Teaching at the Bottom of the World
Traveling to the South Pole on a Research Expedition

PolarTREC

PolarTREC (Teacher and Researchers Exploring and Collaborating) is a program in which teachers spend 3-6 weeks participating in a hands-on field research experience in the arctic or antarctic.

The goal of PolarTREC is to “invigorate polar science education and understanding by bringing K-12 educators and polar researchers together.”

Requirements of the program include:
- Daily journals while in the field
- A live virtual event connecting you with classrooms while in the field
- Lessons plans that connect your field experience to the classroom
- Outreach to the broader community

While on expedition, PolarTREC pays for a long-term substitute for your classroom.

ICECUBE NEUTRINO OBSERVATORY

The IceCube Neutrino Observatory is a detector designed to observe the cosmos from deep within the South Pole ice.

Encompassing a cubic kilometer of ice, IceCube searches for nearly massless subatomic particles called neutrinos. These astronomical messengers provide information to probe some of the most violent events in our universe like exploding stars, gamma-ray bursts, and black holes.

Nicknamed the “ghost particle,” neutrinos travel through nearly everything without being detected. Every so often, a neutrino does interact with the nucleus of an atom. When this happens, a new particle is created along with a wave of blue light, called Cherenkov radiation.

A DOM (Digital Optical Module) detects this blue light, tracing it back to the neutrino interaction. The IceCube array houses over 5000 DOMs, all waiting for the next neutrino to interact.

EXPEDITIONS

2009
Casey helped deploy sensors for IceCube and IceTop, a surface collector of cosmic ray cascade particles.

2010
Katey helped deploy the last of the original 86 strings and set up the IceTop cosmic ray detector array.

2012
Liz helped drill holes and deploy strings for the Askaryan Radio Array (ARA), a sister project for IceCube.

2017
Kate observed calibration and stress-tests on the IceCube detector. She also helped lay the foundation for the deployment of two new ARA stations.

UPWARD BOUND

Each summer, PolarTREC teachers assigned to IceCube have the opportunity to travel to River Falls, WI to teach at Upward Bound, a two-week summer camp aimed at increasing college readiness for students from underrepresented populations.

Themes can range from programming Arduinos to seek out light, designing wearable electronics, or mapping stream flow in 3-D.

Students draw connections between the theme and the IceCube Neutrino Observatory, highlighting how various objects can interact with one another just as neutrinos interact in the IceCube detector.

CLASSROOM IMPACT

The IceCube Collaboration is made up of nearly 300 physicists from 48 institutions in 12 countries. Effective collaboration is the cornerstone of the project. To help our students develop similar collaboration skills, we use team contracts to set norms at the beginning of a group project.

Many classroom topics relate to IceCube explicitly and tangentially. Teachers traveling with PolarTREC seek to make those connections clear and apparent for students.

RESOURCES FOR TEACHERS

Consider applying to PolarTREC! Visit polartrec.com.

#PolarTREC

To find resources & lesson plans developed by PolarTREC teachers visit polartrec.com/resources.

All photos courtesy of ARCUS and the IceCube Collaboration