Objectives

Resource Details

Author(s): Maggie Kane

Related Expeditions:

Region

Antarctic

Completion time

Less than a week

Grade Level

Middle School and Up

Permission

Download and Share

Author/Credits

Author Maggie Kane (maggiiekane0@gmail.com)

ArcGIS concept and part of lesson idea from collaborative work with PolarTREC teacher Kelly McCarthy (OIB Greenland 2016)

<https://nsidc.org/icebridge/portal/quickstart> <https://earth.google.com>

https://www.nasa.gov/mission_pages/icebridge/index.html

<https://www.archgis.com>

Other Standards

NGSS Standards:

MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.



New – Data & Research Focused Products

- PolarTREC Learning Resources hosts a decade of lessons and activities.
- Now, moving beyond ‘the basics’ of polar science.
- Educators products aim to “focus on the science content and the historic, current, or future data/research of the research team”
- Communicate your expectations for data/research use in products.

Arctic Ground Squirrels Data Analysis

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Description Overview

In this activity, students will use data collected about two male arctic ground squirrels by researchers at Toolik Field Station in northern Alaska. Each squirrel had a lightlogger to record light intensity (lux) and an implanted data logger to record internal body temperature (°C). Students work individually or in pairs to analyze the data sets and interpret the results.

Objectives

- Students will use data collected from arctic researchers about arctic ground squirrels.
- Students will learn how scientists use the data they collect to answer their research questions.

Lesson Preparation

- Students should have a good working knowledge of Microsoft Excel. Some background about hibernation

Resource Details

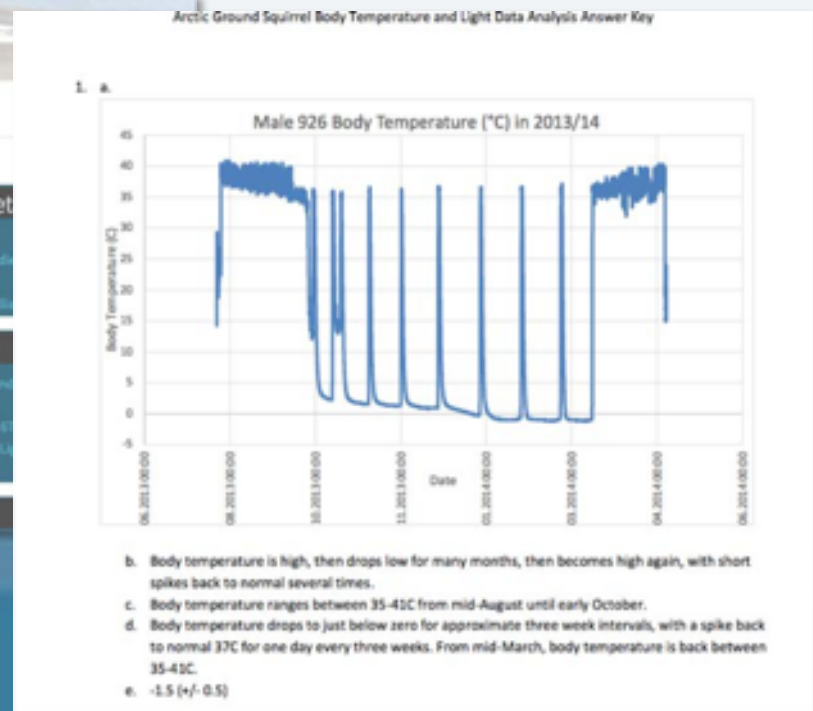
Related Expeditions:
Arctic Ground Squirrel Studies

Related Members:
Dawn Miller, Baldoon, Cory Wilbur

Documents

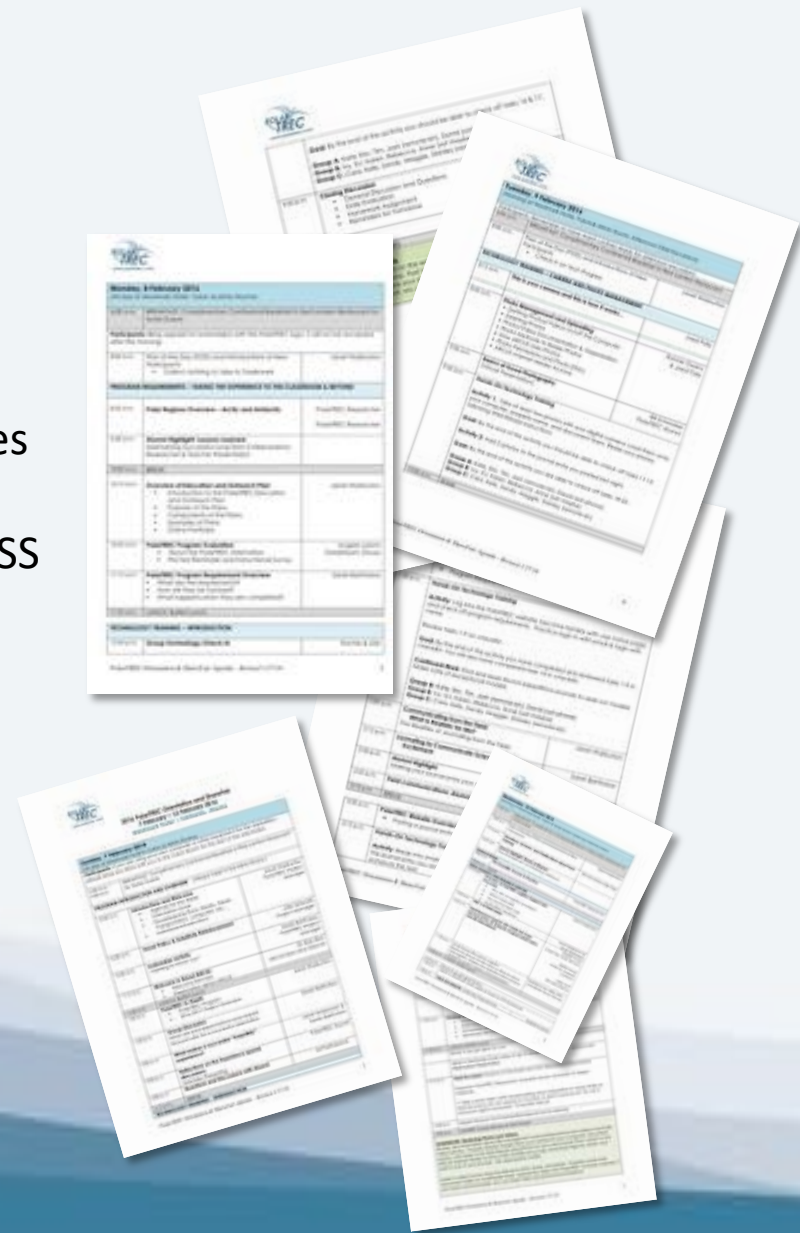
- Full Lesson: Arctic Ground Squirrel Data Analysis (PDF - 786 KB)
- Lesson Materials (PDF - 107 KB)
- Body Temperature and Light Intensity Data Spreadsheet 3.18 MB

Materials

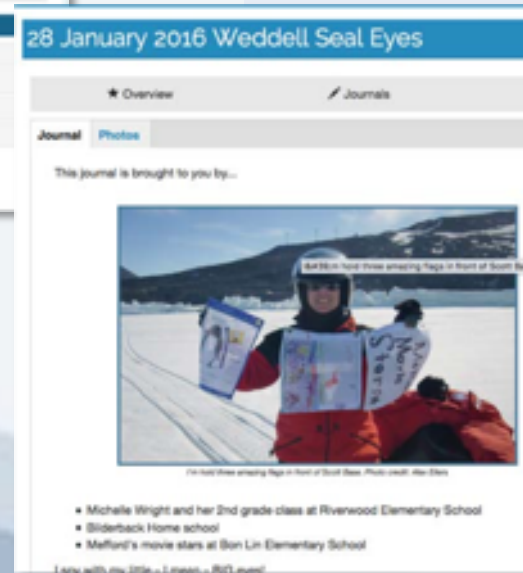
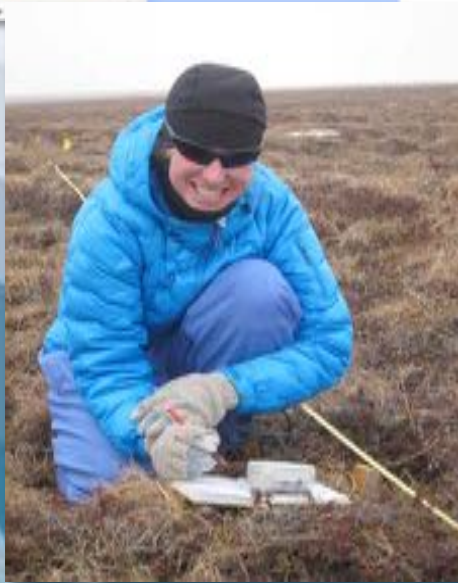
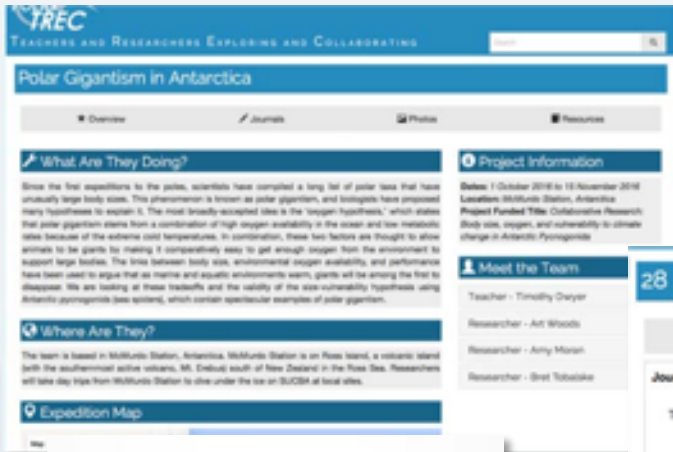


Educator Expectations

- Stay safe and healthy in the field
- Communicate with their research team before/during/after the expedition
- Attend all trainings and practice what they learn
- Stay on top of program requirements
- Communicate the science to a variety of audiences
- Create STEM focused resources that can be used by others that include data and relate back to NGSS
- Integrate what they have learned into their professional activities as much as possible



Educator's Role in the Team



Public Relations Officer
Pre-Field Momentum
In-Field Journaling/Q&A
Capturing the Science
Outreach Campaigns
PolarConnect
Leading by Example

Field Assistant
Learning Science
Translating Science
Hands-on in All Aspects

Researcher Expectations & Requirements

- Reading applications & interviews to select a teacher for your team
- 2-3 webinars related to the program
- Pre-post field logistics Zoom calls
- Fielding prep questions from educator
- Commitment to working with educator in the field
- Helping advertise and share the expedition page and other outreach activities in your networks and through social media.
- Vetting science content of products – checking their portfolio and reading journals, etc.
- Outreach activities before/after the expedition
- PolarTREC evaluation component
- Communicate with ARCUS re: any issues or needs

Teachers		Researchers	
Program Requirements	Other Recommendations	Program Requirements	Other Recommendations
DURING THE EXPEDITION			
<ul style="list-style-type: none"> Participate as an active member of the field research team During the field experience, post daily journal entries and photos online Respond to "Ask the Team" Questions online, seek assistance from research team as needed 	<ul style="list-style-type: none"> Seize your role of teacher research team member and spectator Communicate, be safe, remain flexible, have humor and have fun! Contact PolarTREC Project Managers if any problems arise Use multimedia tools for interviews, sounds, creating photographs, or extend to another tool for documenting your experience. Connect to classrooms through interactive communication channels such as PolarConnect live events when possible 	<ul style="list-style-type: none"> Provide mentoring, training and support for the teacher while serving as a member of your team. Provide information and/or assist teachers in answering questions from the public that are posted on the Virtual Base Camp. 	<ul style="list-style-type: none"> Contact PolarTREC Project Managers if any problems arise Recognize that teachers are required to communicate their field to the public as well as participate in actual research, help them balance these duties Collaborate with the PolarTREC teacher as they post daily entries and connect to classrooms from the field and connect with classrooms from the field Help the teacher connect to classrooms through internet communication channels such as PolarConnect, when possible
IMMEDIATELY FOLLOWING THE EXPEDITION			
<ul style="list-style-type: none"> Post a Closing Journal Entry and/or Reflection Essay Submit your Research Experience Reflection Essay Participate in the Post-Field Debriefing Call 	<ul style="list-style-type: none"> Remember to take adequate time to returning to the classroom Make sure your participation sends an invoice to ARCUS for your title reimbursement Return any borrowed gear or equipment to the supplier provider 	<ul style="list-style-type: none"> Participate in the Post-Field Debriefing Call Follow up with PolarTREC and logistics to ensure that local responsibilities related to the expedition research experience have been received 	<ul style="list-style-type: none"> Check in with your teacher to ensure they made it home okay, and continue communication and collaboration

PolarTREC Program Requirements | Updated 7 January 2012

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START EARLY & SPEAK OFTEN

The most successful teams are those that connect and communicate well before heading into the field. Set goals and objectives together as a team.



MAKE TIME BEFORE THE FIELD

- to foster a relationship
- to generate a mutual goals and expectations
- to discuss any concerns/issues

COLLABORATE

Developing an education and outreach plan together as a team leads to effective and timely outcomes



USE YOUR SPECIFIC SKILL SETS

- Be truly interdisciplinary and build on the expertise of each team member. Foster a mutual respect for these skills.

BE CREATIVE

Leave room for creativity before, during and after the field experience. Work together to expose your target audience(s) to the entire scientific process.



DEFINE CLEAR EXPECTATION

- for post-field communications.
- set deadlines and follow through.

Create pathways for future collaboration - either together or with other teachers or researchers. Build on the incredible professional networks of both the educational and scientific communities.

CREATE, CONNECT, SUSTAIN, and SUPPORT



**Actively participate
in the development
of the
Communication
Strategy**



**Face-to-Face
meetings
when feasible**



**Include teacher
virtually in a reading
seminar -or-
provide with relevant
literature**



**Make time to chat
BEFORE
leaving for the field
outside of program
requirements**

Remember, ARCUS has funding for Pre-Field visits between the educator and research team. This is a great way to get to these discussions.

Program Support for Researchers

- E&O planning strategies
- Pre-Post Field Site Visit Funding
- Seamless integration of teacher logistics
- Prep and Follow-up Management
- Dedicated outreach staffing
- Additional professional networking



Logistics Support

- ARCUS works with PF and ASC and with NSF OPP logistics
- ARCUS provides educators laptops, cameras, and GoPro's (if wanted)
- ARCUS provides all the training related to using our equipment and program requirements
- ARCUS works with educators employers to help them go to the field
- ARCUS reimburses schools for subs.
- We can only support about 4 weeks in the Arctic and 6 weeks in Antarctica.
- ARCUS pays for travel for Antarctica educators before they are on/off ice.
- ARCUS reimburses medical/dental expenses not covered by insurance for educators

Arctic logistics support (including educator travel, clothing, and equipment provided by PFS).

Point of Contact for Educators:
Rachel Murray

<Rachel@polarfield.com>

Antarctic logistics support (including in field educator travel, clothing, and equipment provided by Antarctic Support Contractor ASC)

Point of Contact for Educators:
Hood, Elaine

<Elaine.Hood.Contractor@usap.gov>



- Questions?
- Advice & Thoughts
- Mentor Researchers