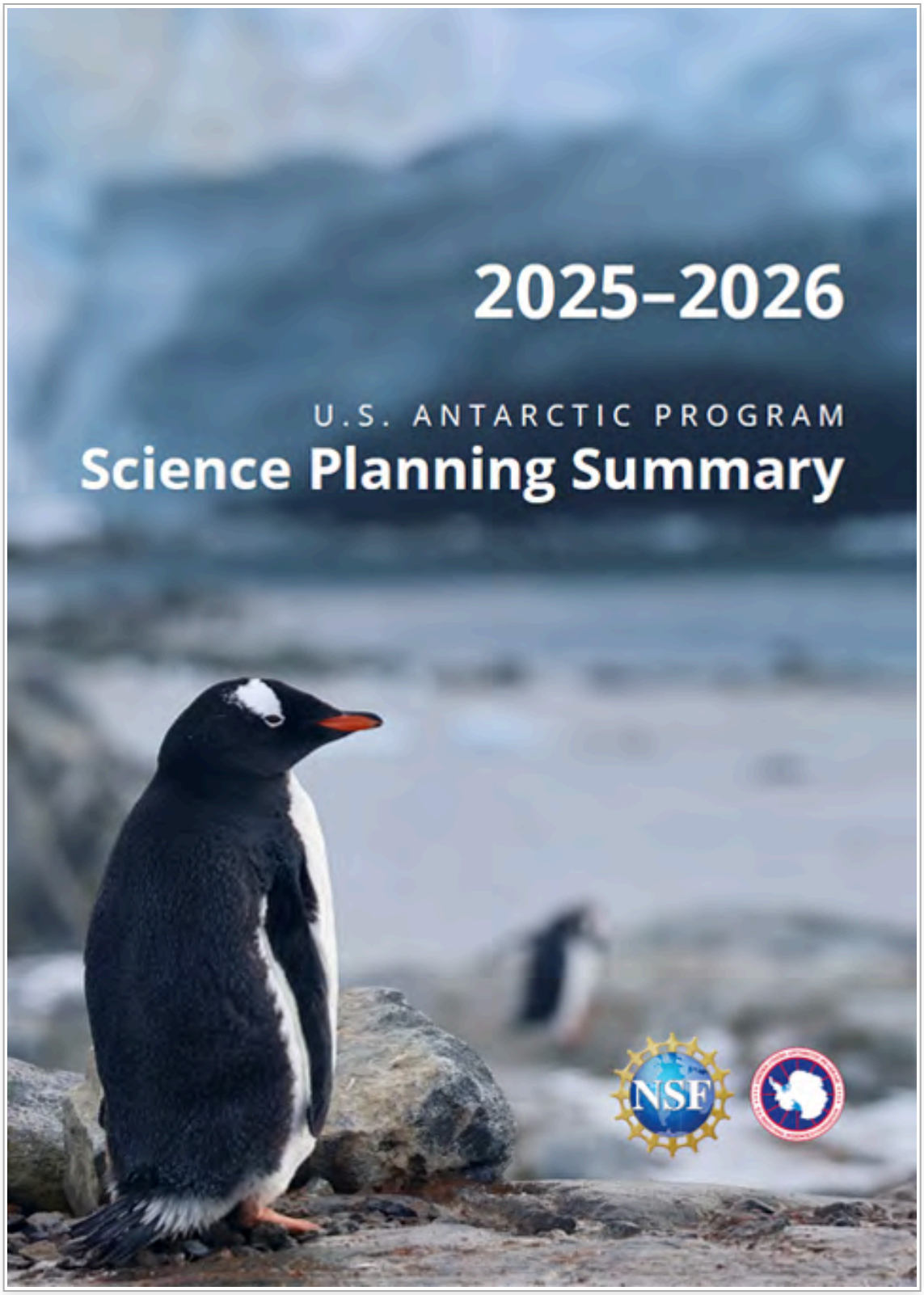

2025–2026
U.S. ANTARCTIC PROGRAM
Science Planning Summary
NSF

United States Antarctic Program

SCIENCE SUPPORT

2025–2026

SCIENCE PLANNING SUMMARY

This publication is for use by United States Antarctic Program (USAP) grantees and participants. Others interested in knowing more about U.S. Antarctic activitities are encouraged to visit the USAP web site or the U.S. National Science Foundation's Office of Polar Programs page.

Cover Photo: Gentoo penguins observed with a telephoto lens near Point 8 at NSF Palmer Station on the Antarctic Peninsula. Photo by Ben Dillon, April 2025.

This publication was prepared by Antarctic Support Contract, LLC under contract to the U.S. National Science Foundation.

Table of Contents

2025-2026 FIELD SEASON

Front Matter

Projects By Discipline

USAP Station Schedules

2025-2026 FIELD SEASON

The United States Antarctic Program operates three permanent research stations on the continent.

Opening Dates

	Austral Summer		Austral Winter
	Operational	Science	
McMurdo (Early Season*)	18 Aug 2025	Continuing through Winter/WinFly 5 Sep 2025	17 Mar 2026
McMurdo (Mainbody)	3 Oct 2025	3 Oct 2025	
South Pole	1 Nov 2025	1 Nov 2025	14 Feb 2026
Palmer	13 Oct 2025	13 Oct 2025	14 April 2026

Estimated Population

	Summer	Winter
McMurdo	952 (weekly average)	188 (winter total)
South Pole	170 (weekly average)	45 (winter total)
Palmer	44 (weekly average)	20 (winter total)

Air Operations

2025-2026 FIELD SEASON

McMurdo Station

McMurdo-based aircraft, including helicopters, fixed wing aircraft, and uncrewed aircraft systems (UAS) will continue to support USAP researchers and program logistical functions.

Helicopters

Pathfinder Aviation, LLC

Pathfinder Aviation, LLC (PAA) is contracted by the U.S. National Science Foundation (NSF) to operate up to three helicopters during day shift and up to two helicopters during night shift this season in support of approved research and operational efforts in the vicinity of McMurdo Station.

A Bell 212 Helicopter, Operated by Pathfinder Aviation

Missions typically take place in McMurdo Sound, McMurdo Dry Valleys, Royal Society Range, Ross Ice Shelf and Ross Island regions, and will be supported by light (Astar B3s) and/or medium (Bell 212) airframes. Antarctica New Zealand (ANZ) will be contracting an Astar B3 from Southern Lakes Helicopters (SLH) this season. U.S. Antarctic Program aircraft are slated to provide several NSF-approved quid pro quo missions in support of ANZ's 2025-26 field science program as supportable throughout the season.

Fixed Wing Support

New York Air National Guard (ANG)

The New York Air National Guard 109th Airwing LC-130 Hercules aircraft will provide research and operational support to South Pole Station, and West Antarctic Ice Sheet Divide (WAIS).

These workhorse aircraft, the largest ski-equipped planes in the world, are essential for transporting personnel, fuel, and equipment across the Antarctic; enabling research, construction, and waste disposal by landing on ice and snow runways.

New York Air National Guard (ANG) LC-130 Airplane

Kenn Borek Air

Kenn Borek Air (KBA) will provide three DHC-6 Twin Otter and one DC-3T Basler aircraft to support a number of USAP operations on continent. Both aircraft types will be based out of McMurdo Station, South Pole Station, WAIS Divide, and Union Glacier at different times throughout the season.

Twin Otter Aircraft, Operated by Kenn Borek Air

Uncrewed Aerial Systems (UAS)

There will be several UAS operating in the McMurdo Station area this season, as well as some field camps. NIWC Air Traffic Control and ASC Aviation Operations will advise aircraft of all UAS activities and deconflict airspace, as required.

Staffed Field Camps

2025-2026 FIELD SEASON

During the 2025-2026 summer season, ASC will operate four staffed field sites providing science support.

Taylor Valley Camps

Tents near the foot of the Canada Glacier, at the Lake Hoare field camp"

~50 Nautical Miles From McMurdo Station

77° 38.000' S, 162° 52.000' E (LAKE HOARE)

The Taylor Valley camps will open to provide support to ongoing science projects in the McMurdo Dry Valleys. All camps are supported by helicopter operations based at McMurdo Station. This year, two resident staff based at Lake Hoare will facilitate operations at Lake Hoare, Lake Fryxell, Lake Bonney, F6, and New Harbor camps. Supported groups in the Taylor Valley this season include MCM-LTER and B-047-M Sumner.

WAIS Divide Camp (WSD)

Portable Shelters at the West Antarctic Ice Sheet (WAIS) Divide Field Camp"

891 Nautical Miles From McMurdo Station

79° 29.000' S 112° 5.000' W

The WAIS Divide camp, with twelve resident staff, will act as a regional aviation hub for West Antarctica. The camp will support O-283 AWS. The West Antarctic Support Traverse will traverse between WAIS Divide and Byrd Surface Camp. WAIS Divide is supported by fixed wing aircraft and LC-130 operations.

Allan Hills

132 Nautical Miles From McMurdo Station

76° 44.35' S 159° 22.23' E

Allan Hills will open to support I-187 COLDEX, with two residential staff to provide aviation coordination and camp operations. Allan Hills is supported by fixed wing aircraft.

Marble Point

44 Nautical Miles From McMurdo Station

77° 26.000' S 163° 50.000' E

Marble Point will open with two residential staff to provide fuel services and weather observation support for helicopter operations between McMurdo Station, Taylor Valley, and Wright Valley. Marble Point is supported by helicopter operations based at McMurdo Station.

Event Numbering System

2025-2026 FIELD SEASON

Every USAP project is assigned a unique event number consisting of three parts: A prefix indicating the USAP program funding the effort, a project number, and a suffix denoting the location where field work will take place. If field work takes place at more than one location the event number will indicate this with multiple suffixes separated by a slash.

Sample Event Number

A - **100** - **M**

In the example above, the project would be funded by the *Astrophysics and Geospace Sciences program*, have a project number of *100*, and would consist of field work to be performed at or near *McMurdo Station*.

Program Prefixes

A

Astrophysics and Geospace Sciences

Dr. Vladimir O. Papitashvili, Dr. Marion Dierickx, Program Directors

B

Organisms and Ecosystems

Dr. William Ambrose, Program Director

C

Integrated System Science

Dr. William Ambrose, Program Director

D

Antarctic Instrumentation and Research Facilities

Dr. Marion Dierickx, Program Director

G

Earth Sciences, Geodesy and Geophysics

Dr. Kelly Brunt, Dr. David Porter, Dr. William Ambrose, Program Directors

I

Glaciology, Ice Core Science and Geomorphology

Dr. Kelly Brunt, Dr. David Porter, Program Directors

O

Oceans and Atmospheric Sciences

Dr. David Porter, Dr. William Ambrose, Program Directors

T

Technical Event - Science

Dr. Kelly Brunt, Dr. Marion Dierickx, Jessie Crain, Program Directors

X

Instrumentation and Technology Development

Dr. Deepankar Medhi, Program Director

Location Suffixes

M

NSF McMurdo Station

P

NSF Palmer Station

S

NSF South Pole Station

E

Special Projects Supported by the USAP

(e.g., Investigators working with other national Antarctic programs)

2025–2026

USAP FIELD SEASON PROJECTS

ASTROPHYSICS AND GEOSPACE SCIENCES

Dr. Vladimir O. Papitashvili, Dr. Marion Dierickx, Program Directors

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Small Multi-GNSS Data Collection Array for Ionosphere and Space Weather Monitoring

Event Number:
A-104-M/P/S
NSF / OPP Award 2332508

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Paul Sullivan / Jamee Johnson / Randolph Jones / Sheryl Seagraves

Principal Investigator(s):
Dr. Jade T Morton
jade.morton@colorado.edu
University of Colorado Boulder
Department of Aerospace Engineering Sciences
Boulder, Colorado

Multi-GNSS data collection system to capture space weather activities. Photo courtesy of University of Colorado Boulder.

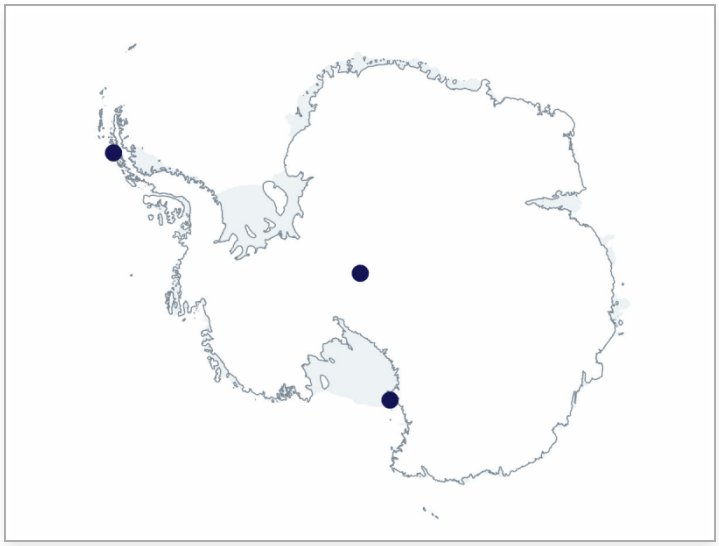
Location(s):

- **Supporting Stations:** McMurdo Station, Palmer Station, South Pole Station
- **Research Locations:** McMurdo Station, South Pole Station, Palmer Station

Project Description:

The polar ionosphere is home to many complex processes that reflect dynamic coupling between solar wind, the magnetosphere, and the upper atmosphere. As we approach the solar maximum, the polar ionosphere increasingly experiences intense space weather events. Global Navigation Satellite System (GNSS) signals propagating through the polar ionosphere offer a unique opportunity to observe and study multiscale ionosphere

irregularities. Irregularities are more intense, frequent, and complex in the Southern Hemisphere. Current models do not adequately capture some observed phenomena and irregularity formation and propagation mechanisms. Better spatial coverage, continuity, and resolution of ionospheric structures are needed to improve observability of ionospheric plasma irregularities and their dynamics over Antarctica and to enable comparative studies of Northern Hemisphere and Southern Hemisphere ionospheric responses to space weather events.



A-104-M/P/S Research Location(s): McMurdo Station, South Pole Station, Palmer Station

Field Season Overview

The team will not deploy to Antarctica this season. At McMurdo Station (Arrival Heights Lab) and South Pole Station (B2 Lab) , a GNSS experiment was installed in 2024-25 with the help of principal investigators (PIs) Kim (2332427) and Weatherwax (2332429). At Palmer Station (Terra Lab), research associate (RA) support is requested to install a GNSS experiment during the 2025-26 season. Each installed GNSS experiment uses 28″ x 28″ x 17″ of lab or tabletop space, and the GNSS equipment will not require data transfers. Removable hard drives will be shipped back to the home institution twice per year or as logistics can accommodate. RA support will be provided weekly for general maintenance and troubleshooting and annually for data-media shipping/receiving.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Collaborative Research: Investigation of Deep Polar Cap Dynamics Using an Autonomous Instrument Network

Event Number:
A-108-E
NSF / OPP Award 2032421

Program Director:
Dr. Marion Dierickx

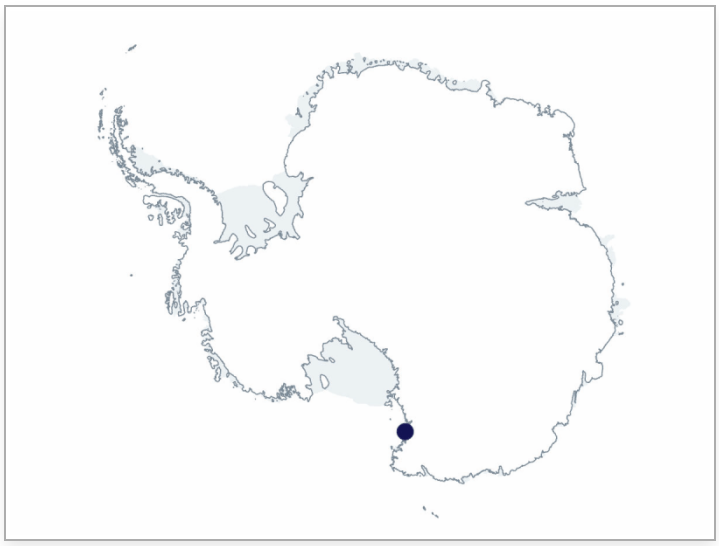
Science Support POC / Implementer(s):
Marissa Goerke; Randy Jones

Principal Investigator(s):
Dr. Hyomin Kim
hmkim@njit.edu
New Jersey Institute of Technology
Department of Physics
Newark, New Jersey

Location(s):

- **Supporting Stations:** Special Project
- **Research Locations:** Christchurch, NZ; Jang Bogo Station

Auroras over a PistenBully. Photo by Jeff Capps.



A-108-E Research Location(s): Christchurch, NZ; Jang Bogo Station

Project Description:
This project aims to fabricate, deploy, and operate three uncrewed AGO-NextGen instrument platforms on the East Antarctic Plateau. Designed to conduct geospace research by measuring magnetic field, radio signals, and auroral activity, these instruments will become part of a spatially extensive ground-based network of instrumentation focused on observing coupled magnetosphere-

ionosphere dynamics in the deep polar cap. The new platforms are more compact, easy-to-transport, easy-to-install, next-generation power/instrument versions of the previous generation of Automatic Geophysical Observatory (AGO) platforms. The systems are to be fabricated at the New Jersey Institute of Technology and deployed by the Korean Polar Research Institute (KOPRI) along the Jang Bogo Station-Dome C K-Route traverse route.

Field Season Overview

The National Science Foundation / Office of Polar Programs (NSF/OPP) will provide cargo shipment support via its Antarctic Support Contractor for the delivery of up to three AGO-NextGen instrument platforms to Christchurch, NZ. No other field support is being provided by NSF/OPP. Onward delivery of the instruments to Antarctica (Jang Bogo Station) and deployment to their final field locations will be performed by KOPRI. One instrument platform was shipped in the 2024-25 season, and up to two more instrument platforms will be shipped in the 2025-26 season.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Next Generation of Geospace Research Facilities at USAP Stations

Event Number:
A-111-M/P/S
NSF / OPP 2332427

Program Director:
Dr. Marion Dierickx

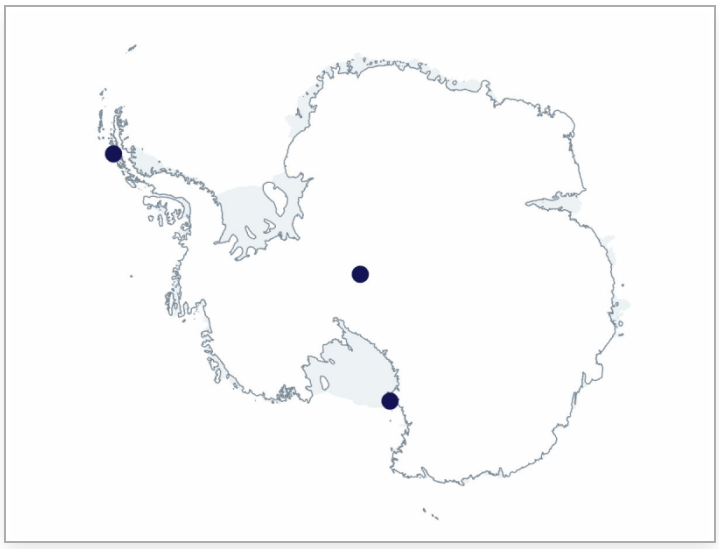
Science Support POC / Implementer(s):
Paul Sullivan / Jamee Johnson / Randolph Jones / Sheryl Seagraves

Principal Investigator(s):
Dr. Hyomin Kim
hmkim@njit.edu
New Jersey Institute of Technology
Department of Physics
Newark, New Jersey

Location(s):

- **Supporting Stations:** McMurdo Station, Palmer Station, South Pole Station
- **Research Locations:** McMurdo Station (Arrival Heights), South Pole Station (B2 Laboratory), Palmer Station (Terra Lab)

Auroras over the radome at South Pole Station. Photo by John-Michael Watson, courtesy of the NSF/USAP Photo Library.



A-111-M/P/S Research Location(s): McMurdo Station (Arrival Heights), South Pole Station (B2 Laboratory), Palmer Station (Terra Lab)

Project Description:

It is increasingly clear that Earth's space environment (geospace) is important to understanding the planet's functions within the solar system and the sun's influence on technological systems deployed on Earth and in space (space weather). Space weather impacts a wide range of technologies, including spacecraft operations and orbits, global

positioning and global navigation satellite systems, high-frequency radio communications, and power grids. The polar caps are specific areas around the geomagnetic poles where geomagnetic field lines are open and directly interact with the interplanetary magnetic field. Antarctica is an ideal location for geospace research, as its land mass provides superior siting for observing Earth's high geomagnetic latitude magnetic field lines, facilitating studies of the polar cap, cusp, auroral zone, and geosynchronous altitude where communications satellites orbit. It also allows for extended and continuous observations of the sun. As such, Antarctic stations have long been outfitted with a variety of instrumentation for observational studies of the geospace environment.

Field Season Overview

No on-site field work is to be performed by the science team in 2025-26. The instruments will continue to operate autonomously, year-round, via remote monitoring and control, aided by on-site support provided by Antarctic Support Contract staff and other station infrastructure (e.g., information technology network, station services) as needed. Research associate support will be provided to install new computers and ship data drives back to the US.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Collaborative Research: The Simpson Neutron Monitor Network

Event Number:
A-118-S
NSF / OPP Award 2112437

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Marissa Goerke / Sheryl Seagraves

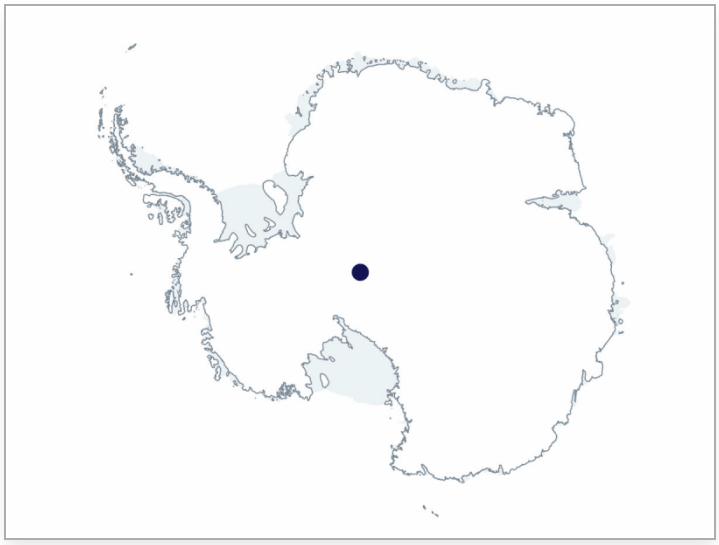
Principal Investigator(s):
Dr. Surujhdeo Seunarine
surujhdeo.seunarine@uwrf.edu
University of Wisconsin River Falls
Department of Physics
River Falls, Wisconsin

Project Web Site:
https://neutronm.bartol.udel.edu/realtime/southpole.html

Location(s):

- **Supporting Stations:** South Pole Station
- **Research Locations:** South Pole Station, B2 Laboratory

CosRay platform between the station and ARO. Photo by Sheryl Seagraves.



A-118-S Research Location(s): South Pole Station, B2 Laboratory

Project Description:

Neutron monitors have been operating at the South Pole with few interruptions since 1964. They indirectly detect galactic cosmic rays and solar energetic particles. The station's high altitude and low-geomagnetic cutoff

provide a unique, scientifically desirable location to observe moderate energy (1-10 gigaelectronvolts [GeV]) solar and galactic cosmic rays, as well as a key low-geomagnetic cutoff dataset for the worldwide network of neutron monitors. Operating a neutron-monitor suite at South Pole Station, this project aims to increase understanding of solar energetic particles using neutron monitor data, complemented by data from the nearby IceTop air shower detector. Another focus area is understanding the nature of multiple coincident particles observed in the neutron monitors, which extend the reach of the South Pole neutron monitor as a single station capable of doing cosmic ray spectral studies. Also central to the research is understanding the response of these detectors to the radiation environment of the South Pole, particularly in determining the cause of the decline in cosmic ray intensity at the South Pole over the last 50 years. Understanding this decline is important because cosmic rays produce radionuclides such as beryllium-10 that become trapped in the ice and are used to determine ice-core ages and precipitation levels over Earth's polar regions. An understanding of the production rate is vital to interpreting these data. The South Pole neutron monitor is a key instrument of the Simpson Neutron Monitor Network.

Field Season Overview

On-site fieldwork for the 2025-26 season includes raising the outdoor equipment platform above the surrounding snow level to mitigate current impacts to measurements. One person will deploy to coordinate and manage detectors during the platform raise, in addition to performing annual maintenance and calibration operations.

Maintenance work will include replacing heaters on the outdoor monitors and further reconfiguration of the bare neutron counters on the B2 Mezzanine, which are susceptible to microphonics and produce especially noisy data when activity on the Mezzanine increases during the field season.

In addition, research associate support will be provided throughout the year for routine monitoring and maintenance of equipment, including observation of the equipment on the outdoor platform and in the B2 Lab to ensure it is in normal operating mode; shutdown and restart of software and hardware as needed; and communication with the project's principal investigator and other personnel. Research associates will also support any required upgrades to electronics boards, mechanical stabilization of the bare neutron monitor on the Mezzanine level of the B2 Lab, and heater and other checks on the outdoor equipment.

Deploying Team Members

- Surujhdeo Seunarine (PI)

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Pan-Antarctic Investigations of Mesospheric Wave Dynamics and Influences Using the ANGWIN Network

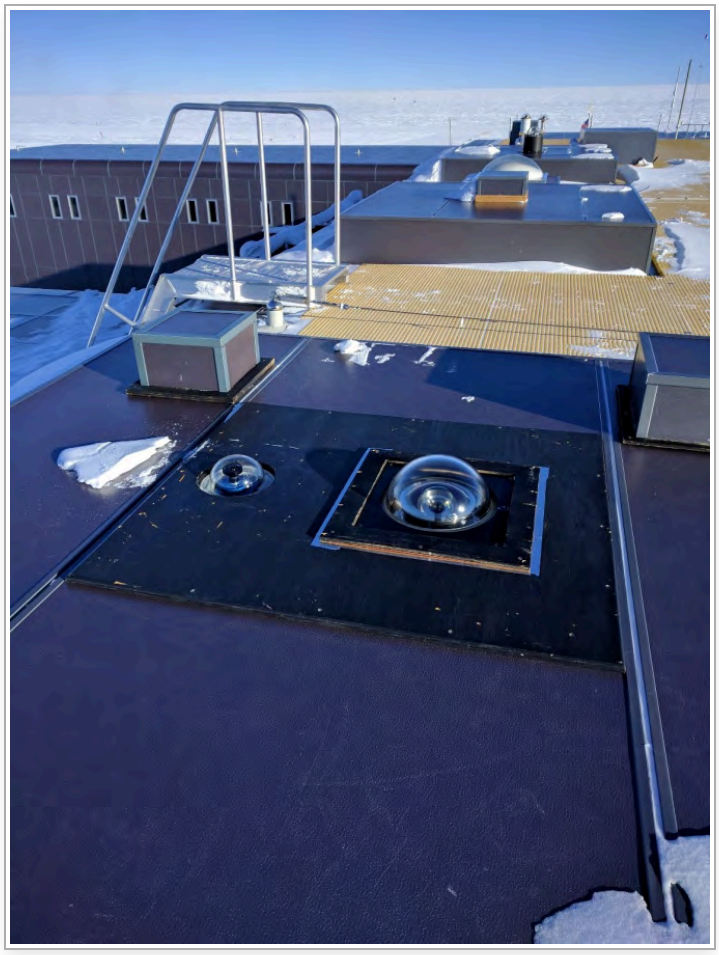
Event Number:
A-119-M/S
NSF / OPP Award 2029318

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Marissa Goerke / Randolph Jones / Sheryl Seagraves

Principal Investigator(s):
Dr. Pierre-Dominique Pautet
dominiquepautet@gmail.com
Utah State University
Center for Atmospheric and Space Sciences
Logan, Utah

Project Web Site:
http://digitalcommons.usu.edu/ail/



Utah State Camera Domes. Photo by Sheryl Seagraves.

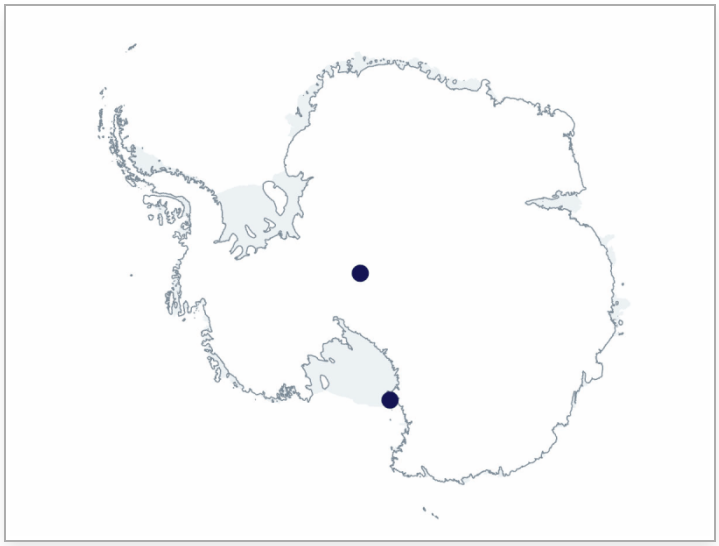
Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** Arrival Heights, B2 Laboratory

Project Description:

The Antarctic Gravity Wave Imaging Network (ANGWIN) is a cooperative effort of six international Antarctic programs to collect continentwide gravity wave measurements. This network capitalizes on existing optical and radar

measurement capabilities at McMurdo Station (US), South Pole Station (US), Halley Research (UK), Showa Station (Japan), Davis Station (Australia), Rothera Research Station (UK), and Comandante Ferraz Antarctic Station (Brazil). The network quantifies the properties, variability, and momentum fluxes of short-period (less than 1 hour) mesospheric gravity waves and their dominant sources and effects over the Antarctic continent. The instrumentation at McMurdo Station consists of an infrared all-sky mesospheric OH (hydroxyl) imager and an Advanced Mesospheric Temperature Mapper (AMTM). Instrumentation at South Pole includes an all-sky airglow imager, an AMTM, and a Rayleigh lidar. Measurements at South Pole Station focus on quantifying the temperature signatures of gravity waves deep within the polar vortex and on complementing the ANGWIN sites around the continent. These measurements substantially contribute to much-needed climatology on effects of gravity waves and their impact on the upper atmosphere over Antarctica.



A-119-M/S Research Location(s): Arrival Heights, B2 Laboratory

Field Season Overview

No on-site fieldwork will be performed by the science team in 2025-26. Research associate support will be provided throughout the year for routine monitoring and maintenance of equipment, including observation of the cameras and lidar to ensure they are in normal operating mode; shutdown and restart of software and hardware; data transfer; and communication with the project's principal investigator and other personnel as needed.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Collaborative Research: Fe and Na Lidar Investigations of Geospace-Atmosphere Temperature, Composition, Chemistry, and Dynamics at McMurdo, Antarctica

Event Number:
A-123-M
NSF / OPP Award 2110428

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Marissa Goerke / Randolph Jones / Richard Dean

Principal Investigator(s):
Dr. Xinzhao Chu
xinzhao.chu@colorado.edu
University of Colorado Boulder
CIRES
Boulder, Colorado

Project Web Site:
http://cires1.colorado.edu/science/groups/chu/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Arrival Heights

This image captures both the LiDAR systems in action, as well as polar cap auroral arcs overhead and the glow of the auroral oval near horizon. Photo by Danny Hampton, Ian Geraghty, and Zimu Li.

A-123-M Research Location(s): Arrival Heights

Project Description:

Researchers on this project operate two narrow-band, multifrequency Doppler lidars at McMurdo Station. These lidars make high-resolution observations of winds and temperatures in the middle and upper atmosphere. Simultaneous observations by the two instruments (a sodium [Na] lidar and an iron [Fe] Boltzmann lidar) provide unprecedented levels of detail to characterize atmospheric conditions. The instruments have been hosted by Antarctica New Zealand (AntNZ) in their Arrival Heights laboratory since late 2010. The observations provide critical data to address key science challenges associated with the space-atmosphere interaction region and, in particular, the sparsely observed high-latitude southern hemisphere.

Field Season Overview

Four participants will deploy to conduct observations with the Na Doppler and Fe Boltzmann lidars. They will upgrade, refurbish, and perform routine maintenance on the instruments and train students who will analyze data and progress toward completing their graduate degrees.

Deploying Team Members

- Jessica Alschuler
- Xinzhao Chu (PI)
- Ariel Diddams
- Sydney Mayer

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Payload for Ultrahigh Energy Observations

Event Number:
A-125-M
NASA / LDB Agreement

Program Director:
Dr. Marion Dierickx

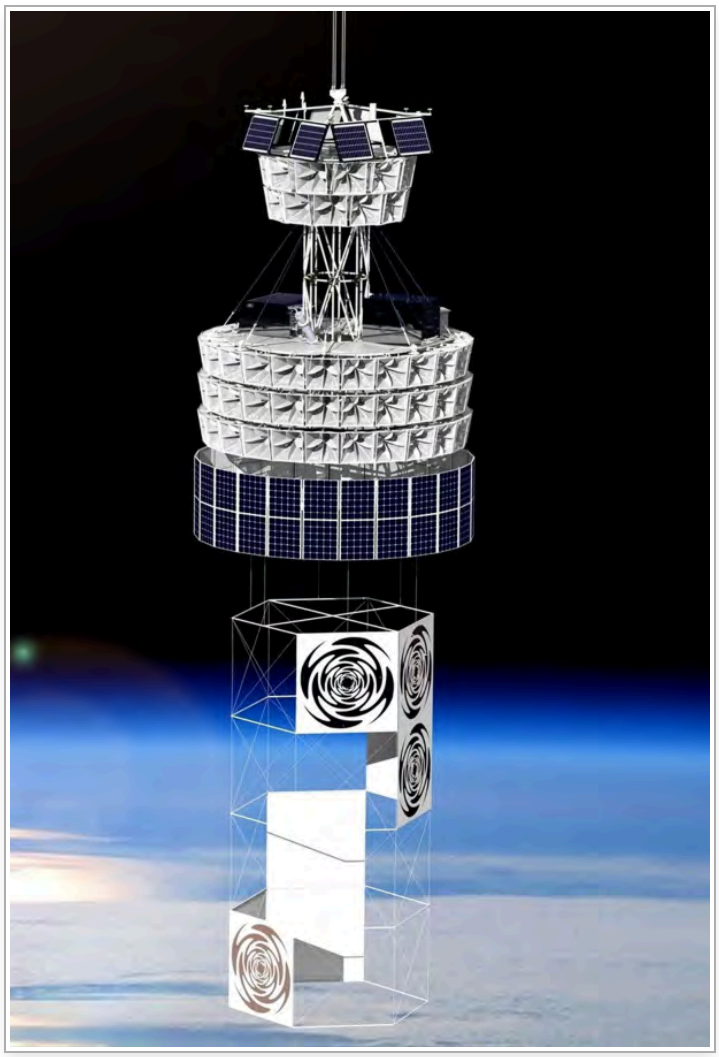
Science Support POC / Implementer(s):
Marissa Goerke / Kaija Webster / Chad Naughton

Principal Investigator(s):
Dr. Abigail G Vieregg
avieregg@kicp.uchicago.edu
University of Chicago
Department of Physics
Chicago, Illinois

Project Web Site:
http://pueo.space/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Long Duration Balloon (LDB) Facility



The Payload for Ultrahigh Energy Observations (PUEO) payload and team in Palestine, TX. Photo by Scott Mackey.

Project Description:
Payload for Ultrahigh Energy Observations (PUEO) will observe the interactions of cosmic ultra-high energy (UHE) neutrinos in deep ice and UHE cosmic rays in the Antarctic atmosphere. PUEO will use this information to

characterize astrophysical source populations in the distant universe with a maximum proton acceleration energy above 10^21 electronvolts (eV). PUEO will also identify astrophysical sources that create neutrinos at energies above 10^18 eV in flaring events that occur within a month-scale cadence, with fluences at levels predicted from neutron star mergers, high luminosity quasars, and short gamma ray bursts. Neutrinos are observed through interactions with the ice sheets, causing subatomic particle showers and resulting in impulsive radio emission detectable from the PUEO payload in orbit in the polar vortex. UHE cosmic ray nuclei create analogous particle cascades in the atmosphere above Antarctica, resulting in beamed radio pulses that PUEO detects, often in reflection off the ice sheets. These methodologies for UHE neutrino and cosmic ray detection were pioneered and validated by the Antarctic Impulsive Transient Antenna (ANITA) payload, and PUEO will extend the sensitivity of the techniques by at least one order of magnitude.

A-125-M Research Location(s): McMurdo Long Duration Balloon (LDB) Facility

Field Season Overview

A team of up to 18 scientists will assemble and test the PUEO instrument at the Long Duration Balloon Facility (LDBF) beginning in mid-November. The target launch date for PUEO is December 1 but may be delayed given the mandated 2-week delay in the LDBF's open-to-science date. Two follow-on hand launch calibration "chaser payloads" named HiCal are designed to launch on or about the same day as the PUEO launch. Target flight duration is 60 days for PUEO and the two Hi-Cal payloads, with a minimum flight requirement of 7-10 days aloft. Prior to launch, two teams of two scientists each are requested to establish payload calibration stations at field sites such as Siple Dome and the West Antarctic Ice Sheet (WAIS) Divide. Ideally, the teams will remain on site during flight to maintain and calibrate the stations, but the team members may be more valuable at the LDBF and could return to McMurdo Station immediately after site setup. The majority of the team will redeploy after launch, with a team of three remaining to help with payload recovery and pack up the instrument.

Deploying Team Members

- Quincy Abarr
- Harry Barnett
- Lucas Beaufore
- Richard Bose
- Taylor Coakley
- Cosmin Deaconu
- Anna Kofman (Team Leader)
- Scott Mackey
- Zachary Martin
- Keith McBride
- Christian Miki
- Rachel Scrandis
- Abigail Vieregg (PI)
- Philipp Windischhofer

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

First Conjugate-Station Studies and Continued Satellite-Conjunction Studies of LF/MF/HF Auroral Radio Emissions at South Pole

Event Number:
A-128-S
NSF / OPP Award 2205753

Program Director:
Dr. Marion Dierickx

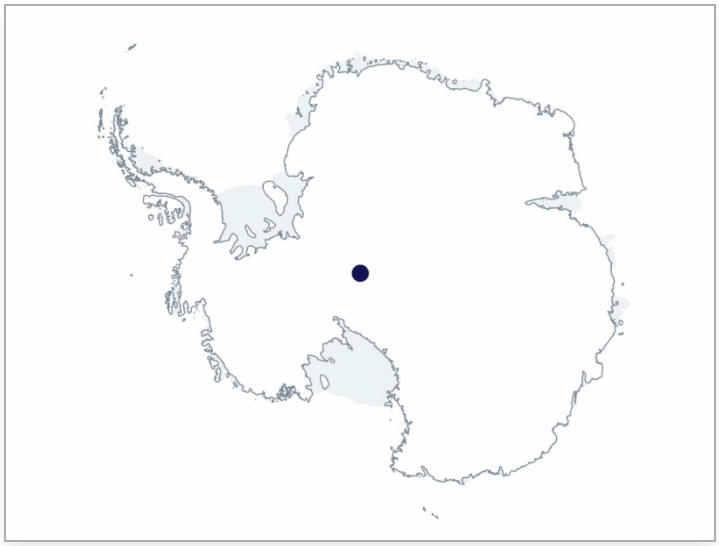
Science Support POC / Implementer(s):
Marissa Goerke / Sheryl Seagraves

Principal Investigator(s):
Dr. James LaBelle
James.W.LaBelle@dartmouth.edu
Dartmouth College
Department of Physics & Astronomy
Hanover, New Hampshire

Location(s):

- **Supporting Stations:** South Pole Station
- **Research Locations:** South Pole Station, B2 Laboratory

Photo courtesy of the NSF/USAP Photo Library. Photo by Dr. Daniel Michalik.



A-128-S Research Location(s): South Pole Station, B2 Laboratory

Project Description:

This project operates instruments at South Pole Station to answer outstanding questions raised by (1) correlations between auroral kilometric radiation (AKR) observed 200,000 kilometers above Earth and AKR-like signals observed simultaneously at South Pole Station, (2) findings that higher electron cyclotron harmonic radiation may

result from non-linear generation mechanisms, and (3) auroral medium-frequency (MF) burst emissions can be used for timing and locating auroral substorm onsets. An important focus of current research is simultaneous observing these phenomena at South Pole and the magnetic conjugate point to South Pole in northern Canada. These phenomena are best (and often can only be) observed from Antarctica, making the South Pole a required location for this research.

Field Season Overview

No on-site fieldwork will be performed by the science team in 2025-26. Research associate support will be provided throughout the year for routine monitoring and maintenance of equipment, including observation of the equipment in the B2 Lab and V8 vault to ensure they are in normal operating mode; shutdown and restart of software and hardware; data transfer; and communication with the project's principal investigator and other personnel as needed.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

GAPS (General AntiParticle Spectrometer) Experiment: A Search for Dark Matter Using Low Energy Antiprotons and Antideuterons

Event Number:
A-132-M
NASA / NSF Agreement

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Marissa Goerke / Kaija Webster / Chad Naughton

Principal Investigator(s):
Charles James Hailey
chuckh@astro.columbia.edu
Columbia University
New York, New York

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Long Duration Balloon (LDB) Facility

Long Duration Balloon launch. Photo by Brian Duffy.

A-132-M Research Location(s): McMurdo Long Duration Balloon (LDB) Facility

Project Description:

The General Antiparticle Spectrometer (GAPS) is an experiment optimized to search for massive dark-matter particles. When dark-matter particles annihilate in the galaxy, they produce antimatter, which the GAPS experiment is optimized to detect in the form of low energy (LE) antideuterons. Because LE antideuterons are extremely

difficult to produce by conventional astrophysical processes, detecting LE antideuterons would be a telling signature of dark matter.

GAPS can also detect LE antihelium and candidate antihelium events that have been reported by another experiment. GAPS also aims to detect LE antiprotons, which would be a conclusive signature of dark matter as they are produced by conventional astrophysical processes. An observed antiproton excess could arise from dark-matter annihilation or primordial black hole evaporation.

Field Season Overview

Since GAPS is looking for extremely rare events, the flight should be as long as possible. The target duration for the first flight is 30 days, which would be long enough to measure a detailed antiproton spectrum and achieve substantive sensitivity in the search for antideuterons and antihelium. After 10 days, GAPS can validate its antimatter detection concept and yield scientifically interesting antiproton results. Since GAPS is expected to carry out two additional flights, it is essential to recover the expensive detectors for reuse. To fully understand the rare antimatter events, it is critical to look at all data. The flight computer will select the most interesting events to telemeter to the ground using the available bandwidth, but that would be only a small fraction of the total. Therefore, data drives must be recovered as soon as possible. Traditionally, balloon flights have been terminated near McMurdo Station after one or more circumnavigations of the continent.

Deploying Team Members

- Kazutaka Aoyama
- Padrick Beggs
- Gabriel Bridges
- Conor Earley
- Florian Gahbauer
- Kaliroe Pappas
- Kerstin Perez (Co-PI)
- Field Rogers
- Sarah Vickers
- Jooyun Woo
- Kelsey Yee
- Gianluigi Zampa

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

NASA Long Duration Balloon (LDB) Support Program

Event Number:
A-145-M/S
NSF / NASA Agreement

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Marissa Goerke / Kaija Webster / Chad Naughton

Principal Investigator(s):
Hugo Franco
hugo.franco@nasa.gov
Columbia Scientific Balloon Facility
Palestine, Texas

Project Web Site:
https://www.csbf.nasa.gov

Aerial photo of the Long Duration Balloon (LDB) facility in Antarctica. Photo credit unknown.

A-145-M/S Research Location(s): McMurdo Long Duration Balloon (LDB) Facility

Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** McMurdo Long Duration Balloon (LDB) Facility

Project Description:

The National Aeronautics and Space Administration (NASA) Columbia Scientific Balloon Facility (CSBF) provides launch, tracking and control, airspace coordination, telemetry and command systems, and recovery services for unmanned high-altitude balloon operations based at the Long Duration Balloon Facility (LDBF) outside of McMurdo Station in Antarctica. This

season, two full-size balloon payload launches and two smaller hand launches from McMurdo Station are scheduled:

- GAPS (General Antiparticle Spectrometer on 34 million cubic-foot [mcf] balloon) - PUEO (The Payload for ultra-high energy observations on 34 mcf balloon) - HiCal 1 hand launch (PUEO calibration pinger on 1.128 mcf balloon) - HiCal 2 hand launch (PUEO calibration pinger on 1.128 mcf balloon)

(The out-season recovery is the Galactic/Extragalactic ULDB Spectroscopic Terahertz Observatory [GUSTO] balloon mission, launched and terminated in 2023-24.) The payloads consist of science instruments, command/control systems and solar/battery power units. The bulk of the data collected is stored on onboard hard drives, with a small amount of data transmitted to ground-based receiving stations via radio telemetry. After the flight has been completed recovery support is required to disassemble the instrument and return data/equipment from the field to McMurdo Station for northbound shipping to the US.

Field Season Overview

On-site planning and preparation will begin in late October. During this time, the CSBF will unpack cargo, dewinterize/test equipment, assemble flight systems, and support science teams with instrument construction. The launch ready date for the science groups is December 1. This date typically coincides with the time when the circumpolar stratospheric winds are expected to become established and stable. The balloons will travel counterclockwise around the Antarctic continent between 70 and 80 degrees south latitude at an altitude of approximately 115,000-160,000 feet. Flight duration for one revolution is typically 8-15 days, though overall flight time can be longer. At the end of the flight. the balloons will be terminated over a suitable location and payloads will be recovered from the field.

Deploying Team Members

- Tyler Barnard
- Scott Battaion (Co-PI)
- Alexander Beange
- John Boyd
- Garrison Breeding
- Wayne Deacon
- Ashley Larson
- Bethany MacQueen
- Jose Marcelino
- Randall McDonald
- Brian Parker
- Michael Sellers

- Juan DeLuna
- Curtis Frazier
- Andrew Hamilton
- Brent Heilman
- Joseph Jones
- Todd Lankford
- Nathan Sparks
- Jonathan Walling
- Christian Ward-Bourdeaux
- David Webb
- Corey Weber
- Serena Willard

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Imaging the Beginning of Time From the South Pole: Completing the BICEP Array Survey

Event Number:
A-149-S
NSF / OPP Award 2220444

Program Director:
Dr. Vladimir Papitashvili

Science Support POC / Implementer(s):
Paul Sullivan / Sheryl Seagraves / Leah Street

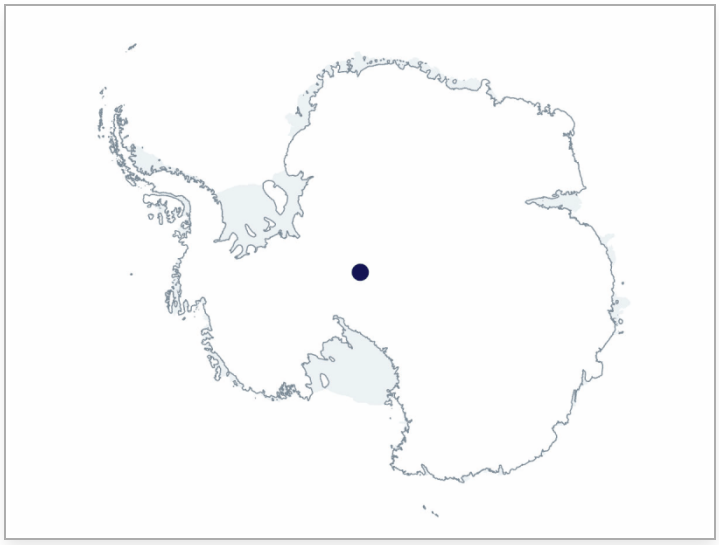
Principal Investigator(s):
Dr. Clement Pryke
pryke@physics.umn.edu
University of Minnesota
Minneapolis, Minnesota

Project Web Site:
http://bicepkeck.org

Location(s):

- **Supporting Stations:** South Pole Station
- **Research Locations:** South Pole (Dark Sector)

The Dark Sector Lab. Photo by Mike Lucibella, courtesy of the NSF/USAP Photo Library.



A-149-S Research Location(s): South Pole (Dark Sector)

Project Description:

This project continues the highly successful Background Imaging of Cosmic Extragalactic Polarization (BICEP) program to measuring polarization of the cosmic microwave background (CMB). These observations include operation

of the BICEP3 stand-alone telescope and the phased installation of the new BICEP Array receivers. This upgrade follows the tradition of improving on previous generations of receivers in the mount installed on the tower (adjacent to the Martin A. Pomerantz Observatory [MAPO]) that was originally built for the Degree Angular Scale Interferometer (DASI) then used by the QUaD telescope (aka Q and U extragalactic survey telescope [QUEST] and DASI), and then the Small Polarimeter Upgrade for DASI (SPUD; aka Keck Array). This project provides excellent training for undergraduate and graduate students and postdoctoral fellows in laboratories that have exceptional track records in this regard. Both cosmology and research in Antarctica capture the public imagination, making them a remarkably effective vehicle for stimulating interest in science. In addition to the development of the BICEP Array, we are continuing observations with the BICEP3 telescope. The sustained campaign at 95 gigahertz (GHz) enables our dataset to build sensitivity at frequencies where the contribution from galactic dust is lower and the signal from the CMB is strongest.

Field Season Overview

Critical BICEP tasking for 2025-26 will include winter-over turnover and training, detector module upgrades to the third BICEP Array receiver, maintenance and upgrades to BICEP3 receivers, and standard on-mount calibration activities for both BICEP3 and the BICEP Array. Radio frequency monitoring will continue in collaboration with other Dark Sector projects and the Antarctic Support Contract (ASC). ASC support will be provided for snow maintenance around the Dark Sector Laboratory and MAPO facilities, cargo and compressed gas deliveries, machine shop resupply, and general station and information technology support. Shared workspace and remote access will also be provided to BICEP grantees as needed while they are in transit through McMurdo Station.

Deploying Team Members

- Brianna Cantrall
- John Della Costa
- Michael Echter
- Sofia Fatigoni
- Nathan McReynolds

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Management and operations of the IceCube Neutrino Observatory 2021-2026

Event Number:
A-333-S
NSF / OPP Award 2042807

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Paul Sullivan / Sheryl Seagraves / Leah Street

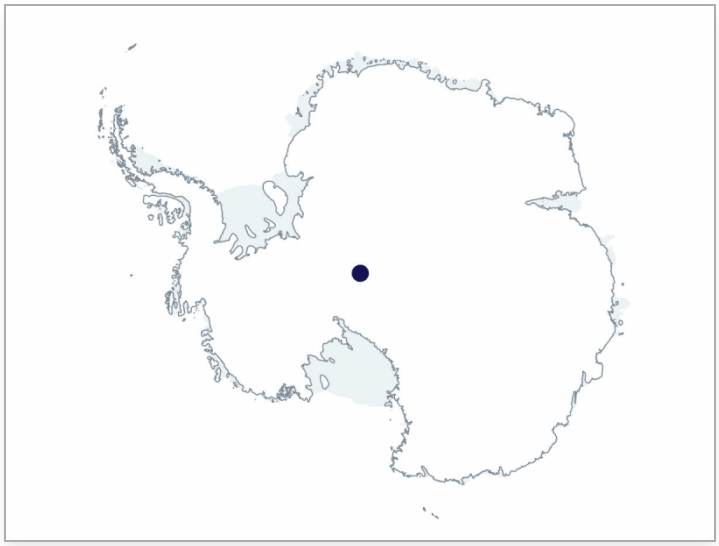
Principal Investigator(s):
Dr. Francis Halzen
halzen@icecube.wisc.edu
University of Wisconsin Madison
Department of Physics
Madison, Wisconsin

Project Web Site:
https://icecube.wisc.edu/

Location(s):

- **Supporting Stations:** South Pole Station
- **Research Locations:** South Pole (Dark Sector)

IceCube Observatory. Photo by Benjamin Eberhardt, courtesy of the NSF/USAP Photo Library.



A-333-S Research Location(s): South Pole (Dark Sector)

Project Description:

The IceCube Neutrino Observatory (ICNO) is located at South Pole Station in the deep ice. The ICNO's Management and Operations (M&O) core team of

researchers and engineers maintains the existing neutrino detector infrastructure at South Pole and the home institution, guaranteeing an uninterrupted stream of scientifically unique, high-quality data. M&O activities build on more than a decade of experience successfully managing the overall ICNO operations, after completing the National Science Foundation-funded major research facility IceCube project, where hardware and software systems were developed and deployed by the core team on schedule and within budget.

Effective coordination of efforts by M&O personnel and from within the IceCube Collaboration has yielded significant increases in the performance of this cubic-kilometer detector with time. The broader impacts of the ICNO/M&O activities are strong, involving postdoctoral researchers and students in the daily operation and calibration of the neutrino detector. The extraordinary data from the ICNO and its South Pole neighborhood will strike the imagination of high school students and the public worldwide.

Field Season Overview

Critical tasking for IceCube M&O in 2025-26 will include winter-over turnover and training, archival data disk replacement, IceTop installation measurements, and routine software updates and security patches. Antarctic Support Contract support will be provided for snow maintenance around the IceCube Laboratory, cargo deliveries, horizontal monitoring survey of IceTop installations, fabrication of IceTop marker pole extensions, and general station and information technology support. Shared workspace and remote access will also be provided to IceCube grantees as needed while they are in transit through McMurdo Station. IceCube M&O personnel will also support IceCube Upgrade efforts, with general support for the drill and installation teams and device verification, commissioning, calibration, and integration into the IceCube data acquisition systems.

Deploying Team Members

- Alicia Fattorini
- Sean Griffin
- Matt Kauer
- Camille Parisel
- Ek Narayan Paudel

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Collaborative Research: IceCube Upgrade: An IceCube Extension for Precision Neutrino Physics and Astrophysics

Event Number:
A-334-M/S
NSF / OPP Award 2227092

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Paul Sullivan / Sheryl Seagraves / Leah Street

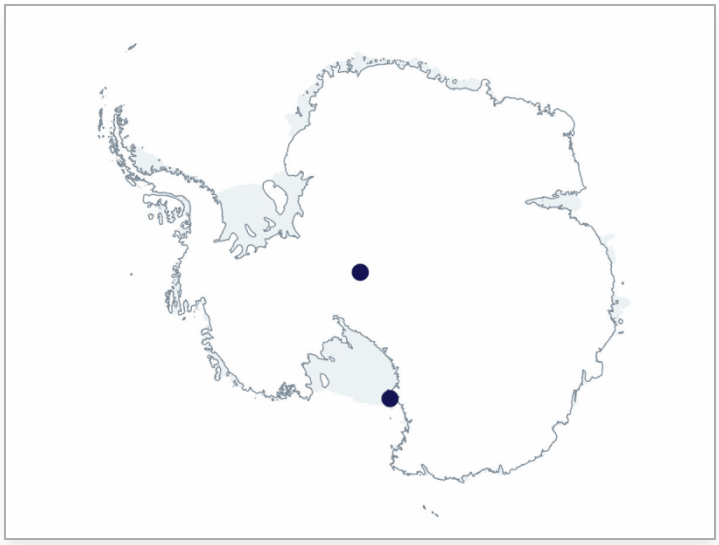
Principal Investigator(s):
Dr. Albrecht Karle
karle@icecube.wisc.edu
University of Wisconsin Madison
Department of Physics
Madison, Wisconsin

Project Web Site:
https://icecube.wisc.edu

Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** South Pole (Dark Sector)

IceCube Observatory. Photo by Martin Wolf, courtesy of the NSF/USAP Photo Library.



A-334-M/S Research Location(s): South Pole (Dark Sector)

Project Description:

Embedded deep in the ice cap at the South Pole, the IceCube Neutrino Observatory (ICNO) is the world's largest and most sensitive high-energy

neutrino telescope. It is a 1-billion-ton detector that uses the deep Antarctic ice to detect high-energy atmospheric and astrophysical neutrinos. Most of the neutrinos observed by the IceCube exhibit energies in the range expected for atmospheric neutrinos that originate from decays of elementary particles produced in extensive air showers by cosmic rays from nearby sectors of the Milky Way Galaxy. The IceCube detector currently consists of 86 strings of 60 deep-ice digital optical modules (DOMs), deployed 1,450-2,450 meters deep, and 81 surface stations each containing four DOMs frozen in shallow tanks. The IceCube Upgrade will deploy seven additional strings of optical sensors in the bottom center of the current IceCube detector. The new strings will use mDOMs (aka multiple photomultiplier tube [PMT] DOMs (mDOMs) which provide better direction and more than double the photocathode area per module than traditional IceCube DOMs. The enhanced hot water drill used previously will be upgraded and optimized for the needs of the proposed one-season drill campaign.

Field Season Overview

At McMurdo Station, no work is foreseen. The Antarctic Support Contract (ASC) will ship cargo through McMurdo, and its South Pole deployers will pass through McMurdo. ASC plans to ship seven main cables and two spools of drill hose at McMurdo to South Pole on the South Pole Traverse 1 (SPoT 1) and retrograde the main drill hose from South Pole to McMurdo to overwinter. At South Pole Station, on-Ice activities for 2025-26 include the following:

Excavate, warm, and recommission the winterized drill camp components and the Rodwell hot water drill (Antarctic Rodwell apparatus); Develop the Rodwell for makeup water for the hot water drill; Reinstall and reintegrate the subsystems at the drill camp into a full system; Recommission Tower Operations Structure (TOS) 1 for deep drilling; Commission and position TOS 2 for installation testing; Complete any repairs or upgrades needed to winches and reels; Commission, troubleshoot, and do full system wet testing of the hot water drill; Receive seven main downhole cables; Receive remaining fives strings of optical modules and test all modules; Drill and install seven strings of detectors; Dewater the drill, winterize, stow cargo for winter, and set up do-not-freeze storage; Respool the main drill hose onto transport spools and load them onto SPoT 3 for transport to McMurdo Station.

ASC support will include cargo, fuels, heavy equipment and light vehicles, facilities, waste, survey, information technology, project coordination, and station services support.

Deploying Team Members

- Ralf Auer
- Vedant Basu
- Timothy Bendfelt
- Terry Benson
- Erik Blaufuss
- Sarah Bouckoms
- Delaney Butterfield
- Tony Carleton
- Jason Chan
- Jeanne Edwards
- Erik Ejdepalm
- Anatoli Fedynitch
- Brent Folmer
- Satoshi Fukami
- Skyler Grulke
- Colton Hill
- Gary Hill
- Aya Ishihara
- Sarah Johnson
- Jonas Kalin
- Albrecht Karle (PI)
- John Kelley
- Emmett Krupczak
- Sven Lidstroem
- Yuya Makino
- Bryan Monteiro
- Curtis Moore
- Joseph Munski
- Jacob Nesbit
- Christopher Ng
- Christian Nielsen
- Andreas Noell
- Thomas Nordin
- Jack Nuckles
- Vivian O'Dell
- Thomas Parker
- Justin Pitts
- Rachel Procter-Murphy
- Lea Schlickmann
- Berit Schluter
- Matthias Schust
- Chana Sinsabvarodom
- Kurt Studt
- Karl-Heinz Sulanke
- Andrii Terliuk
- William Thompson
- Åse Torgilsson
- Delia Tosi
- Christine Verdico
- Jennifer Wang
- Johannes Werthebach
- Thomas Whitis
- Paul Wisniewski

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Local-scale Drivers and Responses of Thermospheric Weather Above Antarctica

Event Number:
A-343-M/S
NSF / OPP Award 2029459

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Marissa Goerke / Randolph Jones / Sheryl Seagraves

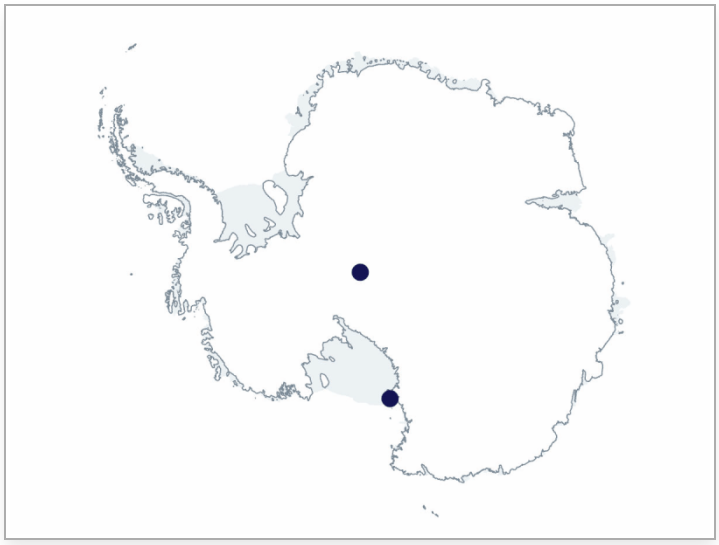
Principal Investigator(s):
Dr. Mark Gerard Conde
mgconde@alaska.edu
University of Alaska Fairbanks
Physics Department
Fairbanks, Alaska

Project Web Site:
http://sdi_server.gi.alaska.edu/sdiweb/index.asp

Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** Arrival Heights, B2 Laboratory

South Pole Telescopes. Photo by Benjamin Eberhardt, courtesy of the NSF/USAP Photo Library.



A-343-M/S Research Location(s): Arrival Heights, B2 Laboratory

Project Description:

This project operates and maintains ground-based Fabry-Perot spectrometers at McMurdo Station and South Pole Station. The instruments measure mesospheric and thermospheric neutral winds and temperatures at heights of around 87, 120, and 240 kilometers. Data collected informs both large-scale changes in mean flow and small-scale local perturbations, independently resolves impacts due to forcing from above and below, and contributes to studies utilizing data from other types of observing systems in Antarctica.

Field Season Overview

No on-site field work is to be performed by the science team in 2025-26. The instruments will continue to operate autonomously, year-round, via remote monitoring and control, aided by on-site support provided by Antarctic Support Contract staff and other station infrastructure (e.g., information technology network, station services) as needed.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

Antarctic SuperDARN Research, Operations, and System Enhancements

Event Number:
A-369-M/S
NSF / OPP Award 2035105

Program Director:
Dr. Marion Dierickx

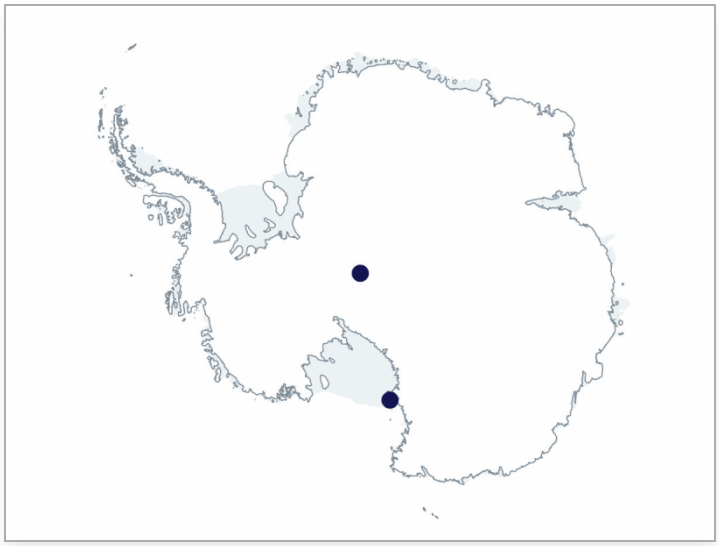
Science Support POC / Implementer(s):
Marissa Goerke / Randolph Jones / Sheryl Seagraves

Principal Investigator(s):
Dr. William Bristow
wab5217@psu.edu
Pennsylvania State University
University Park, Pennsylvania

Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** Arrival Heights, South Pole

SuperDARN array with auroras in the background. Photo by Ted Lee.



A-369-M/S Research Location(s): Arrival Heights, South Pole

Project Description:

The Super Dual Auroral Radar Network (SuperDARN) is an international radar network of 32 installations observing high frequency (HF) bands at 8-22 megahertz (MHz). These systems help answer questions about the geomagnetic conjugacy of global magnetic storms and substorms, as well as the differences in ionospheric plasma convection caused by the asymmetry of solar illumination in both hemispheres. SuperDARN can observe global-scale convection with excellent temporal and spatial resolution, making it a powerful tool for ground-based

research and enabling scientists to address fundamental and important questions of space physics. The data it acquires are also relevant to space weather studies and enhance the usefulness of data from other instruments.

Field Season Overview

No on-site fieldwork will be performed by the science team in 2025-26. At McMurdo Station, it is anticipated that any damage from over the winter will be repaired, and additional midmast guying to reduce future wind-induced damage will be deferred to an outyear. At McMurdo and South Pole stations, research associate support will be provided throughout the year for routine monitoring and maintenance of equipment to ensure it is in normal operating mode; shutdown and restart of software and hardware; data archiving; and communication with the project's principal investigator and other personnel as needed.

Project Detail

ASTROPHYSICS AND GEOSPACE SCIENCES

South Pole Telescope Operations and Data Products

Event Number:
A-379-S
NSF / OPP 2332483

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Paul Sullivan / Sheryl Seagraves / Leah Street

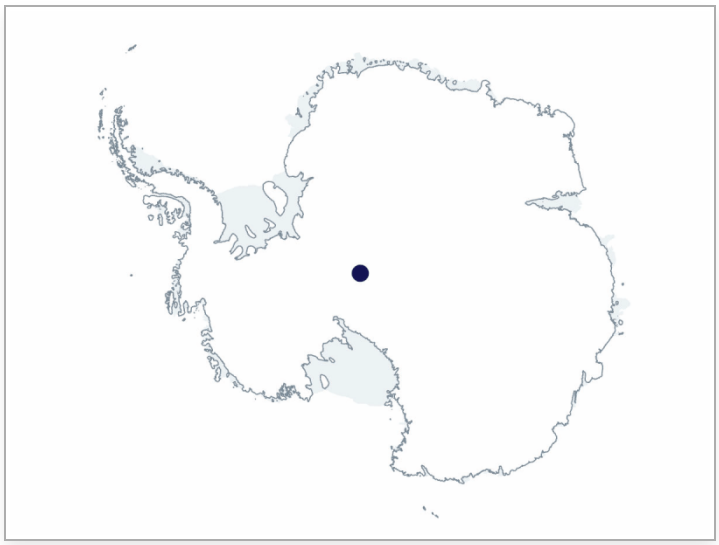
Principal Investigator(s):
Dr. Thomas M Crawford
tcrawfor@kicp.uchicago.edu
University of Chicago
Astronomy and Astrophysics, Enrico Fermi Institute
Chicago, Illinois

Project Web Site:
https://pole.uchicago.edu/

Location(s):

- **Supporting Stations:** South Pole Station
- **Research Locations:** South Pole (Dark Sector)

SPT winterover Dr. Karia Dibert clearing snow off of the telescope near sunset. Photo by Dr. Simeon Bash.



A-379-S Research Location(s): South Pole (Dark Sector)

Project Description:

This project requests support for maintenance and operations of the 10-meter South Pole Telescope (SPT) equipped with the current third-generation

instrument, SPT-3G. The proposed operations plan includes survey observations with SPT-3G to obtain ultra-deep, three-band millimeter-wave measurements of a 1,500-square-degree field. The SPT-3G survey region was chosen to overlap with the Background Imaging of Cosmic Extragalactic Polarization (BICEP; aka BICEP/Keck) survey; the coordinated observations are being used for a joint analysis to search for gravitational waves from the early universe. In addition, the SPT-3G data will place new constraints on the cosmic neutrino density, possibly the first-ever detection of the sum of the neutrino masses, constrain the properties of dark energy, and discover new classes of astronomical objects (including clusters of galaxies, protoclusters, dusty star forming galaxies, and transient sources).

The proposed operations also support SPT's critical role in the Event Horizon Telescope (EHT), a global array of telescopes to image the event horizon of nearby supermassive black holes. The EHT made worldwide headlines with its first detections of the event horizon shadow from the black holes at the center of the Messier 87 (M87) and Milky Way (or Sagittarius A* [Sgr A*]) galaxies.

Field Season Overview

Critical tasking for 2025-26 will include winter-over turnover and training, repairs to the telescope's azimuth cable wrap, and reinstallation of the South Pole Telescope Summertime Line Intensity Mapper (SPT-SLIM) instrument followed by several weeks of on-sky observations. The telescope will be transitioned back to SPT-3G observations in December. Additional annual activities include service, maintenance, and upgrades to the telescope components and computer systems and cryogenic maintenance of the telescope and optics cryostats. Radio frequency monitoring will continue in collaboration with other Dark Sector projects and the Antarctic Support Contract (ASC). ASC support will be provided for snow maintenance around the SPT and Dark Sector Laboratory facilities, cargo and compressed gas deliveries, machine shop resupply, and general station and information technology support. Shared workspace and remote access will also be provided to SPT grantees as needed while they are in transit through McMurdo.

Deploying Team Members

- Michel Adamic
- Adam Anderson
- Chelsea Neske
- Alexandra Rahlin

- Kyra Fichman
- Nicholas Huang
- Anjali Sehrawat
- Matthew Young

2025-2026

USAP FIELD SEASON PROJECTS

ORGANISMS AND ECOSYSTEMS

Dr. William Ambrose, Program Director

Project Detail

ORGANISMS AND ECOSYSTEMS

Collaborative Research: Biogeography, Population Genetics, and Ecology of Two Common Species of Fleshy Red Algae in McMurdo Sound

Event Number:
B-003-M
NSF / OPP Award 2037670

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Randolph Jones

Principal Investigator(s):
Mr. John N Heine
jheine@ju.edu
Jacksonville University
Marine Science Research Institute
Jacksonville, Florida

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Sea Ice (Cape Royds, Cape Evans, Little Razorback, Turtle Rock, Arrival Heights, Dellbridge Seamount, & Granite Harbor)

Red algae in the shallow waters in McMurdo Sound. Photo by Rob Robbins.

B-003-M Research Location(s): McMurdo Sea Ice (Cape Royds, Cape Evans, Little Razorback, Turtle Rock, Arrival Heights, Dellbridge Seamount, & Granite Harbor)

Project Description:
With decreases in Antarctic fast ice, increased light availability in intertidal and subtidal environments may support growth of early colonizers such as

macroalgae. This project has three major objectives to understand macroalgae biogeography in Antarctic coastal waters: (1) The principal investigators predict that *Phyllophora antarctica* will dominate shallower depths (3-4 meters [m]) and *Iridaea cordata* deeper depths (approximately 12 m). It is expected that percentage surface coverage on hard bottoms, seaweed biomass, blade lengths, and percentage of reproductive blades will be higher than in the 1980s survey of similar properties in Cape Evans. Seven locations will be visited in McMurdo Sound by divers during one austral spring. (2) Samples will be collected to test the hypothesis that these early colonizers have low generic diversity, as measured in other Antarctic locations. (3) 3-D models of community structure on hard surfaces will be developed using photogrammetry, in particular the Dellbridge Seamount.

Field Season Overview

Four team members will deploy to McMurdo Station from early October until early December. The team will scuba dive through the sea ice in McMurdo Sound at Arrival Heights, Turtle Rock, Little Razorback Islands, Dellbridge Seamount, Cape Evans, Cape Royds, and Granite Harbor to perform habitat mapping and algal collections of *P. antarctica* and *I. cordata*. During these dives, at depths of 3.5 m and 12.0 m, the team will take photographs of five 25-x-25-centimeter (cm) quadrants to estimate the percentage cover for each algal species, sessile macroinvertebrates, and bare space. They will sample a 5 x 2 cm section of blade per site from each species, preserving at -80°C. For population genetic analysis, a clipping of 2 x 3 cm from one thallus per holdfast and a sample of 50 drifting specimens per species will be respectively desiccated and stored in plastic bags with silica beads. A 21-megapixel Nikon D5 camera with a multicamera array will be used to take video at the Dellbridge Seamount dive site to compare percentage cover of algae, sessile macrofauna, and uncolonized space from the base of the seamount to its shallowest depth using photogrammetry.

Deploying Team Members

- Nisse Goldberg (Co-PI)
- John Heine (PI)
- Lauran Liggan
- Brett Seymour

Project Detail

ORGANISMS AND ECOSYSTEMS

Collaborative Research: Genomic Mechanisms Controlling the Slow Development of the Antarctic Urchin *Sterechinus neumayeri*

Event Number:
B-004-M
NSF / OPP Award 2038149

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Allison Barden / Randolph Jones

Principal Investigator(s):
Dr. Jacob Warner
warnerj@uncw.edu
University of North Carolina at Wilmington
Wilmington, North Carolina

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Sound

Antarctic sea urchins in McMurdo Sound. Photo by Steve Clabuesch.

B-004-M Research Location(s): McMurdo Sound

Project Description:
This project is designed to use the well-characterized antarctic sea urchin, *Sterechinus neumayeri* as a model system for studies of molecular-based development of antarctic invertebrates. The overarching goal is to identify genomic and molecular mechanistic adaptations that allow species to develop in extreme cold environments. The team will work with the United States Antarctic Program (USAP) divers to

collect urchins from McMurdo Sound. Using lab-based experiments that grow out urchin larvae in different temperatures, gene regulatory networks (GRNs) will be specifically evaluated to identify the GRN components responsible for regulating developmental timing in *S. neumayeri*. The main aim is to identify specific GRN elements that have evolved during adaption to the extreme environment of the Southern Ocean.

Field Season Overview

Four participants will deploy to McMurdo Station in teams of two with the overarching goal of identifying genomic and molecular adaptations that allow *S. neumayeri* to develop in polar environments. Fieldwork will include scuba diving to collect approximately 100-200 individual *S. neumayeri* urchins and may opportunistically collect other echinoderm species. Diving cadence is expected to taper after the first 2 weeks, and the team may utilize USAP divers to occasionally collect individuals during the second half of the team's deployment. The primary sampling location is the McMurdo Intake Jetty. In the lab, the team will primarily focus on the culturing and collection of urchin embryos and begin gene expressions and functional assays.

Deploying Team Members

- Jennifer Fenner (Co-PI)
- Kenneth Halanych (Co-PI)
- Ryan Range (Co-PI)
- Jacob Warner (PI)

Project Detail

ORGANISMS AND ECOSYSTEMS

Collaborative Research: The Drivers and Role of Immigration in the Dynamics of the Largest population of Weddell Seals in Antarctica Under Changing Conditions

Event Number:
B-009-M
NSF / OPP Award 2147553

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Randolph Jones

Principal Investigator(s):
Dr. Jay Rotella
rotella@montana.edu
Montana State University Bozeman
Department of Ecology
Bozeman, Montana

Project Web Site:
https://www.montana.edu/weddellseals/index.html

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Erebus Bay

A female Weddell Seal with her pup in Erebus Bay, Antarctica. Photo by William A. Link.

B-009-M Research Location(s): Erebus Bay

Project Description:

The Weddell seal population in the Ross Sea is the most southerly mammal population in the world and has been intensively monitored since 1978. Over

the past 15 years, the team has focused on monitoring both the number of pups produced annually and new immigrants. While continuing the long-term monitoring of the study of the Erebus Bay Weddell seal population, this project will add population modeling and genomic analyses to learn about the environmental factors that influence population dynamics, the geographic origin of immigrants, and immigrants' role in the local population. The team also has a robust plan for early-career science training and education and outreach activities related to this project.

Field Season Overview

Eight McMurdo Station-based participants will deploy from early October to mid-December, focusing on all pupping colonies and haul-outs across Erebus Bay from Cape Evans to Pram Point, at White Island, and at select sites outside of Erebus Bay. These sites include Lewis Bay, Marble Point, and several other sites to be determined based on seal numbers. The team will visit each Weddell seal colony within Erebus Bay every other day to find and tag newborn pups and associate them with their mothers. Any untagged mothers will be tagged. The team will also conduct six surveys per season throughout the Erebus Bay study area to record the identity of previously tagged individuals, tag unmarked animals, and replace broken or missing tags. They will continue collect a tissue sample from each of up to 150 locally born mothers and immigrant mothers throughout the study area for subsequent genetic comparisons. They will also use helicopter support for periodic reconnaissance flights over the study area and to outlying areas such as Marble Point and Lewis Bay, to search for seals and for travel to White Island to conduct population monitoring.

Deploying Team Members

- Nancy Chen
- Thomas Hull
- Nathanael Jourdonnais
- Parker Levinson
- Brynn Miller
- Jay Rotella (PI)
- Natalie Storm
- Collette Webb

Project Detail

ORGANISMS AND ECOSYSTEMS

Collaborative Research: Diving Into the Ecology of an Antarctic Ascidian Microbiome-Palmerolide Association Using a Multiomic and Functional Approach

Event Number:
B-018-N
NSF / OPP Award 2142912

Program Director:
Dr. William Ambrose

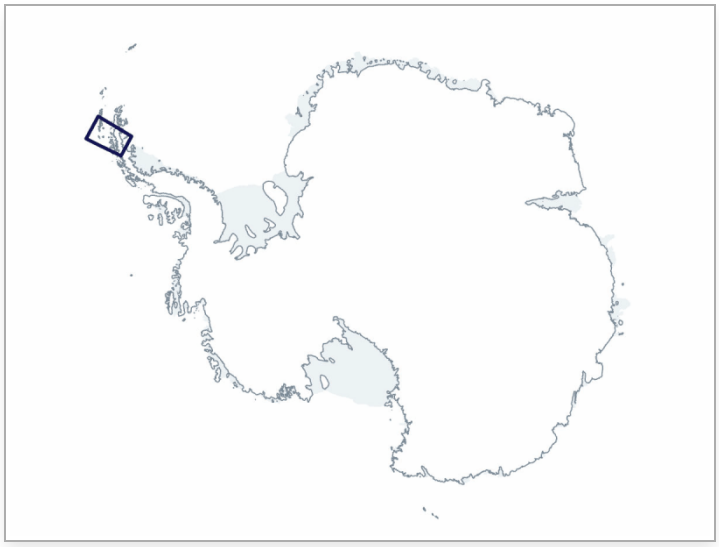
Science Support POC / Implementer(s):
Kenneth Vicknair / Jamee Johnson

Principal Investigator(s):
Dr. Alison Murray
alison@dri.edu
Desert Research Institute
Earth and Ecosystem Sciences
Reno, Nevada

Antarctic ascidian, Synoicum adareanum, photo from Norsel Point, north of Palmer station at 80 ft depth. Photo by Bill Baker, University of South Florida.

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer
- **Research Locations:** Western Antarctic Peninsula



B-018-N Research Location(s): Western Antarctic Peninsula

Project Description:
This project studies an emerging biosynthetic system from a polar ascidian (*Synoicum adareanum*)-microbe association that produces palmerolide A (palA), a natural product with activity against the proton-pumping enzyme V-type H+-

ATPase (VHA). The objectives include (1) determining the microbiome composition, metabolome complexity, palA levels, and mitochondrial DNA sequence of *S. adareanum* morphotypes at sites in the Antarctic Peninsula; (2) characterizing the *Synoicum* microbiome using a multiomics strategy; (3) assessing the potential for co-occurrence of the microbe *Candidatus Synoicihabitans palmerolidicus* -palA-VHA in host tissues; and (iv) exploring the role of palA in modulating VHA activity in vivo and its effects on ascidian-microbe ecophysiology. The project results will inform the geospatial distribution, cellular localization, ecological and physiological roles of this intimate host-microbial association in which the ascidian host bioaccumulates VHA-inhibiting palA. Likewise, a knowledge base of microbial processes in this multispecies core microbiome and of the pal biosynthetic gene cluster as it interacts with its antarctic ascidian host will be developed. In addition to elucidating the ecophysiological roles of palA in their native ascidian-microbe association, the results will contribute to the success of translational science, which aligns with the National Science Foundation's interests in promoting basic research that leads to advances in biotechnology and bioeconomy.

Field Season Overview

A team of up to 17 participants plans to deploy for a research cruise in 2025-26, potentially from a University-National Oceanographic Laboratory System (UNOLS) vessel departing Punta Arenas, Chile. The principal investigators and project participants plan to collect *S. adareanum* morphotypes by scuba dives and bottom trawls. Up to two scuba dives consisting of a buddy pair will be conducted per day. Dive operations will be conducted primarily from small boats, though other small boats may be utilized if deemed appropriate given local conditions. Before starting dive operations, a separate team may conduct remotely operated vehicle (ROV) reconnaissance missions to evaluate potential dive sites. Final decisions on small boat operations and the number and timing of small boats in the water will be confirmed with the vessel captain and crew. Sampling will take place in the South Shetland Islands, the Palmer Archipelago, the Wilhelm Archipelago, and off the Danco Coast. Conductivity, temperature, depth (CTD) rosette casts will be done in the vicinity of dive and trawl locations to collect water samples and record oceanographic data.

Deploying Team Members

- Sam Afoullouss
- Katrin Iken

- Charles Amsler
- Bill Baker (Co-PI)
- Ria Bhabu
- Patrick Chain
- Damien Eveillard
- Andrew Hatch
- Mary Higham
- Ben Meister
- Alison Murray (PI)
- Maitri Rangarajan Paul
- Baptiste Serandour
- Martin Tresguerres (Co-PI)
- Phillip Zerofski
- Robert Zook

Project Detail

ORGANISMS AND ECOSYSTEMS

Seasonal Primary Productivity and Nitrogen Cycling in Photosynthetic Mats in Lake Fryxell, McMurdo Dry Valleys

Event Number:
B-047-M
NSF / OPP Award 2445119

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Dawn Yvonne Sumner
dawninantarctica.23@gmail.com
University of California Davis
Geology Department
Davis, California

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys

Lake Fryxell. Photo by Joe Mastroianni, courtesy of the NSF/USAP Photo Library.

B-047-M Research Location(s): McMurdo Dry Valleys

Project Description:

This project will evaluate the effect of light and microbial mat activity on biogeochemical cycling in winter and summer in Lake Fryxell within the McMurdo Dry Valleys. The team will evaluate the role of light on microbial mat oxygen production and nitrogen cycling in the system. Divers will deploy microsensors in and immediately above the benthic mats in different months to measure small-scale changes in water chemistry

with differing light exposure. Mats will also be subsampled to evaluate changes in microbial gene expression in differing conditions. The proposed research will provide important new insights into the winter behaviors of microbes in mats and how biotic, abiotic, and environmental components of ecosystems interact within specific processes (e.g., redox and nitrogen cycling) to affect the entire McMurdo Dry Valley ecosystem. Results will be used to construct a biogeochemical model for seasonal biomass generation and phenotypic changes in the system.

Field Season Overview

Six participants will deploy from late October through mid-December, residing for 5-6 weeks at Lake Fryxell fixed camp in Taylor Valley. In this final season of this science event, the team will conduct under-ice diving from an Endurance tent positioned on the lake ice to study microbial mats on the lake floor. The aim is to monitor microbial activity in the mats prior to peak photosynthesis in mid-November. The team will collect water and mat samples and recover biogeochemical monitoring equipment and shades that had been deployed over winter. One collaborator from Antarctica New Zealand (AntNZ) will join the group for a week to assist with diving, sample collection and run an underwater remotely operated vehicle (ROV) to collect additional imagery and data.

Deploying Team Members

- Abbey Dias
- Marisol Juarez Rivera
- Anne Jungblut
- Tyler Mackey (Co-PI)
- Elisa Merz
- Dawn Sumner (PI)

Project Detail

ORGANISMS AND ECOSYSTEMS

Antarctica as a model system for responses of terrestrial carbon balance to warming

Event Number:
B-086-P
NSF / OPP Award 1947562

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Allison Barden / Jamee Johnson

Principal Investigator(s):
Dr. Natasja Carla van Gestel
natasja.van-gestel@ttu.edu
Texas Tech University
Lubbock, Texas

Project Web Site:
https://www.nvangestel.com/antarctica

Location(s):

- **Supporting Stations:** Palmer Station
- **Research Locations:** Backyard and Litchfield Island

The Nathaniel B. Palmer Research Vessel at Palmer Station. Photo by Marissa Goerke, courtesy of the NSF/USAP Photo Library.

B-086-P Research Location(s): Backyard and Litchfield Island

Project Description:
This five-year Antarctic Peninsula project is focused on evaluating the magnitude feedback response of soil microbes and plant physiology to effects of changes in climate. The team will use experimental field deployed chambers to evaluate the effects of warming on

microbial mediated carbon losses from soil located on a deglaciated sere gradient at sites in the Western Antarctic Peninsula. Specifically, the team will evaluate the differential warming responses of individual taxa of bacteria, fungi and archaea and their potential roles in carbon cycling. The study will further assess the role of warming on photosynthetic uptake of carbon by the vegetation. Results will advance research in climate change, plant and soil microbial ecology, and ecosystem modeling.

Field Season Overview

No van Gestel participants will be deploying to Palmer Station this season. The Palmer Lab staff will assist with installation and monitoring of equipment to continue annual measurements of carbon fluxes in the field.

Project Detail

ORGANISMS AND ECOSYSTEMS

Population Growth at the Southern Extreme: Effects of Early Life Conditions on Adélie Penguin Individuals and Colonies

Event Number:
B-200-M
NSF / OPP Award 1935870

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Grant Ballard
gballard@pointblue.org
Point Reyes Bird Observatory
San Francisco, California

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Cape Crozier, Cape Royds

Adélie Penguins. Photo by Mika Lucibella, courtesy of the NSF/USAP Photo Library.

B-200-M Research Location(s): Cape Crozier, Cape Royds

Project Description:

In the Ross Sea region, one of the largest Adélie penguin colonies in the world is growing quickly despite signs of negative density dependence. Building on a long-term biologging and demographic dataset, this team will integrate the role of environmental factors with information on penguin foraging behavior, diet, growth, and survival at both Cape Crozier and Cape Royds. Data will be used to evaluate how early-life

conditions and penguin behavior relate to penguin energetics and population size. Results from this study will enhance scientific understanding of important penguin and prey populations and provide valuable information that will feed into the conservation of sea ice ecosystems. The team will also lead a diverse training and public outreach program.

Field Season Overview

Eight participants will deploy this season from late October to early February to continue the long-term study of Adélie penguin demographics and response to environmental change in the Ross Sea. Deployments will be staggered throughout the field season, with participants occupying helicopter-supported camps at Cape Royds and Cape Crozier. Field activities include identifying marked penguins at each location, collecting breeding behavior data, recovering loggers that were attached to penguins in prior seasons, and conducting uncrewed aerial system (UAS) surveys of the penguin colonies. The team will also make 1- to 2-day trips to Cape Bird to conduct a census and UAS flights.

Deploying Team Members

- Grant Ballard (PI)
- Christina Burnham
- Megan Elrod (Team Leader)
- Dennis Jongsomjit
- Amelie Lescroel (Co-PI)
- Anne Schmidt (Co-PI)
- Alexandra Strang
- Arvind Varsani (Co-PI)

Project Detail

ORGANISMS AND ECOSYSTEMS

Career: Ecosystem Impacts of Microbial Succession and Production at Antarctic Methane Seeps

Event Number:
B-249-M
NSF / OPP Award 2046800

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Randolph Jones

Principal Investigator(s):
Dr. Andrew Thurber
athurber@ucsb.edu
University of California Santa Barbara
Department of Ecology, Evolution, Marine Biology
Santa Barbara, California

Project Web Site:
https://colddarkbenthos.earth

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Sound- multiple sites

The white patches at the Cinder Cones Seep indicates where microbes consume the greenhouse-gas methane. Photograph by Andrew Thurber.

B-249-M Research Location(s): McMurdo Sound- multiple sites

Project Description:

This project involves the genomic and transcriptomic study of microbial communities developed and still developing after seepage of methane

through the seafloor into the ocean — the cold seeps. The first methane seepage in the high Antarctic was discovered in McMurdo Sound in 2012 and 5 years later still had an underdeveloped microbial community that was consuming methane. This project will elucidate the microbial community composition in relation to the presence of methane and their function in oxidizing methane in Antarctic coastal waters. The project aims to answer three scientific questions on microbes associated with methane seeps: (1) What is their relation to species present and their evolution over time, (2) what metabolic processes do they support, and (3) what role do they play in providing food for benthic food webs. Sampling must occur in the late winter / early spring, before high light levels support growth of diatom mats over the benthos.

Field Season Overview

The team will focus on sampling the areas of known methane seepage around eastern McMurdo Sound. Four participants will deploy for ~2 months, from early October to early December, to collect sediment cores and animals with the aid of United States Antarctic Program (USAP) dive support and to conduct experiments on the collected sediment within the Crary aquarium and Crary Lab. The majority of the work involves diving out of fish huts, plus dive tomatoes or apples. Antarctica New Zealand (AntNZ) will provide the Cape Evans field camp structures and dive hole. The science team and a USAP diver will do a series of dives at Cape Evans but will be based at McMurdo Station, overnighting at the AntNZ camp up to 3 nights to minimize fuel and drive time between McMurdo Station and Cape Evans.

Deploying Team Members

- Dexter Davis
- Paola Santiago Padua
- Lily Skolnick-Simonson
- Andrew Thurber (PI)

Project Detail

ORGANISMS AND ECOSYSTEMS

Collaborative Research: Role of Endothelial Cell Activation in Hypoxia Tolerance of an Elite Diver, the Weddell Seal

Event Number:
B-464-M
NSF/OPP Award 2020664

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Randolph Jones

Principal Investigator(s):
Dr. Jose Pablo Vazquez-Medina
jpv-m@berkeley.edu
University of California Berkeley
Berkeley, California

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Sound Sea Ice

Weddell seal mom and pup in Erebus Bay. Photo by Allyson Hindle, University of Nevada Las Vegas, NMFS #23273.

B-464-M Research Location(s): McMurdo Sound Sea Ice

Project Description:
The Weddell seal is a champion diver with a high natural tolerance for low blood oxygen concentration (hypoxemia) and inadequate blood supply (ischemia). The processes unique to this species protects their tissue from the inflammation and oxidative stress observed in other mammalian tissues exposed to such physiological conditions. Weddell seals' repetitive short dives before long ones

are hypothesized to precondition the tissues and activate the protective processes. This project aims to understand the signatures of these processes through the use of molecular, cellular, and metabolic tools. In the field, blood samples will be taken after seals are isolated in a dive hole, and their diving performance will be recorded. It is expected that the blood will contain metabolites that can be related to molecular pathways identified in the lab experiments. This study newly investigates endothelial cells (i.e., cells in a single-cell layer lining blood vessels) that can relate directly to seal breathing and how breath hold affects cellular function. Collaborators on the team will provide field support, with the ice camp, dive hole for the seals, and telemetry associated with the seals' dives.

Field Season Overview

Five participants (including a veterinarian) will deploy to McMurdo Station from mid-October through mid-December to focus on three objectives: (1) collecting tissue, both from expelled placentas and opportunistic necropsies of animals who die of natural causes within the Erebus Bay colony; (2) collecting serial blood samples from seals holding their breath during sleep, to validate blood sampling protocols planned for isolated dive hole studies in a second field season; and (3) deploying instruments to measure heart rate and blood oxygen levels in up to 12 free-ranging Weddell seals. Crary Lab resources will be heavily relied upon to maximize on-site experiments that can be performed on the limited samples collected without an isolated dive hole. The McMurdo Station-based field plan shifts logical support plans away from a sea ice-based field camp and toward vehicle support (e.g., snowmachines and a PistenBully), plus helicopter support for reconnaissance flights (recces) in early and late season and contingency flights as needed to recover any wayward seals.

Deploying Team Members

- Allyson Hindle (Co-PI)
- Markus Horning
- Emily Trumbull
- Jose Vazquez-Medina (PI)
- Cassondra Williams

2025–2026

USAP FIELD SEASON PROJECTS

INTEGRATED SYSTEM SCIENCE

Dr. William Ambrose, Program Director

Project Detail

INTEGRATED SYSTEM SCIENCE

PAL-LTER: Ecological Response to "Press Pulse" Disturbances Along a Rapidly Changing West Antarctic Peninsula

Event Number:
C-013-N/P
NSF / OPP Award 2224611

Program Director:
Dr. William Ambrose

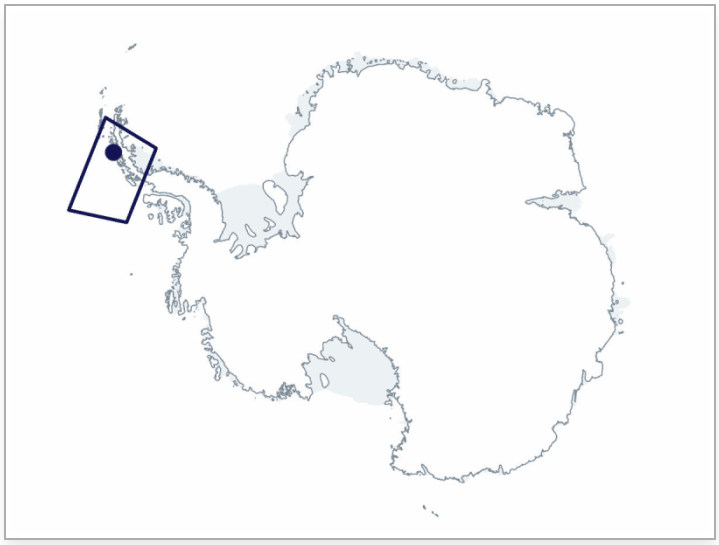
Science Support POC / Implementer(s):
Ryan Steiner / Jamee Johnson

Principal Investigator(s):
Dr. Megan A Cimino
mecimino@ucsc.edu
University of California Santa Cruz
Monterey, California

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer, Palmer Station
- **Research Locations:** Palmer Station

A southern giant petrel. Photo by Mike Lucibella, courtesy of the USAP Photo Library.



C-013-N/P Research Location(s): Palmer Station

Project Description:

Seasonal sea ice-influenced marine ecosystems at both poles are characterized by high productivity concentrated in space and time by local, regional, and remote physical forcing. These polar ecosystems are among the most rapidly changing on Earth. The Palmer Long-Term Ecological Research (PAL-LTER) seeks to build on three decades of research along the West Antarctic Peninsula to gain new mechanistic and predictive understanding of ecosystem changes in response

to disturbances spanning long-term, subdecadal, and higher frequency "pulses" driven by a range of processes, including long-term climate warming, natural climate variability, and storms. These disturbances alter food web composition and ecological interactions across temporal and spatial scales that are not well understood. Researchers will contribute fundamental understanding of how population dynamics and biogeochemical processes are responding within a polar marine ecosystem undergoing profound change.

Field Season Overview

The Palmer Station component of the project will deploy from roughly late October until mid-April. Three to four team members will live at Palmer Station while conducting field research. The team will use small boats to access local islands in the Palmer vicinity. They will conduct population censuses and sampling from local seabird colonies and collaborate with other Long-Term Ecological Research (LTER) groups on twice per week acoustic surveys in the area.

Deploying Team Members

- Helena Dodge
- Victoria Hermanson
- Richard Robbins
- Darren Roberts
- Megan Roberts

Project Detail

INTEGRATED SYSTEM SCIENCE

PAL-LTER: Ecological Response to "Press Pulse" Disturbances Along a Rapidly Changing West Antarctic Peninsula

Event Number:
C-019-N/P
NSF / OPP Award 2224611

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jamee Johnson

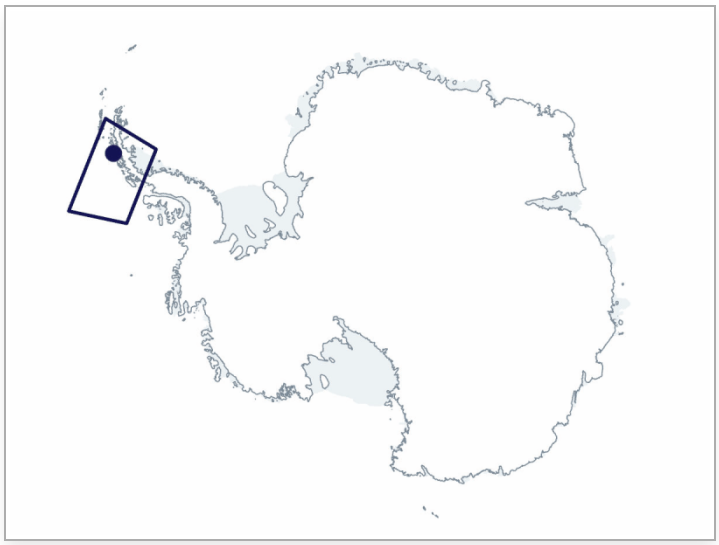
Principal Investigator(s):
Dr. Oscar Schofield
oscar@marine.rutgers.edu
Rutgers University
Institute for Marine & Coastal Sciences
New Brunswick, New Jersey

Project Web Site:
https://pallter.marine.rutgers.edu/

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer, Palmer Station
- **Research Locations:** Palmer Station

Palmer Station. Photo by Ben Rosen-Filardo, courtesy of the USAP Photo Library.



C-019-N/P Research Location(s): Palmer Station

Project Description:
Seasonal sea ice-influenced marine ecosystems at both poles are characterized by high productivity concentrated in space and time by local, regional, and remote physical forcing. These polar ecosystems are among the most rapidly changing on Earth. The Palmer Long-

Term Ecological Research (PAL-LTER) seeks to build on three decades of research along the West Antarctic Peninsula to gain new mechanistic and predictive understanding of ecosystem changes in response to disturbances spanning long-term, subdecadal, and higher frequency “pulses” driven by a range of processes, including long-term climate warming, natural climate variability, and storms. These disturbances alter food web composition and ecological interactions across temporal and spatial scales that are not well understood. Researchers will contribute fundamental understanding of how population dynamics and biogeochemical processes are responding within a polar marine ecosystem undergoing profound change.

Field Season Overview

The two-member team will continue to study seasonal and local-scale processes at Palmer Station. The team will conduct water sampling and optical surveys twice per week in collaboration with the Van Mooy (C-045) group, EK80 echo sounder surveys in collaboration with other Long-Term Ecological Research (LTER) groups, and incubation experiments. The Palmer lab manager will assist with year-round weekly sampling for chlorophyll at the station's seawater intake (SWI) in the pump house. The team will deploy a Slocum glider (if available) periodically during the season via Zodiac or other rigid hull inflatable boats (RHIBs). A conductivity, temperature, depth (CTD) cast with no water sampling will be required during the deployment and recovery.

Deploying Team Members

- Charlotte Bramich
- Michael Cappola
- Rebecca Howritz
- Julian Jacobs
- Eva Scrivner
- Mya Sharpe
- Abby Tomita

Project Detail

INTEGRATED SYSTEM SCIENCE

PAL-LTER: Ecological Response to "Press Pulse" Disturbances Along a Rapidly Changing West Antarctic Peninsula

Event Number:
C-020-N/P
NSF / OPP Award 2224611

Program Director:
Dr. William Ambrose

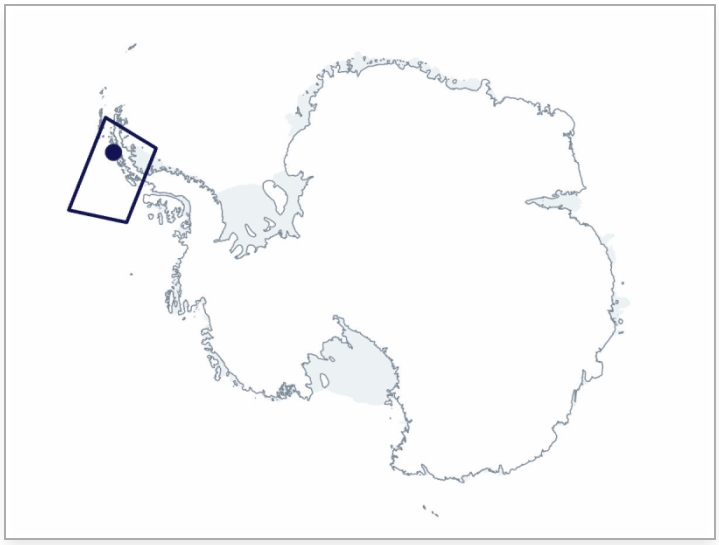
Science Support POC / Implementer(s):
Ryan Steiner / Jamee Johnson

Principal Investigator(s):
Dr. Deborah Steinberg
debbies@vims.edu
Virginia Institute of Marine Sciences
Department of Biological Sciences
Gloucester Point, Virginia

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer, Palmer Station
- **Research Locations:** Palmer Station

A researcher processes samples in the Palmer Station laboratory. Photo by Peter Rejcek, courtesy of the USAP Photo Library.



C-020-N/P Research Location(s): Palmer Station

Project Description:
Seasonal sea ice-influenced marine ecosystems at both poles are characterized by high productivity concentrated in space and time by local, regional, and remote physical forcing. These polar ecosystems are among the most rapidly changing on Earth. The Palmer Long-Term Ecological Research (PAL-LTER) seeks to build on three decades of research along the West

Antarctic Peninsula to gain new mechanistic and predictive understanding of ecosystem changes in response to disturbances spanning long-term, subdecadal, and higher frequency “pulses” driven by a range of processes, including long-term climate warming, natural climate variability, and storms. These disturbances alter food web composition and ecological interactions across temporal and spatial scales that are not well understood. Researchers will contribute fundamental understanding of how population dynamics and biogeochemical processes are responding within a polar marine ecosystem undergoing profound change.

Field Season Overview

At Palmer Station, two team members will use net tows and acoustic surveys to sample the zooplankton and ichthyofaunal (i.e., larval fish) communities. Acoustic, net tow, and conductivity, temperature, depth (CTD) surveys in predator foraging areas will be coordinated among all Long-Term Ecological Research (LTER) field teams.

Net tows and concurrent acoustic surveys will be carried out twice per week at LTER Station E from a rigid hull inflatable boat (RHIB) equipped with a research winch and hull-mounted EK80 echo sounder. At least two and up to five net tows will be conducted. Live samples will be stored and processed on the research vessel. Twice weekly trips in collaboration with other LTER groups into the Palmer Deep Canyon (Adélie penguin foraging area) and Bismarck Strait (gentoo penguin foraging) will be conducted through the field season. Participants will conduct krill heat-shock tolerance experiments.

Deploying Team Members

- Joseph Cope
- Tor Mowatt-Larssen
- Yuuki Niimi
- Meredith Nolan
- Meredith Nolan
- Katherine Philipp
- Corinne Richard
- Deborah Steinberg (PI)

Project Detail

INTEGRATED SYSTEM SCIENCE

PAL-LTER: Ecological Response to "Press-Pulse" Disturbances Along a Rapidly Changing West Antarctic Peninsula

Event Number:
C-021-N
NSF / OPP Award 2224611

Program Director:
Dr. William Ambrose

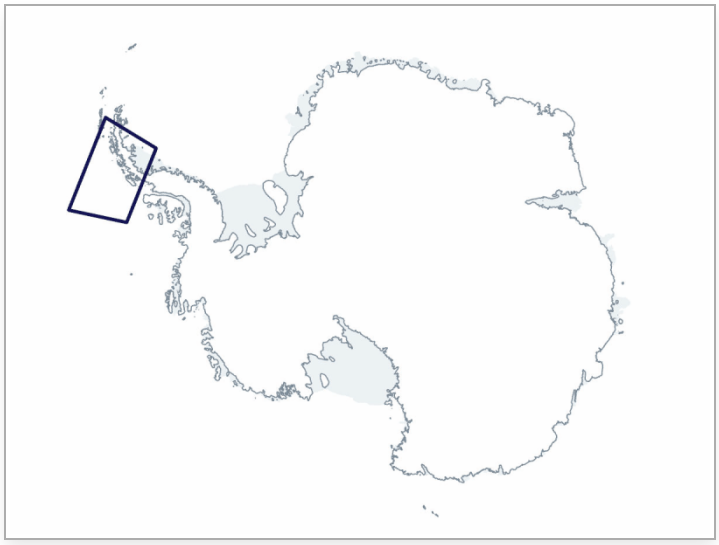
Science Support POC / Implementer(s):
Ryan Steiner / Jamee Johnson

Principal Investigator(s):
Mr. Carlos F Moffat
cmoffat@udel.edu
University of Delaware
Newark, Delaware

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer
- **Research Locations:** Palmer Station

A researcher processes samples in the Palmer Station laboratory. Photo by Peter Rejcek, courtesy of the USAP Photo Library.



C-021-N Research Location(s): Palmer Station

Project Description:

Seasonal sea ice-influenced marine ecosystems at both poles are characterized by high productivity concentrated in space and time by local, regional, and remote physical forcing. These polar ecosystems are among the most rapidly changing on Earth. The Palmer Long-Term Ecological Research (PAL-LTER) seeks to build on three decades of research along the West Antarctic Peninsula to gain new

mechanistic and predictive understanding of ecosystem changes in response to disturbances spanning long-term, subdecadal, and higher frequency “pulses” driven by a range of processes, including long-term climate warming, natural climate variability, and storms. These disturbances alter food web composition and ecological interactions across temporal and spatial scales that are not well understood. Researchers will contribute fundamental understanding of how population dynamics and biogeochemical processes are responding within a polar marine ecosystem undergoing profound change.

Field Season Overview

Vessel support is transitioning to University-National Oceanographic Laboratory System (UNOLS) ships.

Deploying Team Members

- Carlos Moffat (PI)

Project Detail

INTEGRATED SYSTEM SCIENCE

PAL-LTER: Ecological Response to "Press-Pulse" Disturbances Along a Rapidly Changing West Antarctic Peninsula

Event Number:
C-024-N/P
NSF / OPP Award 2224611

Program Director:
Dr. William Ambrose

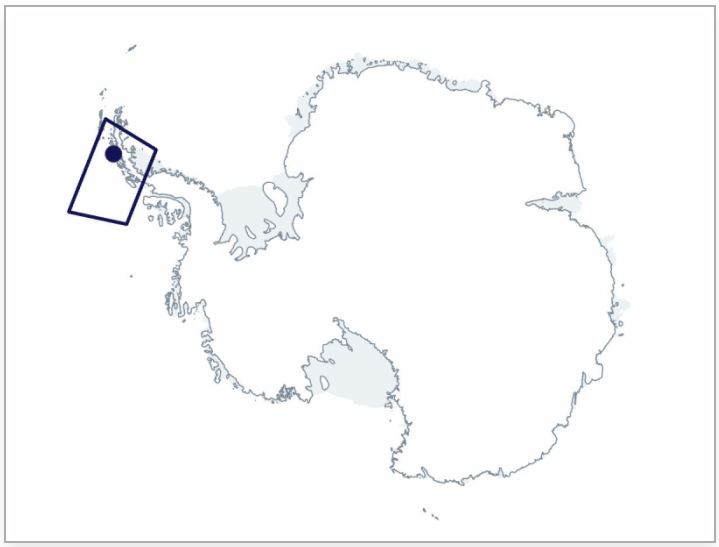
Science Support POC / Implementer(s):
Ryan Steiner / Jamee Johnson

Principal Investigator(s):
Dr. Ari Seth Friedlaender
ari.friedlaender@ucsc.edu
University of California Santa Cruz
Institute of Marine Sciences
Santa Cruz, California

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer, Palmer Station
- **Research Locations:** Palmer Station

Humpback whale. Photo by Ari Friedlaender, courtesy of the USAP Photo Library.



C-024-N/P Research Location(s): Palmer Station

Project Description:
Seasonal sea ice-influenced marine ecosystems at both poles are characterized by high productivity concentrated in space and time by local, regional, and remote physical forcing. These polar ecosystems are among the most rapidly changing on Earth. The Palmer Long-Term Ecological Research (PAL-LTER) seeks to build on three decades of research along the West Antarctic Peninsula to gain new mechanistic and predictive understanding of ecosystem changes in response to disturbances

spanning long-term, subdecadal, and higher frequency “pulses” driven by a range of processes, including long-term climate warming, natural climate variability, and storms. These disturbances alter food web composition and ecological interactions across temporal and spatial scales that are not well understood. Researchers will contribute fundamental understanding of how population dynamics and biogeochemical processes are responding within a polar marine ecosystem undergoing profound change.

Field Season Overview

The team will deploy one to two participants to Palmer Station for the austral summer. Field operations focus on multidisciplinary research to study the behavior, ecology, distribution, and abundance of marine mammals in the waters around the station. Researchers will routinely conduct visual surveys, deploy an uncrewed aerial system (UAS) to collect photogrammetric images of whales, collect remote biopsy samples using crossbows, and deploy suction cup tags to whales. The team will deploy two passive acoustic moorings (one in the Palmer boating area and one near the Wauwermans Islands). To the greatest extent possible, these must be deployed immediately after station science opens and serviced again right at the close of summer field work to maintain a complete and uninterrupted acoustic data stream.

Deploying Team Members

- Mason Cole
- Amanda Klein

Project Detail

INTEGRATED SYSTEM SCIENCE

PAL-LTER: Ecological Response to "Press Pulse" Disturbances Along a Rapidly Changing West Antarctic Peninsula

Event Number:
C-045-N/P
NSF / OPP Award 2224611

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jamee Johnson

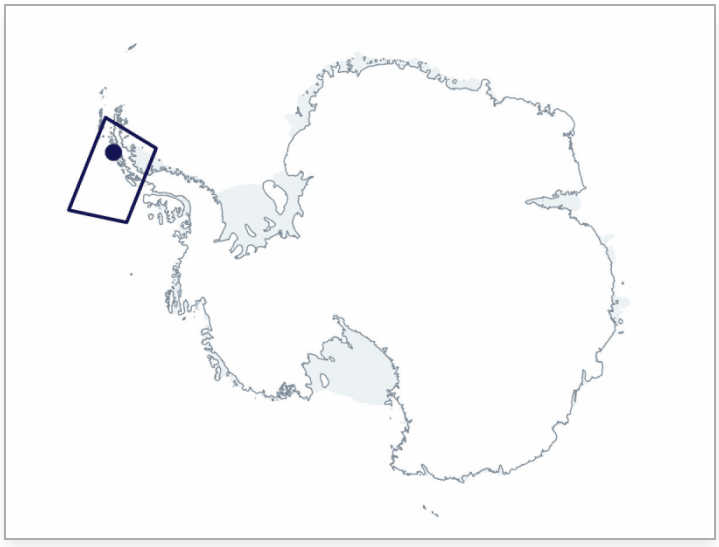
Principal Investigator(s):
Dr. Benjamin Van Mooy
bvanmooy@whoi.edu
Woods Hole Oceanographic Institution
Marine Chemistry & Geochemistry
Woods Hole, Massachusetts

Project Web Site:
https://pallter.marine.rutgers.edu/

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer, Palmer Station
- **Research Locations:** Palmer Station

Researchers work in the laboratory aboard the research vessel Laurence M. Gould. Photo by Peter Rejcek, courtesy of the USAP Photo Library.



C-045-N/P Research Location(s): Palmer Station

Project Description:

Seasonal sea ice-influenced marine ecosystems at both poles are characterized by high productivity concentrated in space and time by local, regional, and remote physical forcing. These polar ecosystems are among the most rapidly changing on Earth. The Palmer Long-

Term Ecological Research (PAL-LTER) seeks to build on three decades of research along the West Antarctic Peninsula to gain new mechanistic and predictive understanding of ecosystem changes in response to disturbances spanning long-term, subdecadal, and higher frequency “pulses” driven by a range of processes, including long-term climate warming, natural climate variability, and storms. These disturbances alter food web composition and ecological interactions across temporal and spatial scales that are not well understood. Researchers will contribute fundamental understanding of how population dynamics and biogeochemical processes are responding within a polar marine ecosystem undergoing profound change.

Field Season Overview

Two participants will deploy to Palmer Station for the 2025-26 austral summer. They will participate in collaborative twice per week sampling at Long-Term Ecological Research (LTER) Station E. Primary sampling responsibilities are for dissolved inorganic carbon/alkalinity, particulate organic carbon, flow cytometry, particulate carbohydrates, particulate lipids, 14-C productivity, and caloric content. Sediment traps will be deployed and recovered weekly. Additionally, participants will conduct incubation experiments with other LTER teams. Grantees will participate in twice weekly trips into the Palmer Deep Canyon (Adélie penguin foraging area) and Bismarck Strait (Gentoo penguin foraging) to conduct acoustic surveys.

Deploying Team Members

- Lydia Babcock-Adams
- Shavonna Bent
- Michelle Cusolito
- Helen Fredricks
- Daniel Lowenstein
- Christina Rorres

Project Detail

INTEGRATED SYSTEM SCIENCE

LTER: MCM6: The Roles of Legacy and Ecological Connectivity in a Polar Desert Ecosystem

Event Number:
C-504-M
NSF / OPP Award 2224760

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Melisa Antonia Diaz
diaz.237@osu.edu
Ohio State University
Byrd Polar and Climate Research Center
Columbus, Ohio

Project Web Site:
https://mcm.lternet.edu/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys

Researchers walk in front of the Canada Glacier in the Taylor Valley. Photo by Amy Chiuchiolo. Image courtesy of NSF/USAP Photo Library.

C-504-M Research Location(s): McMurdo Dry Valleys

Project Description:
In this iteration of the McMurdo Long-Term Ecological Research (MCM-LTER) project (MCM6), the team will test ecological connectivity and stability theory in a system subject to strong

physical drivers (e.g., geological legacies, extreme seasonality, contemporary climate change) and driven by microbial organisms. The team hypothesizes that the structure and functioning of the McMurdo Dry Valleys ecosystem depends on legacies and the contemporary frequency, duration, and magnitude of ecological connectivity. This hypothesis will be tested with new and continuing monitoring, experiments, and analyses of long-term datasets to examine (1) the stability of these ecosystems as reflected by sentinel taxa; (2) the relationship between ecological legacies and ecosystem resilience; (3) the importance of material carryover during periods of low connectivity to maintaining biological activity and community stability; and (4) how changes in disturbance dynamics disrupt ecological cycles through the polar night. Tests of these hypotheses will occur in field and modeling activities using new and existing long-term datasets.

Field Season Overview

Four participants will deploy on the Long-Term Ecological Research (LTER) surface processes team from mid-December to mid-January, based primarily out of F6 camp in Taylor Valley with occasional stays at New Harbor and trips back to Crary Lab to process samples. The team will collect aeolian, stream, and other sediments and shallow ice cores from Taylor Valley glaciers. The team will also measure nutrient concentrations in streams and lakes and use an uncrewed aerial system (UAS) to map and characterize hydrologically active areas at several locations in the Dry Valleys. Following field work, one participant will remain on station into mid-February to process samples.

Deploying Team Members

- Melisa Diaz (PI)
- Maya Hill
- Gavin Moriarty
- Dendup Tshering

Project Detail

INTEGRATED SYSTEM SCIENCE

MCM-LTER: MCM6: The Roles of Legacy and Ecological Connectivity in a Polar Desert Ecosystem

Event Number:
C-505-M
NSF / OPP Award 2224760

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Cristina Danielle Takacs-Vesbach
cvesbach@gmail.com
University of New Mexico
Department of Biology
Albuquerque, New Mexico

Project Web Site:
https://mcm.lternet.edu/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys

Researchers melt hole on Lake Bonney. Photo by John Priscu. Image courtesy of NSF/USAP Photo Library.

C-505-M Research Location(s): McMurdo Dry Valleys

Project Description:

In this iteration of the McMurdo Long-Term Ecological Research (MCM-LTER) project (MCM6), the team will test ecological connectivity and stability theory in a system subject to strong physical drivers (e.g., geological legacies,

extreme seasonality, contemporary climate change) and driven by microbial organisms. The team hypothesizes that the structure and functioning of the McMurdo Dry Valleys ecosystem depends on legacies and the contemporary frequency, duration, and magnitude of ecological connectivity. This hypothesis will be tested with new and continuing monitoring, experiments, and analyses of long-term datasets to examine (1) the stability of these ecosystems as reflected by sentinel taxa; (2) the relationship between ecological legacies and ecosystem resilience; (3) the importance of material carryover during periods of low connectivity to maintaining biological activity and community stability; and (4) how changes in disturbance dynamics disrupt ecological cycles through the polar night. Tests of these hypotheses will occur in field and modeling activities using new and existing long-term datasets.

Field Season Overview

Five participants will deploy on the Long-Term Ecological Research (LTER) limno team between mid-October and mid-February. The team will rotate among Lake Fryxell, Lake Hoare, and Lake Bonney camps, conducting two to three rounds of limno runs. Antarctic Support Contract carpentry staff will set up Polarhavens on the ice of Lake Fryxell, Lake Bonney, and Lake Hoare for the team to work from, and the team will melt holes in the ice to access the water column. The team will also make day trips to other lakes in the Dry Valleys (e.g., lakes Miers, Vanda, Joyce, Trough, and Vida) to collect samples. Between each limno run, the team will return to Crary Lab to process samples.

Deploying Team Members

- Natalia Chavez
- Jade Lawrence (Team Leader)
- Rachael Morgan-Kiss (Co-PI)
- Devon Popson
- Cristina Takacs-Vesbach (PI)

Project Detail

INTEGRATED SYSTEM SCIENCE

LTER: MCM6: The Roles of Legacy and Ecological Connectivity in a Polar Desert Ecosystem

Event Number:
C-506-M
NSF / OPP Award 2224760

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Michael N Gooseff
michael.gooseff@colorado.edu
University of Colorado Boulder
Institute of Arctic and Alpine Research
Boulder, Colorado

Project Web Site:
https://mcm.lternet.edu/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys

Researcher monitors device collecting water samples in Miers Valley. Photo by Mika Lucibella, courtesy of the USAP Photo Library.

C-506-M Research Location(s): McMurdo Dry Valleys

Project Description:

In this iteration of the McMurdo Long-Term Ecological Research (MCM-LTER) project (MCM6), the team will test ecological connectivity and stability theory in a system subject to strong physical drivers (e.g., geological legacies,

extreme seasonality, contemporary climate change) and driven by microbial organisms. The team hypothesizes that the structure and functioning of the McMurdo Dry Valleys ecosystem depends on legacies and the contemporary frequency, duration, and magnitude of ecological connectivity. This hypothesis will be tested with new and continuing monitoring, experiments, and analyses of long-term datasets to examine (1) the stability of these ecosystems as reflected by sentinel taxa; (2) the relationship between ecological legacies and ecosystem resilience; (3) the importance of material carryover during periods of low connectivity to maintaining biological activity and community stability; and (4) how changes in disturbance dynamics disrupt ecological cycles through the polar night. Tests of these hypotheses will occur in field and modeling activities using new and existing long-term datasets.

Field Season Overview

Four participants will deploy on the Long-Term Ecological Research (LTER) streams and glaciers team from early November to mid-February. The team will primarily base out of F6 camp in Taylor Valley, with occasional stays at New Harbor camp and day trips to visit streams and glaciers throughout Taylor, Wright, Garwood, Victoria, and Miers valleys. Activities will include maintaining the network of 17 stream gauges, surveying lake levels, collecting water samples, monitoring microbial mats in abandoned channels, deploying and recovering sensors, and maintaining various sensor and data collection systems deployed throughout the region.

Deploying Team Members

- Natalie Aranda
- Jared Collins (Team Leader)
- Jared Collins (Team Leader)
- Michael Gooseff (PI)
- Michael Gooseff (PI)
- Joseph Maguire

Project Detail

INTEGRATED SYSTEM SCIENCE

LTER: MCM6: The Roles of Legacy and Ecological Connectivity in a Polar Desert Ecosystem

Event Number:
C-507-M
NSF / OPP Award 2224760

Program Director:
Dr. William Ambrose

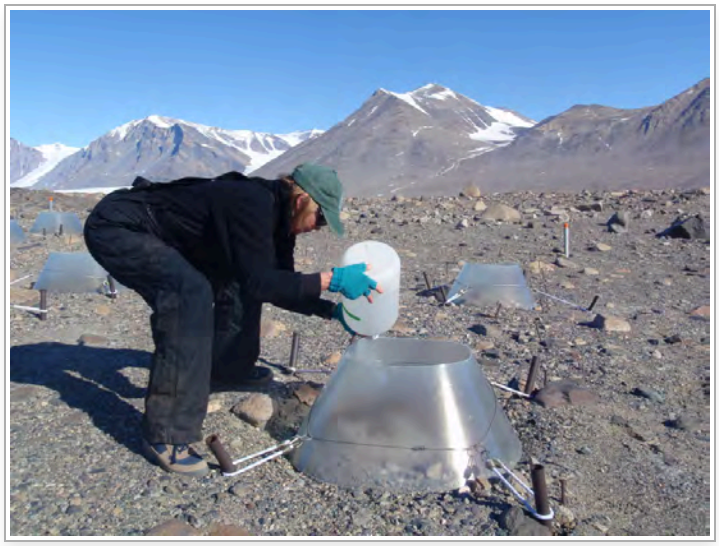
Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Byron J Adams
bjadams@byu.edu
Brigham Young University
College of Life Sciences
Provo, Utah

Project Web Site:
https://mcm.lternet.edu/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys



A researcher adds water to an experimental plot of land in the McMurdo Dry Valley. Photo by Byron J. Adams. Image courtesy of NSF/USAP Photo Library.

C-507-M Research Location(s): McMurdo Dry Valleys

Project Description:

In this iteration of the McMurdo Long-Term Ecological Research (MCM-LTER) project (MCM6), the team will test ecological connectivity and stability theory in a system subject to strong

physical drivers (e.g., geological legacies, extreme seasonality, contemporary climate change) and driven by microbial organisms. The team hypothesizes that the structure and functioning of the McMurdo Dry Valleys ecosystem depends on legacies and the contemporary frequency, duration, and magnitude of ecological connectivity. This hypothesis will be tested with new and continuing monitoring, experiments, and analyses of long-term datasets to examine (1) the stability of these ecosystems as reflected by sentinel taxa; (2) the relationship between ecological legacies and ecosystem resilience; (3) the importance of material carryover during periods of low connectivity to maintaining biological activity and community stability; and (4) how changes in disturbance dynamics disrupt ecological cycles through the polar night. Tests of these hypotheses will occur in field and modeling activities using new and existing long-term datasets.

Field Season Overview

Five participants will deploy on the Long-Term Ecological Research (LTER) soils team from mid-December to early February. The team will primarily base out of McMurdo Station and make day trips to locations throughout the Dry Valleys to sample soils, conduct various in situ soil experiments, and monitor and maintain soil meteorological stations. The team will analyze and prepare collected soil samples at Crary Lab. The team will also make a weeklong overnight trip to Fryxell Camp.

Deploying Team Members

- Byron Adams (PI)
- John Barrett (Co-PI)
- Sophia Gomez
- Kimberlynn Karnes
- Jacob Shaffer

Project Detail

INTEGRATED SYSTEM SCIENCE

LTER: MCM6: The Roles of Legacy and Ecological Connectivity in a Polar Desert Ecosystem

Event Number:
C-509-M
NSF / OPP Award 2224760

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Lydia Helen Zeglin
lzeglin@ksu.edu
Manhattan, Kansas

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys

Researcher collects samples of algal mats along Green Creek. Photo by Brian Minnear, courtesy of the USAP Photo Library.

C-509-M Research Location(s): McMurdo Dry Valleys

Project Description:

In this iteration of the McMurdo Long-Term Ecological Research (MCM-LTER) project (MCM6), the team will test ecological connectivity and stability theory in a system subject to strong physical drivers (e.g., geological legacies, extreme seasonality, contemporary climate change) and driven by microbial organisms. The team hypothesizes that the structure and functioning of the McMurdo Dry Valleys ecosystem depends on legacies and the contemporary

frequency, duration, and magnitude of ecological connectivity. This hypothesis will be tested with new and continuing monitoring, experiments, and analyses of long-term datasets to examine (1) the stability of these ecosystems as reflected by sentinel taxa; (2) the relationship between ecological legacies and ecosystem resilience; (3) the importance of material carryover during periods of low connectivity to maintaining biological activity and community stability; and (4) how changes in disturbance dynamics disrupt ecological cycles through the polar night. Tests of these hypotheses will occur in field and modeling activities using new and existing long-term datasets.

Field Season Overview

Two participants will stagger their deployments, with one arriving in early December and the other arriving in late December. The team will primarily base out of F6 camp to sample long-term established algal transects, along with newer transects at various locations in the McMurdo Dry Valleys. The team will modify stream flow at one location as part of an experiment to measure algal mat resilience to hydrological fluctuation at interannual timescales. Following sampling efforts in December and January, one participant will redeploy while the other remains at Crary Lab to process and analyze samples. Additional samples will be packaged for shipment, and the participant will redeploy in mid-February.

Deploying Team Members

- Claire Utzman
- Lydia Zeglin (PI)

Project Detail

INTEGRATED SYSTEM SCIENCE

LTER: MCM6: The Roles of Legacy and Ecological Connectivity in a Polar Desert Ecosystem

Event Number:
C-511-M
NSF / OPP Award 2224760

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Dr. Peter Doran
pdoran@lsu.edu
Louisiana State University Baton Rouge
Department of Geology and Geophysics
Baton Rouge, Louisiana

Project Web Site:
https://mcm.lternet.edu/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Dry Valleys

Researcher adds 'tracer' to a stream running into Lake Fryxell in McMurdo Dry Valleys. Photo by Emily Stone. Image courtesy of NSF/USAP Photo Library.

Project Description:

In this iteration of the McMurdo Long-Term Ecological Research (MCM-LTER) project (MCM6), the team will test ecological connectivity and stability theory in a system subject to strong physical drivers (e.g., geological legacies,

extreme seasonality, contemporary climate change) and driven by microbial organisms. The team hypothesizes that the structure and functioning of the McMurdo Dry Valleys ecosystem depends on legacies and the contemporary frequency, duration, and magnitude of ecological connectivity. This hypothesis will be tested with new and continuing monitoring, experiments, and analyses of long-term datasets to examine (1) the stability of these ecosystems as reflected by sentinel taxa; (2) the relationship between ecological legacies and ecosystem resilience; (3) the importance of material carryover during periods of low connectivity to maintaining biological activity and community stability; and (4) how changes in disturbance dynamics disrupt ecological cycles through the polar night. Tests of these hypotheses will occur in field and modeling activities using new and existing long-term datasets.

C-511-M Research Location(s): McMurdo Dry Valleys

Field Season Overview

Four participants will deploy from late October to mid-December, basing out of McMurdo Station and then Lake Hoare, Lake Fryxell, and Lake Bonney camps to maintain long-term automated lake monitoring equipment and meteorological stations in the McMurdo Dry Valleys. The team will also carry out manual measurements of lake properties and perform maintenance on their tracking global positioning system (GPS) station on Taylor Glacier with the assistance of EarthScope personnel and an Antarctic Support Contract mountaineer. Sites will be accessed on foot and via helicopter day trips.

Deploying Team Members

- Peter Doran (PI)
- Charles Dougherty
- Charles Dougherty
- Hilary Dugan (Co-PI)
- Kayla Hubbard

2025–2026

USAP FIELD SEASON PROJECTS

ANTARCTIC INSTRUMENTATION AND RESEARCH FACILITIES

Dr. Marion Dierickx, Program Director

Project Detail

ANTARCTIC INSTRUMENTATION AND RESEARCH FACILITIES

A New Instrument and Measurement Approach to Cryoseismogeodesy: Monitoring Antarctic Ice Shelf Stability Using Ice Penetrators

Event Number:
D-550-M
NSF / OPP Award 1931131

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Ryan Steiner / Jenny Cunningham

Principal Investigator(s):
Mr. Pedro Elosegui
elosegui@mit.edu
Massachusetts Institute of Technology
Cambridge, Massachusetts

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Ross Ice Shelf

Calving front of Thwaites Ice Shelf. Photo by James Yungel, NASA IceBridge.

D-550-M Research Location(s): Ross Ice Shelf

Project Description:

Antarctic ice shelves, a critical element in the stability of the Antarctic Ice Sheet (AIS), are showing signs of rapid decline. Ice shelf melting, retreating, and thinning lead to increased discharge of grounded ice to the ocean and to concomitant sea level rise. Ice shelf disintegration could drive the AIS to eventual collapse. Despite their key role in the future fate of the AIS under a warming climate, ice shelves are lacking in situ seismic and geodetic measurements. To address these challenges, the team proposes to

combine cryoseismology and cryogeodesy for the first time into a single instrument — a seismogeodetic ice penetrator (SGIP) — that can be airdropped onto an ice shelf surface to help advance understanding of Antarctic ice-ocean-atmosphere dynamics. The SGIP provides a way to efficiently observe and quantify ice shelf stability. SGIP field testing will occur on the Ross Ice Shelf (RIS), near McMurdo Station, where two penetrators will be helicopter-dropped in the first season and allowed to operate over winter along with reference geodesic and seismic installations. The SGIP and reference equipment will be recovered in the second season.

Field Season Overview

One participant will deploy to McMurdo Station in late November. They will make three helicopter day trips to locations on the RIS where three SGIPs were dropped last season to overwinter. With the assistance of EarthScope personnel and an Antarctic Support Contract (ASC) mountaineer, the participant will dig out and recover the instruments for transport back to McMurdo Station and shipment off continent. This is the final season for D-550-M.

Deploying Team Members

- Chester Ruszczyk

2025-2026

USAP FIELD SEASON PROJECTS

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Dr. Kelly Brunt, Dr. David Porter, Dr. William Ambrose, Program Directors

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Collaborative Research: Sensitivity of the West Antarctic Ice Sheet to 2 Celsius (SWAIS 2C)

Event Number:
G-060-M
NSF / OPP Award 2035138

Program Director:
Dr. Kelly Brunt

Science Support POC / Implementer(s):
Marissa Goerke / Jenny Cunningham

Principal Investigator(s):
Dr. Jeremy Winberry
paul.winberry@gmail.com
Central Washington University
Ellensburg, Washington

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Scott Base, West Antarctica, Crary Ice Rise

Borehole in West Antarctic Ice Sheet to gather ice core samples. Photo by Steven Profaizer, courtesy of the USAP Photo Library.

G-060-M Research Location(s): Scott Base, West Antarctica, Crary Ice Rise

Project Description:

The SWAIS2C project was developed through international collaboration to better forecast the size and timing of future ice-sheet change. SWAIS2C scientists will collect and study geological (rocks), glaciological (ice), and geophysical (Earth physical properties) data and provide new information to guide the development of numerical models to

better understand and predict how the ice sheet on West Antarctica will contribute to future sea level rise. A snowmobile radar survey will occur in the vicinity of the SWAIS2C Crary Ice Rise (CIR) drill site.

Field Season Overview

Three participants will deploy to Antarctica via United States Antarctic Program (USAP) transportation with USAP extreme cold weather gear then embed with the Antarctica New Zealand (AntNZ) SWAIS2C drilling team at Scott Base. USAP and AntNZ team members and cargo will transport via Basler aircraft to the SWAIS2C drilling camp at CIR, where G-060 participants, along with an AntNZ collaborator, will perform seismic and radar surveys of CIR via snowmobile. Along the CIR, the team will deploy seismic nodes and streamers provided by EarthScope (T-299-M) to collect passive seismic data and record phase-sensitive radar (pRES) point measurements and use explosives for seismic source experiments. At the SWAIS2C borehole, the team will deploy global navigation satellite system (GNSS) and autonomous phase-sensitive radar (ApRES) instruments, plus a fiber-optic cable down the borehole that will overwinter and be recovered by AntNZ traverse staff the following season. Work will run from late November to mid-January.

Deploying Team Members

- Samuel Chester
- Audrey Huerta
- Jeremy Winberry (PI)

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Collaborative Research: Sensitivity of the West Antarctic Ice Sheet to 2 Celsius (SWAIS 2C)

Event Number:
G-070-M
NSF / OPP Award 2035035

Program Director:
Dr. Kelly Brunt

Science Support POC / Implementer(s):
Marissa Goerke / Jenny Cunningham

Principal Investigator(s):
Dr. Molly O'Rourke Patterson
patterso@binghamton.edu
Geosciences
Binghamton, New York

Project Web Site:
https://www.swais2c.aq/our-science

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Scott Base, West Antarctica, Crary Ice Rise

Iceberg juts into Ross Sea. Photo by Robyn Waserman, courtesy of NSF/USAP Photo Library.

G-070-M Research Location(s): Scott Base, West Antarctica, Crary Ice Rise

Project Description:

The SWAIS2C project was developed through international collaboration to better forecast the size and timing of future ice-sheet change. SWAIS2C scientists will collect and study geological (rocks), glaciological (ice), and geophysical (Earth physical properties) data and

provide new information to guide the development of numerical models to better understand and predict how the ice sheet on West Antarctica will contribute to future sea level rise. The project's drilling campaign aims to recover ~200-meter sediment cores from two locations beneath the eastern edge of the Ross Ice Shelf, designated as the Kamb Ice Stream (KIS-3) and Crary Ice Rise (CIR-1) field sites. This project, in collaboration with 10 nations and Antarctica New Zealand (AntNZ) acting as project operator for coordination and most logistical needs, is supporting a US scientific team. Key goals of the US participation are to bring a range of scientific expertise to the project and broaden involvement of early career scientists in Antarctic research.

Field Season Overview

The AntNZ's SWAIS2C drilling campaign aims to recover a 200-meter-long sediment drill core from the Crary Ice Rise (CIR). Three US scientists will deploy to Antarctica via United States Antarctica Program (USAP) transportation with USAP extreme cold weather gear then embed with the AntNZ SWAIS2C team at Scott Base. The team, along with AntNZ colleagues, will put in to CIR to engage in drilling and core sampling activities. All support at the field site will be provided by AntNZ. USAP will provide all fixed wing support for the SWAIS2C effort, consisting of up to 10 roundtrip Basler aircraft missions between McMurdo Station and CIR.

Deploying Team Members

- Molly Patterson (PI)
- Kara Vadman
- Ryan Venturelli

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Dry Valleys Seismic Project

Event Number:
G-078-M
NSF / PLR-DoD MOA

Program Director:
(Other)

Science Support POC / Implementer(s):
Allison Barden / Jenny Cunningham

Principal Investigator(s):
Mr. Paul A Bertrand
paul.bertrand@us.af.mil
United States Air Force
AFTAC
Patrick,AFB, Florida

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Mount Newall, Bull Pass

Bull Pass seismic equipment. Photo by Christian Patrick.

G-078-M Research Location(s): Mount Newall, Bull Pass

Project Description:
The McMurdo Dry Valleys seismic project monitors regional and global seismicity. The Dry Valleys' stations near McMurdo Station are part of the Air Force Technical Applications Center's (AFTAC's) southern network, which accumulates near-real-time data from nine locations in the Southern Hemisphere. The data are transmitted to the National Data Center in Florida and made available to the international scientific community.

Field Season Overview

Four participants (two Air Force, two University of Alaska) will deploy to perform maintenance activities at the AFTAC seismic stations at Mount Newall and Bull Pass. They will spend ~14 days at each site, servicing the hybrid power systems (HPSs) and seismic equipment. They will make one trip back to McMurdo Station between field sites to resupply and test and prepare equipment. All movements of personnel and cargo to and from the field will be supported by helicopter. Prior to and following field deployment, the team will review inventory and conduct data path maintenance on their telemetry and computer systems at McMurdo Station.

Deploying Team Members

- Tyler Johnson
- Kyle Wallace
- Andrew Winkelman (Team Leader)
- Andrew Winkelman (Team Leader)
- Harrison Zamba

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Collaborative Research: Investigating Ice Sheet-Solid Earth Feedbacks in West Antarctica: Implications for Ice Sheet Evolution and Stability

Event Number:
G-079-E
NSF / OPP Award 1745074

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Paul Sullivan; Jenny Cunningham

Principal Investigator(s):
Dr. Terry Wilson
wilson.43osu@gmail.com
Ohio State University
Geological Sciences and Byrd Polar and Climate Research Center
Columbus, Ohio

Location(s):

- **Supporting Stations:** Special Project
- **Research Locations:** Union Glacier

Solar Eclipse at WAIS Divide. Photo by Jesse Norquay.

G-079-E Research Location(s): Union Glacier

Project Description:
The Polar Earth Observing Network-Antarctic Network (POLENET-ANET) autonomous global positioning system (GPS) and seismic network has been reconfigured to acquire higher resolution in situ data around the Amundsen Sea Embayment. The network captures spatially varying crustal motions and Earth structure in a region where the ice sheet is rapidly changing.

Observations will be integrated into 3-D modeling to investigate the solid-earth cryosphere feedback processes that influence the past, present, and future behavior of the West Antarctic Ice Sheet (WAIS). Advanced models, constrained by the new observations, will improve estimates of West Antarctic ice mass changes, establish where the WAIS may be stabilized by ongoing Earth deformation, and reduce uncertainties in future sea-level change projections.

Field Season Overview

A team of six participants (three scientists, one mountaineer, one T-295-M EarthScope Geodetic Facility for the Advancement of Geoscience [GAGE] engineer, one T-299-M EarthScope Seismology Facility for the Advancement of Geoscience [SAGE] engineer) will commence removal of GPS/seismic stations of the POLENET/ANET network in West Antarctica. The team will be based out of Union Glacier and primarily supported by subcontractor Antarctic Logistics & Expeditions (ALE). The United States Antarctic Program (USAP) will support transport of participants and cargo to and from Punta Arenas, Chile, and ALE will facilitate movement of the team and cargo to Union Glacier. The team will make day trips via USAP-provided Twin Otter aircraft to Polar Earth Observing Network (POLENET) station sites. Recovery of POLENET sites will involve excavation of instrumentation from beneath years of accumulated snow to recover valuable seismic data and any associated station structures, batteries, solar panels, and enclosures. GPS stations will also be recovered as time and weight limits allow.

Deploying Team Members

- Nicolas Bayou
- Eric Kendrick
- Erica Lucas
- James Normandeau
- Mark Whetu
- Terry Wilson (PI)

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Global Seismographic Network (GSN) at South Pole Station, Palmer Station, and Scott Base

Event Number:
G-090-P/S
NSF / USGS Agreement

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Paul Sullivan / Jamee Johnson / Sheryl Seagraves

Principal Investigator(s):
David Wilson
dwilson@usgs.gov
Albequerque, New Mexico

Project Web Site:
https://earthquake.usgs.gov/monitoring/operations/stations/IU/PMSA/

Location(s):

- **Supporting Stations:** Palmer Station, South Pole Station
- **Research Locations:** McMurdo/Scott Base, Palmer & South Pole (Quiet Sector)

South Pole SPRESSO Vault. Photo courtesy of USGS.

G-090-P/S Research Location(s): McMurdo/Scott Base, Palmer & South Pole (Quiet Sector)

Project Description:

The Global Seismographic Network (GSN) is a worldwide network of ~150 modern seismograph stations. Each station consists of seismometers,

recoding and communications equipment, and facilities necessary for the operation and security of the equipment. Some stations may include ancillary sensors. The GSN is multiuse and serves the interests of scientific research, earthquake monitoring and tsunami warning, nuclear explosion monitoring, assessment of earthquake hazards, and education. The GSN represents a partnership between the US Geological Survey (USGS) and National Science Foundation (NSF). Currently, USGS supports about two-thirds of GSN stations operated by the USGS Albuquerque Seismological Laboratory (ASL). The NSF Division of Earth Sciences provides funding and oversight for a competitively solicited cooperative agreement that includes operations for about one-third of the GSN. The NSF Office of Polar Programs (OPP) provides certain in-kind support for USGS GSN station operations in Antarctica. The ASL operates four GSN stations in Antarctica: Casey (CASY); Palmer Station (PMSA); Scott Base (SBA); and South Pole Remote Earth Science and Seismology Observatory aka SPRESSO (QSPA), located in the Quiet Sector.

Field Season Overview

One participant will deploy to South Pole in 2025-26 to replace a seismometer and perform other maintenance activities as needed. Research associate (RA) support will be provided throughout the year for routine monitoring and maintenance of equipment, including observation of the equipment housed in the SPRESSO vault to ensure it is in normal operating mode; shutdown and restart of software and hardware as needed; annual measurement of vault deformation; and communication with the project's principal investigator and other personnel as needed. At Palmer Station, the project has space in Terra Lab for data analyzer hardware. All other hardware and the seismometer are housed in the seismic vault behind Terra Lab. The Antarctic Support Contract (ASC) provides year-round, on-site support via an ASC RA. The science team does not typically deploy to Palmer Station but operates the GSN station remotely.

Deploying Team Members

- Robert Anthony

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

Collaborative Research: Coring Seymour Island (CSI) Antarctica: Evaluating Causes and Effects of the End Cretaceous Mass Extinction

Event Number:
G-296-N
NSF / OPP Award 2026648

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Kenneth Vicknair / Diane Hutt

Principal Investigator(s):
Dr. Thomas Steven Tobin
ttobin@ua.edu
University of Alabama Tuscaloosa
Department of Geological Sciences
Northport, Alabama

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer
- **Research Locations:** Seymour Island, Weddell Sea

The barren landscape of Seymour Island. Photo by Mort Turner, courtesy of USAP Photo Library.

G-296-N Research Location(s): Seymour Island, Weddell Sea

Project Description:

This project is designed to evaluate evidence of extinction patterns and depositional conditions from a high southern latitude Cretaceous-Paleogene (K-Pg) outcrop section in the Western Antarctic Peninsula region. The team will use hand trenching and drilling in areas around Seymour Island to get below the weathering horizon into high

priority stratigraphic intervals. Collected rock samples and cores will be used to evaluate detailed sedimentary structures, geochemistry, and microfossils. The study will help determine if the K-Pg mass extinction was a single or double phased event and whether the Seymour Island region was a restricted, suboxic marine environment or an open well-mixed shelf environment.

Field Season Overview

The primary objective of this field effort is to collect sediment samples for microfossil and geochemical analyses across important stratigraphic intervals on Seymour Island. This objective will be accomplished by digging trenches and pits to access undisturbed sedimentary rocks, describing exposed features, and collecting samples to return to the principal investigators' (PIs') labs for further analysis. Transportation of drilling equipment will require all-terrain vehicle (ATV) support, and this evaluation will involve locating a suitable drilling site that is ATV accessible, identifying navigable and environmentally suitable ATV paths. Relatively small-scale drilling equipment (e.g., SIPRE hand auger, SHAW backpack drill) will be used to assess the current depth of the permafrost, assessing permeability of the substrate, and stability of drilled bore holes. A team of 12, including two ASC support staff and two IDP drillers, is scheduled to utilize a pop-up camp on Seymour Island for up to 21 days. All camping gear and scientific sampling equipment will be brought ashore, assembled, utilized, disassembled and removed from the island by the end of the field season. Rock, core and microfossil samples will be categorized and shipped to the PI's home institution of the University of Alabama at Tuscaloosa.

Deploying Team Members

- Jason Coenen
- Sean Davis
- Isaac Hautala
- Marianne Heberlein
- James Koehler
- Tanner Kuhl
- Adriane Lam
- Michaela Lonski
- Shane Schoepfer
- Jean Self-Trail (Co-PI)
- Thomas Tobin (PI)

Project Detail

EARTH SCIENCES, GEODESY AND GEOPHYSICS

A Comprehensive Seismic Investigation of the Crust and Uppermost Mantle Beneath the South Pole, East Antarctica

Event Number:
G-298-M/S
NSF / OPP Award 2145410

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Paul Sullivan / Jenny Cunningham / Sheryl Seagraves / Leah Street

Principal Investigator(s):
Dr. Weisen Shen
weisen.shen@stonybrook.edu
State University of New York Stony Brook
Stony Brook, New York

Location(s):

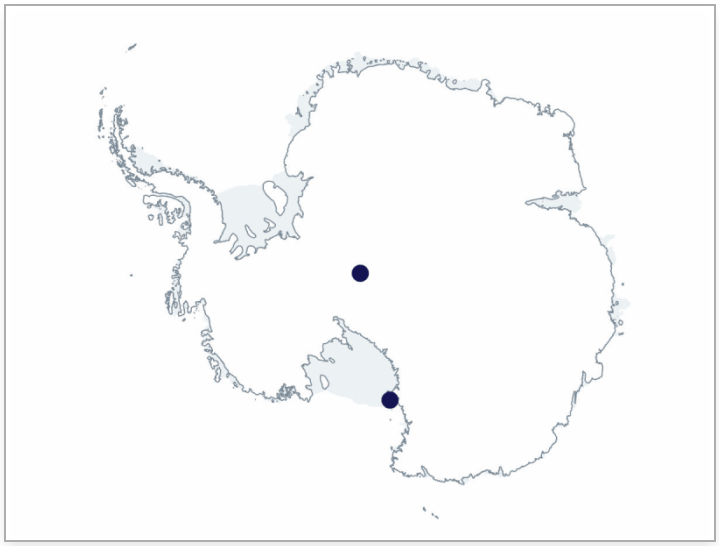
- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** South Pole Station

Big John' Crack near McMurdo Station. Photo by Jon Master, courtesy of NSF/USAP Photo Library.

Project Description:

Understanding the subsurface structure near the South Pole can help answer some of the most exciting scientific questions in Antarctic Earth science, ranging from the origin of the high subglacial mountains and the southernmost volcanic rocks to the existence of nearby subglacial lakes. It had been extremely difficult to investigate these questions since the area is remote and the ice cover is thick. Using seismic

stations deployed on top of the ice sheet provides an alternative tool to see the continent through the ice, as the seismic signal they record contains sensitive information about the geology of the crust below. For example, crustal rocks with more radioactive heating elements may have caused the melts of the ice sheet to create subglacial lakes, and these rocks can be identified by their unique seismic signatures. This project will deploy new seismic sensors in the South Pole area and collect data to perform a suite of modern seismic data analyses to produce a variety of seismic observations.



G-298-M/S Research Location(s): South Pole Station

Field Season Overview

On-site fieldwork for the upcoming season includes: (1) deploying up to 370 high-frequency, three-component, portable seismic nodes near the South Pole, encompassing the nearby Southern Transantarctic Mountains (STAM) and the polar subglacial basins; (2) collecting continuous seismic data for 4 weeks before the nodes are retrieved; (3) conducting additional tests and modifications to the 10th broadband station deployed at the site designated “DICH”; and (4) retrieving 10 broadband stations deployed in prior seasons.

Arctic Trucks will provide a light traverse platform for all field activities. The science team will stage at McMurdo Station before deploying to the South Pole. The team will be housed at the non-governmental organization camp outside of South Pole Station, and all support will be provided through subcontractor Antarctic Logistics & Expeditions (ALE) and Arctic Trucks. The United States Antarctic Program will provide inter- and intra-continental fixed wing transportation and extreme cold weather gear. The team will be provided working space in the B2 Lab at South Pole Station and at McMurdo Station as they transit through.

Deploying Team Members

- Frank Chin
- Andrew Groh
- Amarjeet Kumar
- Hanxiao Wu

2025–2026

USAP FIELD SEASON PROJECTS

GLACIOLOGY, ICE CORE SCIENCE AND GEOMORPHOLOGY

Dr. Kelly Brunt, Dr. David Porter, Program Directors

Project Detail

GLACIOLOGY, ICE CORE SCIENCE AND GEOMORPHOLOGY

Collaborative Research: A New Approach to Firn Evolution Using the Taylor Dome Natural Laboratory

Event Number:
I-162-M
NSF / OPP Award 2024163

Program Director:
Dr. Kelly Brunt

Science Support POC / Implementer(s):
Allison Barden / Jenny Cunningham

Principal Investigator(s):
Kaitlin M Keegan
kkeegan@unr.edu
University of Nevada Reno
Reno, Nevada

Firn hole to gather ice core samples. Photo by Ian Crocker, courtesy of USAP Photo Library.

I-162-M Research Location(s): Taylor Dome

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Taylor Dome

Project Description:

This project will introduce a new combination of firn datasets designed to facilitate development of next-generation, physics-based firn models. Advances in ice core science and satellite altimetry demand firn models that can reliably simulate firn evolution in a range of climatic conditions and on long and short timescales. Current firn compaction models are largely based on a steady state assumption and tuned to

particular geographical locations. Advancing beyond these models requires (1) measuring current firn compaction rates; (2) measuring grain-scale microstructures that play a crucial role in firn compaction; and (3) quantifying processes driving evolution of those microstructures. To decouple the firn's sensitivities to accumulation and temperature, the team will measure in situ strain rates by two independent methods and observe trends in microstructure in cores from sites spanning the accumulation gradient at Taylor Dome in Antarctica while maintaining the same average temperature. The team will assess the ability of phase-sensitive radar to remotely measure firn compaction rates, potentially simplifying future in situ measurements. This work will create a road map for collecting future microstructural data spanning key areas of temperature accumulation space and simplify future collaborations through the availability of the open-source Community Firn Model.

Field Season Overview

Seven participants, including one Ice Drilling Program (IDP) driller, will deploy to McMurdo Station and then to Taylor Dome from late November to early February. The Antarctic Support Contract field aviation support team will first put in at Taylor Dome and groom a skiway to receive the Basler aircraft that will put in science team members and equipment. At Taylor Dome, the science team will set up camp and focus work around four sites within 6-10 miles of camp. The team will drive radar survey lines connecting the four sites and take phase-sensitive radar (pRES) measurements along the lines, with some autonomous phase-sensitive radar (ApRES) left to collect data over winter. At each site, overwintering "firn observatory" stations will be set up to record weather conditions, borehole temperatures, and firn compaction. The team will collect firn cores from each site using the IDP Eclipse drill. Cores will be transported back to McMurdo Station by Twin Otter and Basler aircraft. Some cores will be analyzed at McMurdo Station, with most shipped north on the United States Antarctic Program cargo vessel.

Deploying Team Members

- Knut Christianson (Co-PI)
- Zoe Courville (Co-PI)
- Brita Horlings
- Claire Jensen
- Elliot Moravec
- Ellen Mutter
- Forest Rubin Harmon
- Dylen Swan

Project Detail

GLACIOLOGY, ICE CORE SCIENCE AND GEOMORPHOLOGY

Collaborative Research: Ice Shelf Rumpling and Its Influence on Ice Shelf Buttressing Processes

Event Number:
I-169-M
NSF / OPP Award 2332479

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Allison Barden / Randolph Jones

Principal Investigator(s):
Dr. Douglas R MacAyeal
drm7@uchicago.edu
University of Chicago
Department of Geophysicial Sciences
Stevensville, Michigan

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Ice Shelf

The edge of an iceberg in the Ross Sea. Photo by Emily Stone, courtesy of the USAP Photo Library.

I-169-M Research Location(s): McMurdo Ice Shelf

Project Description:
This project will investigate the complex interplay between factors that promote and factors that inhibit ice shelf damage at compressive margins. The overall goal is to determine how rumples affect ice shelf stability and hence ice shelf buttressing power, with a focus on the rumples at the compressive margin of the McMurdo Ice Shelf and Hut Point Peninsula, adjacent to NZ's Scott Base.

The team will acquire a comprehensive set of geophysical and glaciological observations though field-based surveys, deployed surface sensor networks, and remote sensing, with reference to the large body of available historical observations. All observations will be used to develop and validate an existing process-scale numerical model, which combines ice shelf flow with flexure and fracture in a framework that embodies the thin plate approximation.

Field Season Overview

To allow sufficient time for rumple amplitude changes and geometry to be locally observed, two seasons of ground-based field surveying will be conducted ~12-14 months apart, thereby increasing the likelihood of change detection. Four participants will deploy from early December to mid-January, and field activity will consist of survey and sensor network deployment. Surveys will entail conducting measurements at positions along two transects that traverse the rumpled field area. These measurements will utilize portable geophysical equipment towed by snowmobile and potentially roped travel on skis or foot within the study zone, including ground-penetrating radar (GPR), lidar, spot kinematic global navigation satellite system (GNSS) measurements, a terrestrial radar interferometer (TRI), and optical leveling/survey. Sensor network deployment will require setting up sensors to record data for extended periods. These sensors include up to six seismometers (one or two deployed through winter), permanent GNSS receivers, autonomous phase-sensitive radar (ApRES) sensors, up to four automated weather stations (AWSs), and time-lapse camera systems.

Deploying Team Members

- Alison Banwell (Co-PI)
- Allison Berry
- Ryan Cassotto (Co-PI)
- Michela Savignano

Project Detail

GLACIOLOGY, ICE CORE SCIENCE AND GEOMORPHOLOGY

STC: Center for OLDest Ice EXploration (COLDEX): Surface Geophysics Surveys, East Antarctic Plateau

Event Number:
I-187-M
NSF / OPP Award 2019719

Program Director:
Dr. Kelly Brunt

Science Support POC / Implementer(s):
Allison Barden / Jenny Cunningham / Matthew Kippenhan

Principal Investigator(s):
Dr. Sarah Ann Shackleton
sarah.shackleton@whoi.edu
Princeton University
Department of Geosciences
Princeton, New Jersey

Project Web Site:
https://coldex.org/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Allan Hills

Search for oldest ice. Photo by Peter Neff, University of Minnesota.

I-187-M Research Location(s): Allan Hills

Project Description:
The Center for Oldest Ice Exploration (COLDEX) will address fundamental questions critical to understanding past and future climate. This is a National Science Foundation (NSF) Science and Technology Center project that involves

multiple US institutions. Antarctic field campaigns are required to support the central focuses of the effort: (1) identify sites for a continuous 1.5-million-year ice core capable resolving orbital cycles in climate variables; and (2) create an archive of well-documented old ice samples. This project addresses that second goal.

Field Season Overview

Ten participants, including four Ice Drilling Program (IDP) drillers, will work out of a Twin Otter and Basler aircraft-supported camp at the Allan Hills Blue Ice Area. Antarctic Support Contract (ASC) staff will set up communal tents and other camp structures, and two ASC staff will manage the camp through the season. Across 8 weeks, the team will drill for ice cores using two drill rigs: IDP's large-bore Blue Ice Drill and smaller diameter fluid-enabled 4-Inch Drill. The team will split in two to work each drill at different locations, drilling several cores 90-400 meters deep. Recovered ice cores will be packed in ice core boxes then transported weekly by Twin Otter aircraft to McMurdo Station for storage and eventual shipment off continent to the NSF Ice Core Facility. The team will recover up to 24,000 pounds of ice, filling up to 135 ice core boxes.

Deploying Team Members

- Dusty Brunner
- Andrew Haala
- Romilly Harris Stuart
- John Higgins (Co-PI)
- Jay Johnson
- Ann Li
- Elizabeth Morton
- Martin Silva
- Ivo Strawson
- Danielle Whittaker

Project Detail

GLACIOLOGY, ICE CORE SCIENCE AND GEOMORPHOLOGY

NSFGEO-NERC: Investigating the Direct Influence of Meltwater on Antarctic Ice Sheet Dynamics

Event Number:
I-347-E
NSF / OPP Award 2053169

Program Director:
Dr. Kelly Brunt

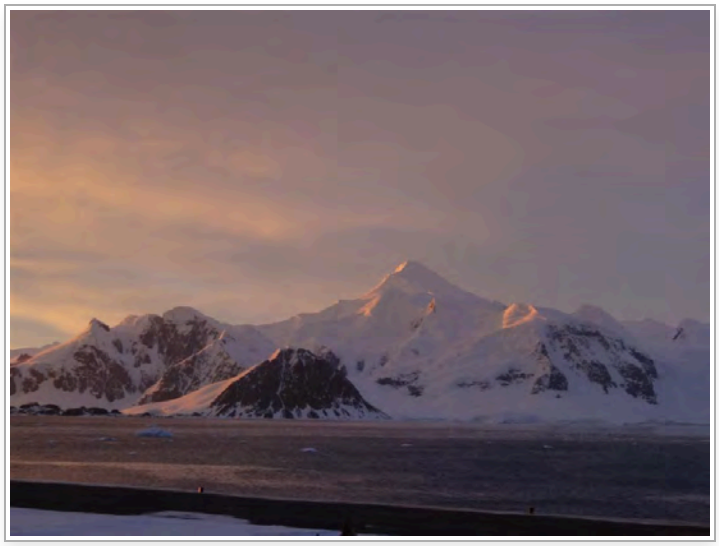
Science Support POC / Implementer(s):
Allison Barden / Diane Hutt

Principal Investigator(s):
Dr. Jonathan Kingslake
jonnyk@ldeo.columbia.edu
Columbia University
Lamont-Doherty Earth Observatory
New York, New York

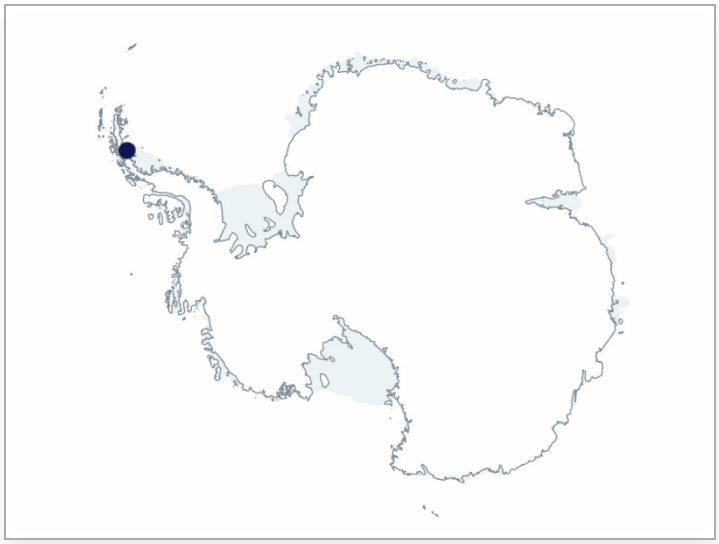
Project Web Site:
https://ldeo-glaciology.github.io/AntPen_NSF_NERC/

Location(s):

- **Supporting Stations:** Special Project
- **Research Locations:** Flask Glacier



Glaciated mountains taken from Rothera Research Station. Photo by Jonathan Kingslake, British Antarctic Survey, Lamont-Doherty Earth Observatory.



I-347-E Research Location(s): Flask Glacier

Project Description:
Surface melting is widespread in Antarctica and predicted to increase significantly as the continent warms. This US-UK project will take steps toward understanding and predicting these changes. The team will test three hypotheses: (1) Short-

term changes in ice velocity indicated by satellite data result from surface meltwater reaching the bed of outlet glaciers in the Antarctic Peninsula; (2) this is widespread in Antarctica today; and (3) this results in a measurable increase in mean annual ice discharge. The team will also conduct a continentwide remote sensing survey using synthetic aperture radar and multispectral imagery to comprehensively map meltwater on grounded ice and short-term velocity variations.

Field Season Overview

In conjunction with the British Antarctic Survey (BAS), this project spans three seasons of field work scheduled in 2024-25, 2025-26, and 2026-27 for the installation, maintenance, and removal of survey equipment respectively. Fieldwork will be conducted on Flask Glacier on the Antarctic Peninsula deploying a global navigation satellite system (GNSS), passive seismometers, uncrewed aerial systems (UASs), automated weather stations (AWSs), and ice-penetrating radar.

For the 2025-26 season, United States Antarctic Program (USAP) support will involve cargo and grantee travel support. Cargo will be shipped to Punta Arenas, Chile, and transferred to BAS. BAS will handle cargo transportation to Rothera Station and into the field. Two USAP participants will deploy via the USAP travel system to Punta Arenas before flying to Rothera Station and joining the field team, including BAS field guides. Field gear and camp rations will also be supplied by BAS. From November 2025 to January 2026, the team will conduct maintenance to raise and collect data from installed instruments at Flask Glacier (i.e., differential global navigation satellite system [DGNSS] systems, autonomous phase-sensitive radar [ApRES] systems, thermistor strings, passive seismic, and an AWS). The team will deploy a fixed wing UAS equipped with single-frequency GNSS and a single-lens reflex (SLR) camera on repeat flights along a ~40-kilometer roundtrip survey grid. A BAS team will return in the 2026-27 field season to collect and retrograde all instrumentation.

Deploying Team Members

- Andrew Hoffman
- Rohi Muthyala

2025–2026

USAP FIELD SEASON PROJECTS

OCEANS AND ATMOSPHERIC SCIENCES

Dr. David Porter, Dr. William Ambrose, Program Directors

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

UV Measurements at McMurdo Station for the NOAA/Global Monitoring Lab's Division (GMD) Antarctic UV Network

Event Number:
O-257-M/S
NSF / NOAA Agreement

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Paul Sullivan / Randolph Jones / Sheryl Seagraves

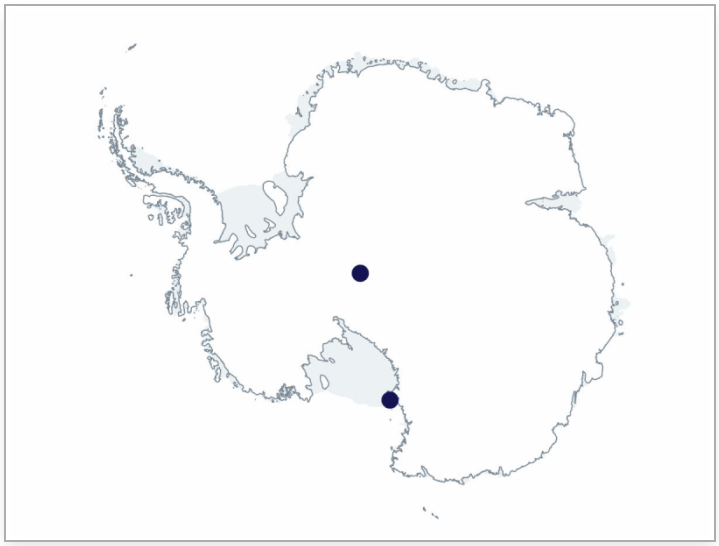
Principal Investigator(s):
Dr. Vanda Grubisic
vanda.grubisic@noaa.gov
National Oceanic and Atmospheric Administration
Global Monitoring Division (GMD)
Boulder, Colorado

Project Web Site:
https://gml.noaa.gov/

Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** McMurdo Station; South Pole Station

A time lapse of a NOAA balloon launch. Photo by Christian Krueger, courtesy of the USAP Photo Library.



O-257-M/S Research Location(s): McMurdo Station; South Pole Station

Project Description:

The National Oceanic and Atmospheric Administration (NOAA) Global Monitoring Laboratory (GML) team will continue long-term measurements of ultraviolet (UV) radiation and trace gas constituents that influence the atmosphere, including the ozone layer. The work done at McMurdo, Palmer, and South Pole stations is in conjunction with the ongoing long-term worldwide measurements of atmospheric composition, aerosols, solar radiation, and the ozone layer. At the South Pole, GML collects year-round, long-term measurements of trace atmospheric constituents. The measurements are used for time series analysis of multiyear data that focus on stratospheric ozone depletion, trans-Antarctic transport and deposition, the interplay of trace gases and aerosols with solar and terrestrial radiation fluxes on the polar plateau, the magnitude of seasonal and temporal variations in atmospheric constituents, and the development of polar stratospheric clouds over Antarctica. Other objectives of this research are to determine the rate at which concentrations of these atmospheric constituents change and to examine the sources, sinks, and budgets.

Field Season Overview

This season, up to four deploying participants will focus on South Pole Station, including upgrades and routine maintenance for the instruments located in the Atmospheric Research Observatory (ARO), regular launch of atmospheric balloons, and shipment of air samples to GML for analysis of carbon dioxide and other trace constituents. Two participants staff the ARO year-round at the South Pole. At McMurdo Station, a research associate provides year-round support for the instruments located at Arrival Heights, with daily checks, routine calibrations, and troubleshooting as needed.

Deploying Team Members

- Michael Doneghey
- Julianne Fernandez
- Janelle Hakala
- Luke Longren

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Collection of Atmospheric Air for the NOAA/Global Monitoring Division (GMD) Worldwide Flask-sampling Network

Event Number:
O-264-P
NSF / NOAA Agreement

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Paul Sullivan / Jamee Johnson

Principal Investigator(s):
Dr. Vanda Grubisic
vanda.grubisic@noaa.gov
National Oceanic and Atmospheric Administration
Global Monitoring Division (GMD)
Boulder, Colorado

Project Web Site:
https://gml.noaa.gov

Location(s):

- **Supporting Stations:** Palmer Station
- **Research Locations:** Palmer Station

Palmer Station. Photo by Ken Keenan. Image courtesy of NSF/USAP Photo Library.

O-264-P Research Location(s): Palmer Station

Project Description:
The National Oceanic and Atmospheric Administration (NOAA) Global Monitoring Laboratory (GML) team will continue long-term measurements of ultraviolet (UV) radiation that influence weather and the ozone layer, and surface concentrations of ozone in the

atmosphere. The work done at Palmer Station is in conjunction with the ongoing long-term worldwide measurements of atmospheric composition, aerosols, solar radiation, and the ozone layer. The measurements will be used for time-series analysis of multiyear data that focus on stratospheric ozone depletion, trans-Antarctic transport and deposition, the interplay of trace gases and aerosols with the solar and terrestrial radiation fluxes on the polar plateau, the magnitude of seasonal and temporal variations in atmospheric constituents, and the development of polar stratospheric clouds over Antarctica. UV monitoring instruments are located at Palmer Station. SUV, GUV, TUVR, and PSP instruments are located on the roof of Terra Lab. The UV instruments run continuously throughout the year. NOAA's Long-Term Observations of Greenhouse Gases and Ozone-depleting Substances (LOGOS) and Carbon Cycle Greenhouse Gases (CCGG) divisions, as well as the Scripps Institution of Oceanography's Atmospheric Oxygen Research group, capture clean air samples upwind of station activities.

Field Season Overview

The Palmer Station research associate (RA) provides year-round support for the UV monitoring instruments. Typically, site visits are needed every 2 years for one NOAA UV instrument participant. The next maintenance visit for the UV monitoring system is tentatively scheduled for 2027-28. Additionally, the RA performs Scripps, CCGG, and LOGOS air sampling. Samples are shipped back to grantee institutions periodically for analysis.

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Collaborative Research: Antarctic Automatic Weather Station Program

Event Number:
O-283-M/S
NSF / OPP Award 2301362

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Marissa Goerke / Jenny Cunningham

Principal Investigator(s):
Dr. Matthew Lazzara
mattl@ssec.wisc.edu
University of Wisconsin Madison
Space Science and Engineering Center/AMRC
Madison, Wisconsin

Location(s):

- **Supporting Stations:** McMurdo Station, South Pole Station
- **Research Locations:** West Antarctica, South Pole, Near McMurdo Station

Matt Lazzara checks an Automatic Weather System. Photo by Matthew Lazzara. Image courtesy of NSF/USAP Photo Library.

O-283-M/S Research Location(s): West Antarctica, South Pole, Near McMurdo Station

Project Description:

The Antarctic automated weather station (AWS) network has been making meteorological observations since the early 1980s. This continentwide network is positioned to observe significant meteorological events in real time and increase understanding of the climate of the Antarctic surface. The activities for this project will focus on maintaining the AWS network, establishing an

advisory board, student engagement, and outreach activities. This project aims to continue to maintain and operate the AWS network. This effort will upgrade the real-time AWS processing, keep abreast of evolving communication methods, and have the data distributed widely. Prior National Science Foundation investments in the polar climate and weather station will be leveraged with the development of a more robust version that can be reliably utilized year-round in Antarctica. The observations will be quality-controlled and placed into a database where the public can search and select observations. A test system of different radiation shields (with and without aspiration) will be deployed for 1 year at South Pole Station. This is to resolve conflicting radiation-shield bias corrections of historical data and to inform optimal setup for temperature observations going forward. The project will be advised by a group of peers with the development of an AWS Advisory Board. A concerted effort to engage the public will be undertaken via scaled-up interactions with television meteorologists from several US states to bring Antarctica to the public.

Field Season Overview

A team of two will deploy from early November to mid-December to service AWSs in the vicinity of McMurdo Station. AWSs will be accessed via helicopter, Twin Otter aircraft, and overland vehicles. In early to mid-November, the team will spend 2 nights at distant Cape Hallett to service the station there. In early December, the team will travel to South Pole Station for several nights to install a weather observation system near the Atmospheric Research Laboratory (ARO) before returning to McMurdo and redeploying. A second team of two will also deploy in early December and travel to West Antarctic Ice Sheet (WAIS) Divide. The team will access, raise, and service several West Antarctic AWSs via Twin Otter aircraft. They will return to McMurdo Station in mid-January to service any remaining local AWSs as needed before redeploying in late January. A McMurdo Station research associate will assist with monitoring and troubleshooting AWS network equipment at McMurdo Station year-round.

Deploying Team Members

- Forbes Filip (Team Leader)
- Andres Garcia-Sampedro Perez
- Matthew Lazzara (PI)
- Lee Welhouse (Team Leader)

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Collaborative Research: How to Trace Glacial Meltwater in the Ocean by Shipboard Hydrographic Analysis of Dissolved Neon and Krypton

Event Number:
O-363-N
OCE-1924140

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Kenneth Vicknair / Jamee Johnson

Principal Investigator(s):
Dr. Brice Griffith Loose
bloose@uri.edu
University of Rhode Island
Graduate School of Oceanography
Narragansett, Rhode Island

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer
- **Research Locations:** Western Antarctic Peninsula

A snow-covered mountain and the ocean in the Antarctic Peninsula. Photo by Cynthia Spence, courtesy of the USAP Photo Library.

O-363-N Research Location(s): Western Antarctic Peninsula

Project Description:

This project will build a new instrument to measure meltwater from glaciers in the ocean. Distinguishing glacier melt from sea ice, snow melt, and rain is a difficult but important task, because melting glaciers pose significant and acute risks, including chronic flooding and sea level rise. The causes and impacts of melting glaciers are a challenge to observe and predict, because they unfold in complex and hard-to-reach

places (e.g., beneath miles of ice, under floating ice shelves, and during the coldest times of the year). This project aims to increase oceanographer's capacity to measure and map glacier melt in the ocean by 300%-400%, while reducing costs and providing near real-time results. This increase in measurement capacity will permit comparison of regional and seasonal changes in the glacier melt from the ice-covered land masses of Antarctica and Greenland. The instrument will be field-validated in Rhode Island coastal waters then used to measure glacier melt near Palmer Station on the Antarctic Peninsula. The partnership between the University of Rhode Island and SRI International presents an important public-private partnership that will encourage the use of private sector technology for open access research.

Field Season Overview

Two participants will join the Long-Term Ecological Research (LTER) biannual cruise to collect glacial meltwater samples and test a prototype mass spectrometer. They will conduct conductivity, temperature, depth (CTD) casts in Marguerite Bay, as close to the terminus of the George VI Ice Shelf as possible. Collected seawater will be analyzed for noble gasses, particularly krypton and helium. The science team will run samples through a custom-built mass spectrometer and collect and ship cold-welded noble gas shipments back to the US.

Deploying Team Members

- Laura Glastra
- Brice Loose (PI)

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Observing the Atmospheric Boundary Over the Antarctic Ice Sheet

Event Number:
O-400-M
NSF / OPP Award 1745097

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Marissa Goerke / Randolph Jones

Principal Investigator(s):
Dr. John Cassano
john.cassano@colorado.edu
University of Colorado Boulder
CIRES
Louisville, Colorado

Project Web Site:
https://amrdc.ssec.wisc.edu/projects/byrd-tall-tower

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo/Ross Ice Shelf

Drone flying over Pegasus runway during Winfly 2016. Photo by John Cassano, University of Colorado.

O-400-M Research Location(s): McMurdo/Ross Ice Shelf

Project Description:

The atmospheric boundary layer links the atmosphere and the underlying surface — the Antarctic ice sheet for this project. Exchange of heat, moisture, momentum and other atmospheric constituents occur in the atmospheric

boundary layer and are critical to climate processes such as ice sheet melt. Initially, an observational campaign using a 30-meter (m) tall tower (TT) and a small uncrewed aerial system (sUAS) was planned for West Antarctica, but due to logistical constraints, the campaign has been relocated near McMurdo Station. The 30 m TT will provide year-round observations of the lower portion of the atmospheric boundary layer.

Field Season Overview

Two participants will conduct an observational campaign focused on the atmospheric boundary layer near McMurdo Station using an instrumented 30 m tower ("Elijah"), installed during the 2024-25 season. The Antarctic Support Contract will provide a fish hut for the field team, adjacent to the 30 m TT site, and rigger support for maintenance of the 30 m TT during the Mainbody season.

Deploying Team Members

- John Cassano (PI)
- Kara Hartig

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Formation, Transformation, and Northward Spread of Dense Saline Water Derived From Terra Nova Bay, Ross Sea, Antarctica

Event Number:
O-401-E
NSF / OPP Award 2332418

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Kenneth Vicknair; Randolph Jones

Principal Investigator(s):
Dr. Christopher Zappa
zappa@ldeo.columbia.edu
Columbia University
Lamont-Doherty Earth Observatory
Palisades, New York

Location(s):

- **Supporting Stations:** Special Project
- **Research Locations:** Western Ross Sea

Recovery of the Lamont-Doherty Earth Observatory mooring from Terra Nova Bay. Photo by Fiona Elliott, NIWA.

O-401-E Research Location(s): Western Ross Sea

Project Description:

This project primarily aims to investigate the formation, transformation, and northward spread of dense saline water derived from Terra Nova Bay (TNB), along the Drygalski Trough into the western Ross Sea and off the shelf to the Southern Ocean, to form the Antarctic bottom water (AABW). The project will deploy a series of moorings: two heavily instrumented full-water-column moorings within TNB to capture

high-salinity shelf water (HSSW) production; and a series of bottom-focused moorings to evaluate the transformation and northward spreading of the dense saline water. The broad science goals to be addressed by this program through a coordinated analysis of these mooring measurements include (1) how the water column profile and HSSW characteristics evolve on timescales ranging from hourly/daily through seasonal; and (2) what regulates the transformation and northward spread of the dense saline water derived in TNB. This project involves international cooperation between the US, South Korea, NZ, and Italy.

Field Season Overview

Field work will consist of the deployment and recovery of six oceanographic moorings across 3 years. These moorings consist of two heavy moorings (instrumented from the ocean floor to 50 meters [m] beneath the ocean surface in water depths of roughly 400-500 m and 800-1,000 m) deployed in TNB and four deep bottom moorings (instrumented within the bottom 10-100 m of seafloor). One deep bottom mooring will be deployed in the Drygalski Basin in TNB; one near Cape Washington in the northern extent of TNB; and the remaining two along the Drygalski Trough, further north in the Ross Sea toward Cape Adare. The deployment and recovery of the moorings will be supported by the Korean Polar Research Institute (KOPRI) aboard the research vessel (RV) *Araon* in all 3 years. Recovery of two heavy moorings and four deep bottom moorings and redeployment at the same locations will occur in 2025-26. United States Antarctic Program support includes movement of cargo and personnel to and from the port of departure and arrival of the RV *Araon* in all three field seasons and the storage of equipment in NZ between seasons.

Deploying Team Members

- Mackenzie Blanusa
- Lindsay Hogan
- Carson Witte
- Christopher Zappa (PI)

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Collaborative Research: Southern Ocean Carbon Gas Observatory (SCARGO)

Event Number:
O-404-M
NSF / OPP Award 1839218

Program Director:
Dr. David Porter

Science Support POC / Implementer(s):
Marissa Goerke / Randolph Jones

Principal Investigator(s):
Dr. Britton B Stephens
stephens@ucar.edu
National Center for Atmospheric Research (NCAR)
Boulder, Colorado

Project Web Site:
https://www.eol.ucar.edu/field_projects/scargo

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** Christchurch, McMurdo Station, South Pole Station, and LC-130s

View from an LC-130 while flying the SCARGO instrument in 2022. Photo by Hannah Allen, NCAR.

O-404-M Research Location(s): Christchurch, McMurdo Station, South Pole Station, and LC-130s

Project Description:

The Southern Ocean plays a fundamental role in the global carbon cycle, yet there is great uncertainty regarding air-sea fluxes of carbon dioxide in the

region. This project will conduct a novel airborne measurement program called the Southern Ocean Carbon Gas Observatory (SCARGO), which will map distributions of carbon dioxide, methane, carbon monoxide, and water vapor in the polar troposphere and enable estimates of austral summer air-sea fluxes. SCARGO will leverage an observational platform of opportunity: the New York Air National Guard (NYANG) LC-130 aircraft operating each austral summer from McMurdo Station supporting the United States Antarctic Program. Analysis and modeling activities will quantify Southern Ocean air-sea carbon dioxide, methane, carbon monoxide, and water vapor exchange based on the observations, including the intraseasonal evolution and interannual variability of the fluxes.

Field Season Overview

SCARGO will conduct sampling between Christchurch, NZ; McMurdo Station; and the South Pole. The SCARGO instrumentation rack and air sampling hatch will be installed on different LC-130 aircraft, depending on the mission. The rack is a roll-on/roll-off crate that will strap down in the forward cabin. SCARGO will nominally join two National Science Foundation (NSF) South Pole flights per week, plus one NSF intercontinental mission or one NYANG MX Wash (Rotator) mission per week. Two participants at a time (six total) will be based at McMurdo Station for the season, with additional support staff from Earth Sciences New Zealand based in Christchurch. Instrument assembly and testing, training of flight crews, and support staff will be at the Christchurch hangar before deployment. At McMurdo, SCARGO will operate out of a Rac-Tent at Williams Field.

Deploying Team Members

- Hannah Allen
- Zoë Buxton
- Mack Goodstein
- Charles Martin
- Britton Stephens (PI)
- Isabel Suhr

Project Detail

OCEANS AND ATMOSPHERIC SCIENCES

Collaborative Research: RAPID: Linking Sea Ice and Biogeochemistry in the Weddell Sea Marginal Ice Zone: Physical Structure, Meltwater, Chemistry and Biological Gradients

Event Number:
O-409-N
NSF / OPP Award 2532479

Program Director:
Dr. William Ambrose

Science Support POC / Implementer(s):
Kenneth Vicknair / Jamee Johnson

Principal Investigator(s):
Dr. Margaret Anne Mars Brisbin
mmarsbrisbin@usf.edu
University of South Florida
College of Marine Science
St. Petersburg, Florida

Location(s):

- **Supporting Stations:** RV/IB Nathaniel B. Palmer
- **Research Locations:** Weddell Sea

A conductivity, temperature, and depth (CTD) rosette used to gather water samples. Photo by Anna McBee, courtesy of the USAP Photo Library.

Project Description:
This project aims to evaluate physical and chemical characteristics of sea ice in the Weddell Sea near Seymour Island and quantify the effects of melting sea ice on phytoplankton growth, zooplankton growth, and carbon export. Sea ice is a key feature of the Southern Ocean, shaping the physical structure of the water column and regulating phytoplankton community dynamics and primary production. Phytoplankton are the base of the food chain, and the

type of phytoplankton present, and their overall productivity impact the abundance of zooplankton and larger animals. Phytoplankton communities and production are also an important link for carbon export to the deep sea, a critical service provided by the Southern Ocean. However, sea ice extent and duration are decreasing in the Antarctic Peninsula region of the Southern Ocean, potentially affecting carbon export. This work promotes the progress of polar science and will allow for better predictions of ecosystem effects from changing sea ice conditions, such as shifts in krill abundance and the krill communities' ability to support macrofauna and fisheries, as well as changes in carbon export.

O-409-N Research Location(s): Weddell Sea

Field Season Overview

In 2025-26, five participants will deploy on a University-National Oceanographic Laboratory System (UNOLS) vessel along with the Tobin group (G-296-N). Sampling will take place when the vessel is not supporting science for Tobin. Work will consist of characterizing summer sea ice by measuring sea ice thickness and characteristics. Grantees will conduct conductivity, temperature, depth (CTD) casts for water collection. Surface sediment will be collected, and net tows will be conducted to sample phytoplankton. Additionally, incubation experiments will be conducted to evaluate the effect of varying salinities and nutrient concentrations on biological communities. Participants will deploy to ice floes to sample snow and collect ice cores if conditions permit.

Deploying Team Members

- Patricia Beaudoin
- Ellen Buckley (Co-PI)
- Rose Malanga
- Margaret Mars Brisbin (PI)

2025-2026

USAP FIELD SEASON PROJECTS

TECHNICAL EVENT - SCIENCE

Dr. Kelly Brunt, Dr. Marion Dierickx, Jessie Crain, Program Directors

Project Detail

TECHNICAL EVENT - SCIENCE

Ice Drilling Program (IDP)

Event Number:
T-150-M
NSF Agreement

Program Director:
Dr. Kelly Brunt

Science Support POC / Implementer(s):
Matthew Erickson / Jenny Cunningham

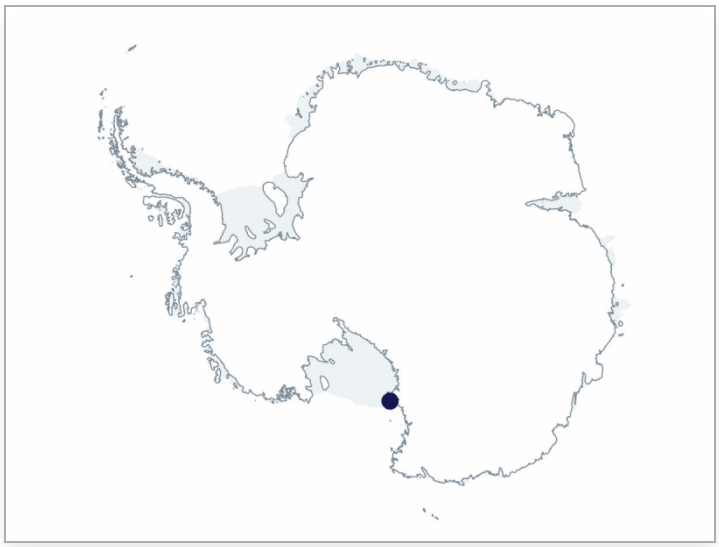
Principal Investigator(s):
Dr. Mary R Albert
mary.r.albert@dartmouth.edu
Dartmouth College
Thayer School of Engineering
Hanover, New Hampshire

Project Web Site:
https://icedrill.org/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:**

Drilling using the IDP ice-enabled Winkie drill for subglacial coring near Mt. Waesche during the 24/25 season. Photo by Nels Iverson.



T-150-M Research Location(s):

Project Description:
The Ice Drilling Program (IDP) (1) provides community leadership in ice drilling research and development; (2) identifies new technology needs and plans technology development and funding; (3) acquires new drilling technology to support science objectives for new discoveries; (4) provides the drills, equipment, and drilling expertise needed

by science groups; (5) enhances communication and information exchange related to ice coring and drilling science and technology; and (6) establishes activities in collaboration with the polar science and engineering community to contribute to the National Science Foundation's strategic goals for desired societal outcomes.

Field Season Overview

IDP will provide cold regions drilling equipment and personnel support to I-162-M at Taylor Dome and I-187-M at Allan Hills.

Project Detail

TECHNICAL EVENT - SCIENCE

EarthScope GAGE high-precision GPS and ground-based light detection and ranging (LiDAR) support

Event Number:
T-295-M
NSF / EAR Award 1724794

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Paul Sullivan / Jenny Cunningham

Principal Investigator(s):
Mr. Joseph R Pettit
joe.pettit@earthscope.org
EarthScope Consortium
Longmont, Colorado

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo and Field Locations

A POLENET instrument at Lower Thwaites Glacier. Photo by Elizabeth Widen. Image courtesy of NSF/USAP Photo Library.

T-295-M Research Location(s): McMurdo and Field Locations

Project Description:
The EarthScope Consortium provides technical support and equipment for precision geodetic observations using global positioning system (GPS), terrestrial lidar, and uncrewed aerial system (UAS) technologies. Survey-grade GPS receivers, terrestrial laser scanners, and power and communications systems for both

high-precision campaign surveying and continuous data collection are available to project researchers. Infrastructure for this support includes a real-time kinematic (RTK) differential GPS broadcasting station covering McMurdo Sound, a repeater on Mount Erebus for GPS data retrieval from the Transantarctic Mountains, and an Iridium satellite communications hub in Colorado. Technical support is also provided for the Palmer Station GPS surveying system. Operation and maintenance is provided as needed for the National Aeronautics and Space Administration (NASA) International Global Navigation Satellite System (GNSS) Service (IGS) stations MCMD and PALM, the Polar Earth Observing Network-Antarctic Network (POLENET-ANET) remote GPS stations, and GPS reference stations on the West Antarctic Ice Sheet (WAIS) Divide and at South Pole Station. EarthScope also provides high-rate reference station data from continuously operating GNSS receivers at McMurdo Station (MCMD, ARVL), South Pole Station (AMU2), and Palmer Station (PAL2).

Field Season Overview

EarthScope field engineers will work out of McMurdo Station for much of this field season, providing technical and field engineering support to various projects, managing the on-Ice geodetic equipment pool, and servicing near field installed instruments as needed. Supported science events include C-504-M Diaz, C-506-M Gooseff, C-511-M Doran, D-550-M Elosegui, I-162-M Keegan, I-169-M MacAyeal, I-187-M COLDEX, O-283-M Lazzara, and G-298-MS Shen, among other science and operational events. One EarthScope engineer will be embedded in the G-079-E POLENET-ANET team this year. This group will be based at the Antarctic Logistics & Expeditions (ALE) Union Glacier field camp.

Deploying Team Members

- Nicholas Bruno
- Lia Lajoie
- Joseph Pettit (PI)
- Joseph Pettit (PI)
- Joseph Pettit (PI)
- Joseph Pettit (PI)
- Erika Schreiber (Team Leader)
- Erika Schreiber (Team Leader)

Project Detail

TECHNICAL EVENT - SCIENCE

EarthScope SAGE Seismic Support

Event Number:
T-299-M
NSF Agreement

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Paul Sullivan / Jenny Cunningham

Principal Investigator(s):
Mr. Joseph R Pettit
joe.pettit@earthscope.org
EarthScope Consortium
Longmont, Colorado

Project Web Site:
https://www.earthscope.org/

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo and Field Locations

Digging out buried instruments on Ross Island. Photo by Avilash Cramer. Image courtesy of NSF/USAP Photo Library.

T-299-M Research Location(s): McMurdo and Field Locations

Project Description:
The EarthScope Consortium is the new name for the restructured and consolidated Incorporated Research Institutions for Seismology (IRIS) Portable Array Seismic Studies of the Continental Lithosphere (PASSCAL) activities and University NAVSTAR Consortium (UNAVCO) activities. EarthScope's

Seismological Facility for the Advancement of Geoscience (SAGE) continues to provide support to National Science Foundation Office of Polar Programs-funded projects requiring seismic detection and monitoring equipment and expertise. Support provided specific to Antarctic requirements include (1) equipment testing and provisioning in cold regions; (2) training researchers; (3) on-continent instrument troubleshooting, performance evaluation, and data quality control; (4) assisting researchers with data backup and archiving; and (5) field support, including installation and maintenance as required. The organization develops cold station deployment strategies, collaborates with vendors to develop and test equipment rated to -55°C (-67°F), builds and maintains an equipment pool, and sustains a cold station techniques repository.

Field Season Overview

The SAGE team will provide equipment and personnel support to several deep field and McMurdo area science events, including D-550-M Elosegui, G-060-M Winberry, I-169-M MacAyeal, and possibly others. The team will also conduct equipment testing near Castle Rock and on Observation Hill (local to McMurdo Station) and manage and maintain seismic equipment (nodes) at Crary Lab. One EarthScope engineer will be embedded in the G-079-E Polar Earth Observing Network (POLENET) team this year. This group will be based at the Antarctic Logistics & Expeditions (ALE) Union Glacier field camp. Another SAGE engineer will be embedded in the G-298-MS Shen team and assist with SAGE equipment preparation and work at McMurdo Station.

Deploying Team Members

- Danue Bustos
- Samuel Jannke
- Joseph Pettit (PI)
- Joseph Pettit (PI)
- Joseph Pettit (PI)
- Joseph Pettit (PI)
- Susan Stanford

Project Detail

TECHNICAL EVENT - SCIENCE

Operation and Maintenance of a CTBT Class Infrasound Array at Windless Bight

Event Number:
T-396-M/P
NSF / DTRA Agreement

Program Director:
Ms. Jessie Crain

Science Support POC / Implementer(s):
Allison Barden / Jenny Cunningham / Jamee Johnson

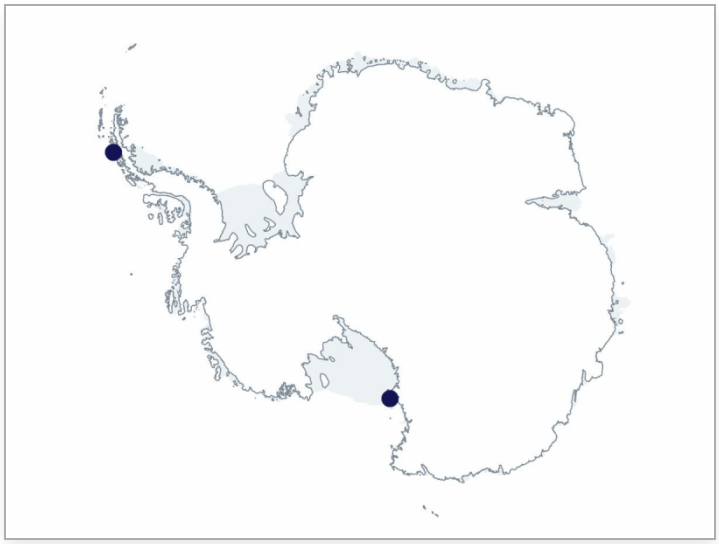
Principal Investigator(s):
Mr. Lukas J Blom
ljblom@alaska.edu
University of Alaska Fairbanks
Geophysics Institute
Fairbanks, Alaska

Project Web Site:
https://watc.alaska.edu/

Location(s):

- **Supporting Stations:** McMurdo Station, Palmer Station
- **Research Locations:** Windless Bight, Palmer Backyard, Terra Lab, Bonaparte Point

Mount Erebus. Photo by Peter Rejcek. Image courtesy of NSF/USAP Photo Library.



T-396-M/P Research Location(s): Windless Bight, Palmer Backyard, Terra Lab, Bonaparte Point

Project Description:

This project operates, maintains, upgrades, calibrates, and services the joint US Comprehensive Nuclear-Test Ban Treaty (CTBT) infrasound array at Windless Bight. Windless Bight's location on the Ross Ice Shelf is unique for its low wind levels, which makes infrasound detection possible. This season will also include the installation of an infrasound array at Palmer Station which consists of four infrasound sensor sites (elements) and a communication hub. The sensor sites will be distributed over approximately two square kilometers. The communication hub, known as the Central Recording Facility (CRF), will be located in Terra Lab at Palmer Station.

Infrasound can detect volcanic eruptions, winds over distant mountain ranges, large storms at sea, auroral and meteor events, earthquakes, and avalanches, as well as human-caused events such as large explosions, at great distances from the sound-producing events. Detection of events occurring worldwide are routinely made at the Windless Bight site.

Field Season Overview

Four participants will deploy from late October to mid-December to perform servicing of the infrasound array and hybrid power system at Windless Bight. The team will camp at the field site for 5 weeks, with occasional trips back to McMurdo Station for resupply. The field camp, consisting of two Polarhavens and an outhouse, will be set up by the Antarctic Support Contract (ASC) and accessed by ground vehicles. Major service work will include excavation and raising of system components, performance of power system service, and restoration of the power system snow berm. Connectivity equipment and servers for the system are located at McMurdo Station Building 159, and a mini-ISO container at the station is used for year-round cold storage of supplies and spare parts. ASC will provide year-round research associate support and deliver JP-8 fuel to the field site. This season, team members will also provide assistance to the G-078-M Bertrand Air Force Technical Applications Center (AFTAC) team performing maintenance of their hybrid power systems at Mount Newall and Bull Pass in the McMurdo Dry Valleys.

CTBT is utilizing two chartered vessels to install the first four infrasound array systems at Palmer Station. The first ship will arrive in January to drop off cargo at Bonaparte Point and the Palmer Pier. Five participants will arrive in February to install the equipment. The Palmer Research Associate will assist with installation at the four field sites and Terra Lab.

Deploying Team Members

- Kitsel Lusted
- Matthew VonLintig
- Andrew Winkelman (Team Leader)
- Andrew Winkelman (Team Leader)

Project Detail

TECHNICAL EVENT - SCIENCE

The Polar Geospatial Information Center: Joint Support

Event Number:
T-434-M
NSF / OPP Award 2434541

Program Director:
Dr. Marion Dierickx

Science Support POC / Implementer(s):
Ryan Steiner / Randolph Jones

Principal Investigator(s):
Dr. Jay Dickson
jdickson@umn.edu
University of Minnesota
Polar Geospatial Center (PGC)
Saint Paul, Minnesota

Project Web Site:
https://www.pgc.umn.edu

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Station

Aerial view of McMurdo Dry Valleys. Photo by Peter Rejcek. Image courtesy of NSF/USAP Photo Library.

T-434-M Research Location(s): McMurdo Station

Project Description:

The Polar Geospatial Center (PGC; fka Antarctic Geospatial Information Center [AGIC]) covers both polar regions. PGC provides geospatial support in the form of mapping, data delivery, and geographic information systems (GIS) analysis to science and logistics communities of the National Science Foundation's (NSF) Arctic and Antarctic research programs. PGC provides

satellite imagery of aircraft landing sites, satellite radar, elevation models, real-time surface imagery, and historical time-lapse sequences of changing ice conditions.

Field Season Overview

PGC will provide cartographic support, remote sensing products, and geospatial analysis assistance to science event grantees and other United States Antarctic Program contractor and logistics entities. In 2025-26, there will be no deploying participants, and support will be provided remotely.

Project Detail

TECHNICAL EVENT - SCIENCE

Operation and Maintenance of a CTBT Radionuclide Monitoring Station at Palmer Station

Event Number:
T-998-P
NSF / DTRA Agreement

Program Director:
Ms. Jessie Crain

Science Support POC / Implementer(s):
Allison Barden / Jamee Johnson

Principal Investigator(s):
Mr. Matthew Stephen Wright
Matt.wright@gd-ms.com
Chantilly, Virginia

Project Web Site:
https://www.ctbto.org/

Location(s):

- **Supporting Stations:** Palmer Station
- **Research Locations:** Palmer Station, Terra Lab

Terra Lab at Palmer Station. Photo by Mike Lucibella, courtesy of the USAP Photo Library.

T-998-P Research Location(s): Palmer Station, Terra Lab

Project Description:
This project services and calibrates the automated radionuclide aerosol sampler analyzer (RASA) air particulate monitoring system in the International Monitoring Station (IMS) building (i.e., Terra Lab) at Palmer Station (RASA station code RN73). The IMS continuously collects and automatically analyzes daily air samples for radiation. The collected filter media samples from the

RASA are sent to Vienna, Austria, quarterly for archiving. Filter samples are shipped upon request to various laboratories in the world.

Field Season Overview

The project operates, maintains, upgrades, and sustains the RN73 RASA monitoring instrument. The RASA continuously collects and automatically analyses daily air samples for radiation. The collected filter media samples from the RASA are sent to Vienna for archiving on a quarterly basis. Additionally, periodic requests are made for single samples to be shipped to various laboratories in the world. General Dynamics Mission Systems (GDMS) ships consumables for standard operation on an annual basis to RN73.

The United States Antarctic Program provides year-round, on-site support via the Antarctic Support Contract research associate to help operate and maintain the RASA. Additionally, a GDMS engineer deploys each season for maintenance of the RASA, network switches, the uninterruptable power supply, computers and other station-related hardware.

Deploying Team Members

- Tony Ly

2025–2026

USAP FIELD SEASON PROJECTS

INSTRUMENTATION AND TECHNOLOGY DEVELOPMENT

Dr. Deepankar Medhi, Program Director

Project Detail

INSTRUMENTATION AND TECHNOLOGY DEVELOPMENT

Collaborative Research: Research Infrastructure: CCRI: New: Distributed Space and Terrestrial Networking Infrastructure for Multiconstellation Coexistence

Event Number:
X-279-M
NSF / CNS 2235139

Program Director:
Dr. Deepankar Medhi

Science Support POC / Implementer(s):
Marissa Goerke / Carrie Piesen

Principal Investigator(s):
Mr. Joshua Smith
sjosh03@vt.edu
Virginia Tech
Blacksburg, Virginia

Project Web Site:
https://leoscope.surrey.ac.uk/, https://github.com/SpaceNetTestbed-public

Location(s):

- **Supporting Stations:** McMurdo Station
- **Research Locations:** McMurdo Station

Aerial view of McMurdo Station. Photo by Joe Harrigan, courtesy of the USAP Photo Library.

X-279-M Research Location(s): McMurdo Station

Project Description:

Internet infrastructure is currently undergoing a transformation driven by projects to provide global wireless internet to every individual and internet-

connected device on Earth, leveraging megaconstellations of small satellites deployed in low Earth orbit (LEO). Companies such as Starlink, OneWeb, and Amazon Kuiper are at the forefront of this work, seeking to deliver low-latency, high-bandwidth broadband services worldwide. These developments have created a need to conduct real-world experiments on deployed LEO networks to confirm performance parameters and potential bottlenecks, develop innovative LEO-specific solutions, and enhance the sophistication, data-driven nature of simulators and emulators used in the research community.

Virginia Tech (VT) and the University of Surrey (UoS) are collaborating with global research institutions and industries to build LEOScope, a global LEO satellite network testbed to serve as the go-to platform for conducting customized network and application experiments over LEO networks. The primary objective is to collect LEOScope data from a stand-alone Starlink terminal based at McMurdo Station in Antarctica. This network requires Starlink to employ intersatellite links (ISLs) to route data from Antarctica to the internet access point in Sydney, Australia, which is only a subset of the constellation supports. This study will yield invaluable insights into how Starlink and satellite links in general perform under harsh polar weather conditions.

Field Season Overview

During the 2024-25 season, the team shipped measurement computers, received "smart hands" support from the McMurdo team, and set up service with the Starlink terminal. Since December 2024, the team has been getting daily measurements of internet service to compare with the modeling and simulation work for their National Science Foundation CCRI project. Their data pipelines are operational for collecting ISL hop data and relevant satellite two-line element sets (TLEs) in the McMurdo area. Data products have included latency heat maps on azimuth and elevation degree, telemetry throughput analysis at McMurdo (uplink and downlink), a time series of all telemetry data points, data on obstruction reports, and correlations between telemetry parameters, among others. During 2025-26, the team aims to maintain the current setup to continue capturing data. This may involve minimal "smart hands" technical support. The team also hopes to incorporate local weather data into its analysis.