2004-2005 USAP Field Season

Table of Contents

Project Indexes

Project Websites

Station Schedules

Technical Events

Environmental and Health & Safety Initiatives

2004-2005 USAP Field Season

Table of Contents

[Project Indexes]

[Project Websites]

[Station Schedules]

[Technical Events]

[Environmental and Health & Safety Initiatives]

Project websites

List of projects by principal investigator

List of projects by USAP program

List of projects by institution

List of projects by station

List of projects by event number digits

List of deploying team members

- Scouting In Antarctica
- Technical Events
- Media Visitors

Top of Page

2004-2005 USAP Field Season

USAP Station Schedules

Click on the station name below to retrieve a list of projects supported by that station.

	Austral Summer Season Openings		Austral Winter Season Openings	Estimated Population	
Station	**Operational**	**Science**		**Summer**	**Winter**
McMurdo	20 August 2004 (WINFLY*)	05 October 2004 (Mainbody)	23 February 2004	890 (weekly average) 2,900 (total)	187 (winter total)
South Pole	24 October 2004	30 October 2004	15 February 2004	232 (weekly average) 650 (total)	72 (winter total)
Palmer	N/A	22 September 2004	8 April 2004	34-44 (weekly average) 75 (total)	40 (winter total)
Research Vessels	Year-round operations Vessel schedules on the Internet: http://www.polar.org/science/marine.			**RV/IB NBP** 39 science & staff 25 crew	**RV LMG** 32 science & staff 25 crew
	Field Camps				
	Air Support				

* A limited number of science projects deploy at WinFly.

Every field season, the USAP sponsors a variety of technical events that are not scientific research projects but support one or more science projects.

NASA GSFC T-008-M	NASA Goddard Space Flight Center: NAILS, MTRS1, MTRS2, and SPTR
ICDS T-150-M	Ice Core Drilling Services
Scripps AARC T-312-M/P/S	Arctic and Antarctic Research Center at Scripps Institution of Oceanography
CTBT T-396-M	Installation, operation and maintenance of a Comprehensive Test Ban Treaty class infrasound array in Windless Bight, Antarctica
MGS T-927-M	NASA/McMurdo Ground Station

NASA GSFC NAILS, MTRS1, MTRS2, and SPTR

Event #: T-008-M

Station: McMurdo

Work Site: McMurdo Station

Team Leader: Michael Comberiate

Affiliation: NASA Goddard Space Flight Center
Code 422
Building 16W, Room N066
Greenbelt, MD 20771
301.286.2165
mike.comberiate@gsfc.nasa.gov

http://www.gsfc.nasa.gov/

MTRS2. Photo courtesy of Seth White.

Project Description: NASA researchers will perform maintenance and upgrades to their systems during each austral summer season:

NAILS two-meter satellite tracking station on Ross Island:

- Perform system checkup, test and repair if necessary
- Examine spares, reorganize, and retrograde old equipment and equipment for antarctic museum display

MTRS1 and MTRS2 TDRS uplink station on Black Island:

- Perform system checkup, repair if necessary

The project team will work with a staff communications technician for reconfigurations and repairs. Except for AC power, heat, and internet support to the project team's equipment, normal operations will require no support from McMurdo Station contractor support personnel.

Top of Page

ICDS Ice Core Drilling Services (ICDS)

Event #: T-150-M/S

Station: South Pole Station

Work Site: USGC observatory 8 kilometers from South Pole Station

Team Leader: Dr. Charles R. Bentley

Affiliation: University of Wisconsin Madison
Department of Geology and Geophysics
1215 W. Dayton Street
Madison, WI 53706
608.262.0693
bentley@geology.wisc.edu

http://www.ssec.wisc.edu/a3ri/icds/

Project Description: Ice Coring and Drilling Services (ICDS) at the University of Wisconsin Madison provides ice coring and drilling services to NSF-sponsored researchers both in the polar regions and at high-altitude sites. ICDS maintains and operates a variety of drills and develops new systems when needed to provide the best possible ice cores, deploy instruments within the ice, and provide access to glacial beds. At the same time, they seek to minimize the environmental impact of drilling projects and employ methods that are in compliance with applicable environmental law.

Collectively, ICDS staff have almost three years of experience in ice drilling, successful completion of the field portion of the AMANDA project in Antarctica (Bob Morse A-130-S) including the development and construction of the AMANDA hot water drill, a variety of high-altitude drilling projects in Tibet, China, Bolivia, and Peru, and half a century of glacial geophysics in Greenland, Antarctica, and Arctic Canada.

Top of Page

Scripps AARC — Arctic and Antarctic Research Center at Scripps Institution of Oceanography (AARC), TeraScan project

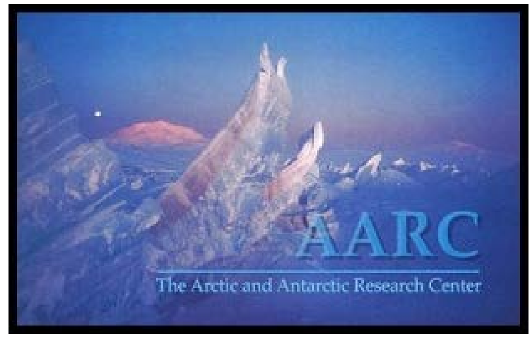
Event #: T-312-M/N/P

Station: McMurdo and Palmer stations, R/V Nathaniel B. Palmer

Work Site: TeraScan computer installations

Team Leader: Dr. Dan Lubin

Affiliation: Scripps Institution of Oceanography
Arctic and Antarctic Research Center (AARC)
California Space Institute
9500 Gilman Drive, mail code 0214
La Jolla, CA 92093-0221
858.534.6369
dlubin@ucsd.edu
http://arcane.ucsd.edu



Project Description: The AARC is funded to archive and distribute all NOAA and DMSP (Defense Meteorological Satellite Program) data collected south of 60 degrees. The data from polar orbiting satellites are collected by ground stations at McMurdo and Palmer Stations aboard the RV/IB Nathaniel B. Palmer. It is distributed by ARCC to the scientific community and to support contractor meteorologists for forecasting.

Support contractor technicians collect data from each TeraScan-equipped station. Data collection is scheduled for the maximum coverage and quantity of NOAA and DMSP data for the McMurdo region on a year-round basis. ARCC personnel check it for quality by reading and processing random collected passes.

Top of Page

CTBT — Installation, operation and maintenance of a Comprehensive Test Ban Treaty (CTBT) class infrasound array in Windless Bight, Antarctica

Event #: T-396-M

Station: McMurdo

Work Site: Windless Bight

Team Leader: Mr. Daniel L. Osborne

Affiliation: University of Alaska Fairbanks
Geophysical Institute
903 Koyukuk Avenue
P.O. Box 757320
Fairbanks, AK 99775-7320
907.474.7107
dosborne@gi.alaska.edu
http://www.gi.alaska.edu/~jvo/newinfrasound/...
infrasound/members.htm


Univ. of Alaska team servicing infrasound sensor in Windless Bight November, 2003

Project Description: This group operates and maintains a CTBT (Comprehensive Test Ban Treaty) infrasound array at Windless Bight, Ross Island.

Project team members will refuel and service the power system at the Windless Bight installation. Team members will establish a camp at the site and spend about two weeks in the field.

Data from the Windless Bight system is forwarded to the CTBT office in Vienna, as well as to the principal investigator's home institution where it will be made available for research into the natural infrasonic background.

Top of Page

MGS NASA/McMurdo Ground Station (MGS)

Event #: T-927-M

Station: McMurdo

Work Site: McMurdo Station

Team Leader: Mr. Ken Griffin

Affiliation: Honeywell Technical Solutions, Inc.
NASA Wallops Flight Facility
Building E-106, Room 209
Wallops Island, VA 23337
757.824.2478
Ken.Griffin@csoconline.com
http://www.wff.nasa.gov/~code452/mcmurdo.html

Project Description: NASA's McMurdo Ground Station (MGS) performs critical support for countdown, liftoff and early-orbit phases of satellite launching operations. It also tracks a variety of in-orbit scientific (TRACE, FAST, WIRE, SWAS, GRACE 1 and 2, SAC-C, CHAMP, etc.) and mapping (Radarsat, Lansat-7,QuikSCAT, ERS-2, etc.) satellites. MGS supplies real time data (downlink) and commanding (uplink) support to a variety of projects via NASA's dedicated 128Kbit data line. Voice support is through a dedicated 16Kbit voice loop with Goddard Space Flight Center. Radarsat, ERS-2 SAR, and Taurus START 2 treaty compliance data will be shipped back to the U.S. for processing. If requested, MGS will uplink data through the MTRS-1 ground station located on Black Island, or MTRS-2 ground station located on Crater Hill through TDRSS (Telemetry and Data Relay Satellite System) to White Sands, New Mexico.

Each austral summer, project team members at McMurdo Station are responsible for the maintenance and operation of the ground station. This season the MGS team will relocate their equipment to the Joint Spacecraft Operations Center (JSOC).

In addition to relocating the equipment, upgrades may be performed on the system to include a RAID storage device, and system automation enhancements.

Top of Page

All projects are identified by a unique event number. It comprises a prefix, a 3-digit number, and a suffix. The prefix is a letter that indicates the USAP program funding a project:

Prefix	USAP Program
A	Aeronomy & Astrophysics
B	Biology & Medicine
G	Geology & Geophysics
I	Glaciology
O	Oceans & Climate Systems
W	Artists & Writers
T	Technical Event

List projects by program

The 3-digit number provides the uniqueness for each event number. No two projects have the same number.

List projects by event number digits

The suffix represents the supporting station. If field work takes place at more than one location the event number carries more than one suffix separated by a slash.

Suffix	Supporting Station
M	McMurdo Station
P	Palmer Station
S	South Pole Station
L	R/V Laurence M. Gould
N	RV/IB Nathaniel B. Palmer
E	Special projects supported by the USAP. Examples include investigators working with other national antarctic programs, groups working on islands in the peninsula.

List projects by station

Top of Page

2004-2005 USAP Field Season

Science Project Websites

Website	PI Last Name	PI First Name	Event Number	Project Title
Go	Ainley	David	B-031-M	Geographic structure of Adélie penguin populations: Demography of population expansion
Go	Anandakrishnan	Sridhar	I-205-M	Tidal modulation of ice stream flow
Go	Anderson	John	G-083-N	SHALDRIL: A demonstration drilling cruise to the James Ross Basin
	Arthus-Bertrand	Yann	W-217-M	Mission Antartica
Go	Bieber	John	A-120-M/S	Solar and heliospheric studies with antarctic cosmic rays
Go	Bowser	Samuel	B-015-M	Remotely operable micro environmental observatory for antarctic marine biology research
Go	Bristow	William	A-369-S	Southpole SuperDARN (Super Dual Auroral Radar Network)
Go	Butler	Rhett	G-090-P/S	Global seismograph station at Palmer and South Pole stations
Go	Caldwell	Douglas	A-103-S	A search for extrasolar planets from the South Pole
Go	Carlstrom	John	A-373-S	Degree Angular Scale Interferometer (DASI)
	Chereskin	Teresa	O-317-L	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Laurence M. Gould
	Chin	Yu-Ping	B-300-M	Biogeochemistry of dissolved organic material in Pony Lake, Ross Island
Go	Church	Sarah	A-366-S	Next generation CMB polarization measurements with the QUEST experiment on DASI
Go	Doran	Peter	B-426-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	Ducklow	Hugh	B-045-L/P	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

Go	Ejiri	Masaki	A-117-S	All-sky imager at South Pole
Go	Emslie	Steven	B-034-M	Occupation history and diet of Adélie penguins in the Ross Sea region
Go	Engebretson	Mark	A-102-M/S	Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites
Go	Firing	Eric	O-315-N	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Nathaniel B. Palmer
Go	Fountain	Andrew	B-425-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	Garrott	Robert	B-009-M	Patterns and processes: Dynamics of the Erebus Bay Weddell seal population
	Gast	Rebecca	B-207-N	Comparative and quantitative studies of protistan molecular ecology and physiology in coastal antarctic waters
Go	Goes	Joaquim	B-206-N	Ultraviolet radiation induced changes in the patterns of production and biochemical composition of antarctic marine phytoplankton
Go	Gordon	Arnold	O-215-N	ANSLOPE: Cross slope exchanges at the antarctic slope front
Go	Halzen	Francis	A-333-S	IceCube
Go	Hansen	Anthony	O-314-M	Solar / wind powered instrumentation module development for polar environmental research
Go	Harvey	Ralph	G-058-M	The ANtarctic Search for Meteorites (ANSMET)
Go	Hernandez	Gonzalo	A-110-M/S	Austral high-latitude dynamics and thermodynamics
	Hildebrand	John	B-239-L	Mysticete whale acoustic census in the GLOBEC west antarctic project area
Go	Hofmann	David	O-257-S	South Pole monitoring for climatic change: US Department of Commerce NOAA climate monitoring and diagnostic laboratory
Go	Hofmann	David	O-264-P	Collection of atmospheric air for the NOAA/CMDL worldwide flask sampling network
Go	Hollibaugh	James	B-114-L/P	Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER

				study area
Go	Holt	John	I-141-M	Airborne Geophysical survey of the Amundsen Sea Embayment, Antarctica (AGASEA)
Go	Holzapfel	William	A-378-S	High resolution obervations of the CMB with ACBAR
Go	Inan	Umran	A-306-P	Global thunderstorm activity and its effects on the radiation belts and the lower Ionosphere
Go	Inan	Umran	A-108-S	A VLF beacon transmitter at South Pole (2001-2004)
	Jeffrey	Wade	B-200-N	Interactive effects of UV and vertical mixing on phytoplankton and bacterial productivity of Ross Sea Phaeocystis bloom
Go	Johns	Bjorn	G-295-M	UNAVCO GPS survey support
	Keeling	Ralph	O-204-P/S	A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems
Go	Kieber	David	B-266-N	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea
Go	Kiene	Ronald	B-002-N	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea
	Kim	Stacy	B-010-M	Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic
Go	Kreutz	Karl	I-191-M	Dry Valleys Late Holocene climate variability
Go	Kyle	Philip	G-081-M	Mount Erebus Volcano Observatory and Laboratory (MEVOL)
Go	Lange	Andrew	A-033-S	Background Imaging Of Cosmic Extragalactic Polarization (BICEP)
Go	Lyons	W. Berry	B-420-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	MacAyeal	Douglas	I-190-M	Collaborative research of Earth's largest icebergs
Go	McKnight	Diane	B-421-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	Morse	Robert	A-130-S	AMANDA 2004 (Antarctic Muon and Neutrino Detector Array)

Go	Mullins	Jerry	G-052-M/P/S	Geodesy and geospatial data program
	Neale	Patrick	B-203-N	Interactive effects of UV and vertical mixing on phytoplankton and bacterioplankton in the Ross Sea
Go	Palinkas	Lawrence	B-321-M/S	Prevention of environment-induced decrements in mood and cognitive performance
Go	Palo	Scott	A-284-S	Dynamics of the antarctic MLT region using ground-based radar and TIMED instrumentation
Go	Parks	George	A-144-E	Balloon observations of MeV electron precipitation
	Ponganis	Paul	B-197-M	Diving physiology and behavior of Emperor penguins
Go	Priscu	John	B-195-M	Microbial diversity and function in the permanently ice-covered lakes of the Dry Valleys
Go	Priscu	John	B-422-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	Ross-Quetin	Robin	B-028-L/P	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
Go	Seo	Eun-Suk	A-137-M	Cosmic Ray Energetics And Mass (CREAM)
Go	Sidell	Bruce	B-036-L/P	Cold body temperature as an evolutionary shaping force in the physiology of antarctic fishes.
Go	Sivjee	Gulamabas	A-129-S	The antarctic investigations of upper atmospheric disturbances over the South Pole Station
Go	Smith	Raymond	B-032-L/P	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
Go	Smith	Walker	B-047-M	Interannual Variability in the Antarctic-Ross Sea (IVARS): Nutrients and seasonal production
	Sprintall	Janet	O-260-L	The Drake Passage high density XBT / XCTD program
Go	Stacey	Gordon	A-377-S	Wide-field imaging spectroscopy in the submillimeter: Deploying SPIFI on

				AST/RO
Go	Stark	Antony	A-371-S	Continued operation of the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO)
Go	Stearns	Charles	O-202-M/P/S	Antarctic Meteorological Research Center 2002-2005 (AMRC)
Go	Stearns	Charles	O-283-M/P/S	Antarctic Automatic Weather Station (AWS) program 2004-2006
Go	Stepp	Bill	A-145-M	Long Duration Balloon (LDB) program
Go	Stock	Joann	G-071-N	Collection of marine geophysical data on transits of the R/V Nathaniel B. Palmer
Go	Stone	John	I-175-M/S	Late Quaternary history of Reedy Glacier
Go	Takahashi	Taro	O-214-L	Processes driving spatial and temporal variability of surface PCO2 in the Drake Passage
	Thiele	Deborah	B-280-N	Mysticete Whale Acoustic Census in the GLOBEC West Antarctic Project Area
Go	Vernet	Maria	B-016-L/P	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
Go	Virginia	Ross	B-423-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	Wall	Diana	B-424-M	McMurdo Dry Valleys LTER (Long Term Ecological Research)
Go	Weatherwax	Allan	A-111-M/S	Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions
Go	Weatherwax	Allan	A-112-M	Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIN): A new vision for global studies
Go	Wefel	John	A-143-M	Advanced Thin Ionization Calorimeter (ATIC) scientific balloon experiment
Go	Wilson	Terry	G-079-M	Transantarctic Mountains deformation network: GPS measurements of neotectonic motion in the antarctic interior
	Zesta	Eftyhia	A-357-P	Extending the South American Meridional B-field Array (SAMBA) to auroral latitudes in Antarctica

Top of Page

NSF Contact:

Environmental Officer
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

The Antarctic Conservation Act (ACA) was made U.S. law in 1978 and was amended by the Antarctic Science, Tourism, and Conservation Act of 1996. The ACA is intended to conserve and protect the native mammals, birds, and plants of Antarctica and the ecosystem. It is broadly applied to U.S. citizens and other participants in U.S. government activities south of 60 degrees south latitude. It regulates ordinary on-ice activities and provides a permit system that allows while carefully restricting certain otherwise prohibited activities for worthwhile purposes. It empowers enforcement officers and prescribes serious penalties for violations.

In 1991, the United States along with the other treaty nations adopted the Protocol on Environmental Protection and its five annexes that outline a comprehensive protection system for the antarctic environment. Together, the ACA and the Protocol formalizes America's commitment to protect the environment of the southernmost continent and its dependent and associated ecosystems. Together, the United States and other treaty nations are committed to preserving the region as a natural reserve devoted to peace and science.

Specific provisions for environmental protection include regulating the introduction of nonindigenous species, prohibiting casual interference with flora and fauna, and managing pollutants. Particularly sensitive regions have been designated ASPAs (Antarctic Specially Protected Areas) and permits are required to enter them. Each five years, NSF's support contractor must apply for and be issued a Master Permit which establishes requirements for managing pollutants and wastes including removal and recycling or proper disposal in the United States of most wastes and excess materials generated by the program.

Recognizing that worthwhile scientific research and related logistic support can have effects on the Antarctic environment, the Antarctic Treaty Consultative Parties adopted recommendations on environmental monitoring in Antarctica with two important goals: To detect any unforeseen effects, and to verify the actual impact and scope of those effects that were anticipated. The Protocol on Environmental Protection to the Antarctic Treaty also requires that environmental impacts be monitored. The U.S. Antarctic Program (USAP) is developing an Environmental Monitoring Program designed to detect and measure any impacts from science and operations at its research stations in Antarctica. Only with a sustained and coherent monitoring program can a reliable basis for sound environmental management decisions and possible improvements be established. Data obtained from the monitoring program will be used to document baseline conditions, verify operational impact, and monitor activities undertaken to recover from accidental impacts to the environment.

Environmental, Health and Safety (EHS) initiatives for the United States Antarctic Program were established in 1987 by a safety review panel appointed by the director of the NSF. The goals of the initiatives are to clean up debris from past activities, improve the health and safety of all USAP participants, and minimize the environmental impact of on-ice activities. The initiatives are consistent with US environmental protection regulations (45CFR670-672).

Historically, the USAP has recycled 60-70 percent of all the waste generated on stations. The remainder is incinerated, treated, or removed to landfills in the United States. Last season, 1.9 million kilograms of recyclables, waste, and equipment were removed from USAP stations and field camps. The preferred waste management strategy is pollution prevention and the EHS initiatives waste minimization program has reduced waste by about 9 percent annually since 1994.

The initiatives also include an environmental impact assessment program. All on-ice activities, research or otherwise, which are expected to have a minor or transitory environmental impact are documented to help identify alternatives and mitigate potential impacts. This program is designed to ensure that environmental considerations are taken into account in the planning of all activities with the aim of preventing adverse impacts. Each season, audits are conducted to ensure that research activities comply with environmental impact assessment requirements.

A comprehensive plan to educate science parties about the Antarctic Conservation Act (ACA) and other environmental practices has been developed to support the USAP. Waste management education and training is provided at each major station and for personnel deploying to the field. Specialized environmental information and training is provided for the wide variety of environments and situations encountered within the USAP, both before and during the field season. For example, all participants entering the McMurdo Dry Valleys are trained to work in an area with its unique environmental sensitivities.

Antarctica's remote location and extreme environment, combined with limited medical services, make safety a top priority for all people working within the USAP. The USAP integrates health and safety requirements and awareness into every activity at every site. A comprehensive field safety training program has been implemented to ensure participants know what to expect, and how to survive in a variety of field situations. On station, RPSC invites all USAP participants to take part in specific safety training, safety evaluations and work place inspections to become more proactive in safety as opposed to reactive. With the addition of new safety multi-media and presentations at each of the stations, USAP participants can check out videos and safety information to round out their knowledge or to learn new techniques in preventing personal injuries. USAP participants are ultimately responsible for their behaviors and contributions to the Safety and Health Program. RPSC Safety and Health Professionals & Management are a dedicated safety resource to the USAP who can and should be used by all program participants.

Top of Page

PI Last Name	PI First Name	Award	Project Title	Event #
Ainley	David	NSF/OPP Award 01-25608	Geographic structure of Adélie penguin populations: Demography of population expansion	B-031-M
Anandakrishnan	Sridhar	NSF/OPP Award 02-29629	Tidal modulation of ice stream flow	I-205-M
Anderson	John	NSF/OPP Award 01-25922	SHALDRIL: A demonstration drilling cruise to the James Ross Basin	G-083-N
Arthus-Bertrand	Yann	Artist/Writer Program	Mission Antarctica	W-217-M
Avallone	Linnea	NSF/OPP Award 04-11437	In situ measurements of halogen oxides in the Troposphere	O-251-M
Besson	Dave	NSF/OPP Award 03-38219	RICE - Radio Ice Cherenkov Experiment	A-123-S
Bieber	John	NSF/ATM (Division of Atmospheric Sciences) 00-00315	Solar and heliospheric studies with antarctic cosmic rays	A-120-M/S
Blake	James	NSF/OPP Award 00-86665	Origin and evolution of antarctic and deep-sea macroinfauna: Systematics and reproductive patterns of polychaetes	B-292-E
Blanchette	Robert	NSF/OPP Award 02-29570	Investigations on deterioration in the historic huts of Antarctica	B-038-E/M
Borns	Harold	NSF/OPP Award 03-38189	West antarctic ice sheet stability	I-187-M
Bowser	Samuel	NSF/OPP Award 02-16043	Remotely operable micro environmental observatory for antarctic marine biology research	B-015-M
Bristow	William	NSF/OPP Award 03-37635	South Pole SuperDARN (Super Dual Auroral Radar Network)	A-369-S
Butler	Rhett	NSF/EAR (Division of Earth Sciences) 00-04370	Global seismograph station at Palmer and South Pole stations	G-090-P/S
Caldwell	Douglas	NSF/OPP Award 01-	A search for extrasolar planets from the South Pole	A-103-S

		26313		
Carlstrom	John	NSF/OPP Award 01-30612	South Pole observations to test cosmological models	A-379-S
Castellini	Michael	NSF/OPP Award 01-30417	Effects of foraging on the lipid biochemistry of freely diving Weddell seals	B-199-M
Chereskin	Teresa	NSF/OPP Award 03-38103	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Laurence M. Gould	O-317-L
Chin	Yu-Ping	NSF/OPP Award 03-38260	Biogeochemistry of dissolved organic material in Pony Lake, Ross Island	B-300-M
Church	Sarah	NSF/OPP Award 03-38138	Next generation CMB polarization measurements with the QUEST experiment on DASI	A-366-S
Cole-Dai	Jihong	NSF/OPP Award 03-37933	Investigating atmospheric chemistry through oxygen and sulfur isotopes in volcanic sulfate from South Pole ice cores	I-355-S
Conrad	Pamela	NASA ASTEP (Astrobiology Science and Technology for Exploring Planets) 02-0040-0014	SPISE3: A non-contact instrument suite for rapid detection of chemical biosignatures	B-330-M
Day	Thomas	NSF/OPP Award 02-30579	Response of terrestrial ecosystems along the Antarctic Peninsula to a changing climate	B-003-P
DeVries	Arthur	NSF/OPP Award 02-31006	Antifreeze proteins in antarctic fishes: Integrated studies of freezing environments and organismal freezing avoidance, protein-structure and mechanism, genes and evolution	B-005-M
Dempsey	John	NSF/OPP Award 03-38226	Physics and mechanics of the breakup of warm antarctic sea ice: In-situ experiments and modeling	O-316-M
Deshler	Terry	NSF/OPP Award 02-30424	Measurements addressing quantitative ozone loss, polar stratospheric cloud nucleation, and large polar stratospheric particles during austral winter and spring	A-131-M
Doran	Peter	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-426-M
Ducklow	Hugh	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-045-L/P
Dye	Timothy	NSF/OPP Award 01-25893	Culture and health in Antarctica: Year 3	B-027-M
Ejiri	Masaki	US/Japan agreement	All-sky imager at South Pole	A-117-S
Emerson	Steven	NSF/OCE (Division of Ocean	Tracers of biological productivity and gas exchange	O-271-L

		Sciences) 02-42139		
Emslie	Steven	NSF/OPP Award 01-25098	Occupation history and diet of Adélie penguins in the Ross Sea region	B-034-M
Engebretson	Mark	NSF/OPP Award 02-33169	Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites	A-102-M/S
Firing	Eric	NSF/OPP Award 03-38103	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Nathaniel B. Palmer	O-315-N
Fountain	Andrew	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-425-M
Fraser	William	NSF/OPP Award 02-17282	Long-Term Ecological Research (LTER) on the antarctic marine ecosystem: Climate migration, ecosystem response and teleconnections in an ice-dominated environment (seabird component)	B-013-L/P
Fraser	William	NSF/OPP Award 02-17282	Monitoring the effects of tourism and environmental variability on Adélie penguins at Palmer Station	B-198-P
Fraser-Smith	Antony	NSF/OPP Award 01-38126	The operation of an ELF/VLF radiometer at Arrival Heights	A-100-M
Fricker	Helen	NSF/OPP Award 03-37838	Monitoring an active rift system at the front of Amery Ice Shelf, East Antarctica	I-277-E
Garrott	Robert	NSF/OPP Award 02-25110	Patterns and processes: Dynamics of the Erebus Bay Weddell seal population	B-009-M
Gast	Rebecca	NSF/OPP Award 01-25833	Comparative and quantitative studies of protistan molecular ecology and physiology in coastal antarctic waters	B-207-N
Glasberg	Elena	Artist/Writer Program	End as beginning: An American antarctic imaginary	W-219-M/S
Goes	Joaquim	NSF/OPP Award 01-26150	Ultraviolet radiation induced changes in the patterns of production and biochemical composition of antarctic marine phytoplankton	B-206-N
Gooseff	Michael	NSF/OPP Award 03-38267	Hydrologic controls over biogeochemistry and microbial community structure and function across terrestrial/aquatic interfaces in a polar desert	B-268-M
Gordon	Arnold	NSF/OPP Award 01-25172	ANSLOPE: Cross slope exchanges at the antarctic slope front	O-215-N
Halanych	Kenneth	NSF/OPP Award 03-38218	Relevance of planktonic larval dispersal to endemism and biogeography of antarctic benthic invertebrates	B-281-L
Hallet	Bernard	NSF/OPP Award 02-30338	Mechanics of dry-land calving of ice cliffs	I-139-M
Halzen	Francis	NSF/OPP Award 02-36449, 03-	IceCube	A-333-S

		31873		
Hansen	Anthony	NSF/DBI (Division of Biological Infrastructure) 01-19793	Solar / wind powered instrumentation module development for polar environmental research	O-314-M
Harvey	Ralph	NSF/OPP Award 99-80452	The Antarctic Search for Meteorites (ANSMET)	G-058-M
Hernandez	Gonzalo	NSF/OPP Award 02-29251	Austral high-latitude atmospheric dynamics	A-110-M/S
Hildebrand	John	NSF/OPP Award 99-10007	Mysticete whale acoustic census in the GLOBEC west antarctic project area	B-239-L
Hofmann	David	NSF/NOAA agreement	South Pole monitoring for climatic change: US Department of Commerce NOAA climate monitoring and diagnostic laboratory	O-257-S
Hofmann	David	NSF/NOAA agreement	Collection of atmospheric air for the NOAA/CMDL worldwide flask sampling network	O-264-P
Hollibaugh	James	NSF/OPP Award 02-34249	Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER study area	B-114-L/P
Holt	John	NSF/OPP Award 02-30197	Airborne Geophysical survey of the Amundsen Sea Embayment, Antarctica (AGASEA)	I-141-M
Holzapfel	William	NSF/OPP Award 02-32009	High resolution observations of the CMB with ACBAR	A-378-S
Inan	Umran	NSF/OPP Award 02-33955	Global thunderstorm activity and its effects on the radiation belts and the lower Ionosphere	A-306-P
Inan	Umran	NSF/OPP Award 00-93381	A VLF beacon transmitter at South Pole (2001-2004)	A-108-S
Jeffrey	Wade	NSF/OPP Award 01-27022	Interactive effects of UV and vertical mixing on phytoplankton and bacterial productivity of Ross Sea Phaeocystis bloom	B-200-N
Johns	Bjorn	NSF/EAR (Division of Earth Sciences) 03-21760	UNAVCO Geodetic GPS Support	G-295-M
Keeling	Ralph	NSF/ATM (Division of Atmospheric Sciences) 00-00923	A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems	O-204-P/S
Kemerait	Robert	NSF/DOD agreement	Dry Valley seismic project	G-078-M
Kennicutt	Mahlon	SGER (Small Grant for Exploratory Research)	Temporal variability in natural and anthropogenic disturbance of McMurdo Station	B-518-M

Kieber	David	NSF/OPP Award 02-30499	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea	B-266-N
Kiene	Ronald	NSF/OPP Award 02-30497	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea	B-002-N
Kim	Stacy	NSF/OPP Award 01-26319	Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic	B-010-M
Kremer	Patricia	NSF/OPP Award 03-38290	Salpa thompsoni in the Southern Ocean: Bioenergetics, population dynamics and biogeochemical impact.	B-307-L
Kreutz	Karl	NSF/OPP Award 02-28052	Dry Valleys Late Holocene climate variability	I-191-M
Kyle	Philip	NSF/OPP Award 02-29305	Mount Erebus Volcano Observatory and Laboratory (MEVOL)	G-081-M
Lange	Andrew	NSF/OPP Award 02-30438	Background Imaging Of Cosmic Extragalactic Polarization (BICEP)	A-033-S
Lee	Richard	NSF/OPP Award 03-37656	Physiological and molecular mechanisms of stress tolerance in a polar insect	B-256-P
Lessard	Marc	NSF/OPP Award 01-32576	A proposal for the measurement and analysis of extremely low frequency waves at South Pole Station	A-136-S
Lessard	Marc	NSF/OPP Award 02-16279	Development of an Autonomous Real-time Remote Observatory (ARRO)	A-362-S
Lyons	W. Berry	NSF/OPP Award 02-29836	Soil biodiversity and response to climate change: A regional comparison of Cape Hallett and Taylor Valley	B-259-M
Lyons	W. Berry	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-420-M
MacAyeal	Douglas	NSF/OPP Award 02-29546	Collaborative research of Earth's largest icebergs	I-190-M
Manahan	Donal	NSF/OPP Award 01-30398	Energetics of protein metabolism during development of antarctic echinoderms	B-006-M
Marchant	David	NSF/OPP Award 03-38291	Age, origin, and climatic significance of buried ice in the western Dry Valleys	G-054-M
Marsh	Adam	NSF/OPP Award 02-38281	CAREER: Genomic networks for cold-adaptation in embryos of polar marine invertebrates	B-029-M
Marsh	Bruce	NSF/OPP Award 02-29306	Magmatism in the Dry Valleys: A workshop	G-056-M
Martinson	Douglas	NSF/OPP Award 02-	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an	B-021-L

		17282	ice-dominated environment.	
McKnight	Diane	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-421-M
Mende	Stephen	NSF/OPP Award 02-30428	Dayside auroral imaging at South Pole	A-104-S
Mitchell	John	NSF/NASA agreement	Balloon-borne Experiment with a Superconducting Spectrometer (BESS)	A-140-M
Morse	Robert	NSF/OPP Award 03-37726	AMANDA 2004 (Antarctic Muon and Neutrino Detector Array)	A-130-S
Mullins	Jerry	NSF/OPP Award 02-33246	Geodesy and geospatial data program	G-052-M/P/S
Murcray	Frank	NSF/OPP Award 02-30370	Infrared measurements of atmospheric composition over Antarctica	A-255-M/S
Naveen	Ron	NSF/OPP Award 02-30069	Long-term data collection at select Antarctic Peninsula visitor sites	B-086-E
Neale	Patrick	NSF/OPP Award 01-27037	Interactive effects of UV and vertical mixing on phytoplankton and bacterioplankton in the Ross Sea	B-203-N
Nutter	Judith	Artist/Writer Program	Time, place, and imagination: Images and poems from Antarctica	W-220-P
Palinkas	Lawrence	NSF/OPP Award 00-90343	Prevention of environment-induced decrements in mood and cognitive performance	B-321-M/S
Palo	Scott	NSF/ATM (Division of Atmospheric Sciences) 03-36946	Dynamics of the antarctic MLT region using ground-based radar and TIMED instrumentation	A-284-S
Parks	George	NSF/OPP Award 02-30441	Balloon observations of MeV electron precipitation	A-144-E
Peterson	Jeffrey	NSF/OPP Award 03-42448	PAST: The Primeval Structure Telescope	A-375-S
Pitman	Robert	NSF/OPP Award 03-38428	Genetic and photogrammetric investigations of three ecotypes of Killer whales in the southern Ross Sea	B-289-M
Ponganis	Paul	NSF/OPP Award 02-29638	Diving physiology and behavior of Emperor penguins	B-197-M
Priscu	John	NSF/MCB (Division of Molecular and Cellular Biosciences) 02-37335	Microbial diversity and function in the permanently ice-covered lakes of the Dry Valleys	B-195-M
		NSF/OPP		

Priscu	John	Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-422-M
Putkonen	Jaakko	NSF/OPP Award 03-38224	Stability of landscapes and ice sheets in Dry Valleys: A systematic study of exposure ages of soils and surface deposits	G-076-M
Rogers	Susan Fox	Artist/Writer Program	Antarctic Anthology	W-218-M/S
Ross-Quetin	Robin	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-028-L/P
Samaras	Connie	Artist/Writer Program	Vast active living intelligence system: Photographing the South Pole	W-221-S
Sanderson	Colin	NSF/DOE agreement	Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab	O-275-P/S
Seo	Eun-Suk	NSF/NASA agreement	Cosmic Ray Energetics And Mass (CREAM)	A-137-M
Sidell	Bruce	NSF/OPP Award 01-25890	Cold body temperature as an evolutionary shaping force in the physiology of antarctic fishes.	B-036-L/P
Sivjee	Gulamabas	NSF/OPP Award 03-37618	The antarctic investigations of upper atmospheric disturbances over the South Pole Station	A-129-S
Smith	Raymond	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-032-L/P
Smith	Walker	NSF/OPP Award 00-87401	Interannual Variability in the Antarctic-Ross Sea (IVARS): Nutrients and seasonal production	B-047-M
Sprintall	Janet	NSF/OPP Award 00-03618	The Drake Passage high density XBT / XCTD program	O-260-L
Stacey	Gordon	NSF/OPP Award 00-94605	Wide-field imaging spectroscopy in the submillimeter: Deploying SPIFI on AST/RO	A-377-S
Stark	Antony	NSF/OPP Award 01-26090	Continued operation of the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO)	A-371-S
Stearns	Charles	NSF/OPP Award 01-26262	Antarctic Meteorological Research Center 2002-2005 (AMRC)	O-202-M/P/S
Stearns	Charles	NSF/OPP Award 03-38147	Antarctic Automatic Weather Station (AWS) program 2004-2006	O-283-M/P/S
Stepp	Bill	NSF/NASA agreement	Long Duration Balloon (LDB) program	A-145-M
Stock	Joann	NSF/OPP Award 03-38317	Collection of marine geophysical data on transits of the R/V Nathaniel B. Palmer	G-071-N
Stone	John	NSF/OPP Award 02-21394	Late Quaternary history of Reedy Glacier	I-175-M/S

Takahashi	Taro	NSF/OPP Award 03-38248	Processes driving spatial and temporal variability of surface PCO2 in the Drake Passage	O-214-L
Thiele	Deborah	International Whaling Commission	International Whaling Commission Southern Ocean Collaboration Program: Cetacean ecology, acoustic detection and sea ice habitat	B-280-N
Trivelpiece	Wayne	NSF/OPP Award 01-25985	Foraging behavior and demography of Pygoscelis penguins	B-040-E
Tulaczyk	Slawek	NSF/OPP Award 03-38295	Is Kamb Ice Stream restarting? Glaciological investigations of the bulge-trunk transition on Kamb Ice Stream, West Antarctica	I-345-M
Uhle	Maria	NSF/OPP Award 02-30237	Biogeochemistry of Victoria Land coastal ponds: Role in terrestrial ecosystem organic carbon dynamics and structure	B-011-M
Vernet	Maria	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-016-L/P
Virginia	Ross	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-423-M
Walker	Gabrielle	Artist/Writer Program	Antarctica: The biography of a continent	W-223-M
Wall	Diana	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-424-M
Ward	Bess	NSF/OPP Award 02-30276	What limits denitrification and bacterial growth in Lake Bonney, Taylor Valley?	B-310-M
Warren	Stephen	NSF/OPP Award 00-03826	Solar radiation on the East Antarctic Plateau	O-201-M
Weatherwax	Allan	NSF/OPP Award 03-38105	Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions	A-111-M/S
Weatherwax	Allan	NSF/OPP Award 03-41470	Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIN): A new vision for global studies	A-112-M
Wilcock	William	NSF/OPP Award 02-30094	High-resolution seismic tomography and earthquake monitoring at Deception Island volcano	G-135-E
Wilson	Terry	NSF/OPP Award 02-30285	Transantarctic Mountains deformation network: GPS measurements of neotectonic motion in the antarctic interior	G-079-M
Zesta	Eftyhia	NSF/OPP Award 03-41861	Extending the South American Meridional B-field Array (SAMBA) to auroral latitudes in Antarctica	A-357-P

Top of Page

2004-2005 USAP Field Season

USAP Programs in Antarctica

Aeronomy & Astrophysics	Dr. Vladimir Papitashvili Program Manager
Biology & Medicine	Dr. Polly Penhale Program Manager
Geology & Geophysics	Dr. Thomas Wagner Program Manager
Glaciology	Dr. Julie Palais Program Manager
Oceans & Climate	Dr. Bernhard Lettau Program Manager
Artists & Writers	Mr. Guy Guthridge Program Manager

Click on a link to view a list of projects for each USAP program.

2004-2005 USAP Field Season

Principal Investigators' Home Institutions

Table of Contents | List projects by PI | List projects by program | List projects by institution | List projects by station | List projects by event number digits | List deploying team members

Institution	PI Last Name	PI First Name	Award	Event #
AMLR (Antarctic Ecosystem Research Division)	Trivelpiece	Wayne	NSF/OPP Award 01-25985	B-040-E
Alaska Fairbanks, University of	Bristow	William	NSF/OPP Award 03-37635	A-369-S
Alaska Fairbanks, University of	Castellini	Michael	NSF/OPP Award 01-30417	B-199-M
Arizona State University Tempe	Day	Thomas	NSF/OPP Award 02-30579	B-003-P
Auburn University	Halanych	Kenneth	NSF/OPP Award 03-38218	B-281-L
Augsburg College	Engebretson	Mark	NSF/OPP Award 02-33169	A-102-M/S
Bard College	Rogers	Susan Fox	Artist/Writer Program	W-218-M/S
Bigelow Marine Laboratory	Goes	Joaquim	NSF/OPP Award 01-26150	B-206-N
Boston University	Marchant	David	NSF/OPP Award 03-38291	G-054-M
California Berkeley, University of	Holzapfel	William	NSF/OPP Award 02-32009	A-378-S
California Berkeley, University of	Mende	Stephen	NSF/OPP Award 02-30428	A-104-S
California Berkeley, University of	Parks	George	NSF/OPP Award 02-30441	A-144-E
California Institute of Technology	Lange	Andrew	NSF/OPP Award 02-30438	A-033-S
California Institute of Technology	Stock	Joann	NSF/OPP Award 03-38317	G-071-N
California Irvine, University of	Samaras	Connie	Artist/Writer	W-221-

			Program	S
California Los Angeles, University of	Zesta	Eftyhia	NSF/OPP Award 03-41861	A-357-P
California San Diego, University of	Chereskin	Teresa	NSF/OPP Award 03-38103	O-317-L
California San Diego, University of	Keeling	Ralph	NSF/ATM (Division of Atmospheric Sciences) 00-00923	O-204-P/S
California San Diego, University of	Palinkas	Lawrence	NSF/OPP Award 00-90343	B-321-M/S
California Santa Barbara, University of	Ross-Quetin	Robin	NSF/OPP Award 02-17282	B-028-L/P
California Santa Barbara, University of	Smith	Raymond	NSF/OPP Award 02-17282	B-032-L/P
California Santa Cruz, University of	Tulaczyk	Slawek	NSF/OPP Award 03-38295	I-345-M
Carnegie-Mellon University	Peterson	Jeffrey	NSF/OPP Award 03-42448	A-375-S
Case Western Reserve University	Harvey	Ralph	NSF/OPP Award 99-80452	G-058-M
Chicago, University of	MacAyeal	Douglas	NSF/OPP Award 02-29546	I-190-M
Chicago, University of	Carlstrom	John	NSF/OPP Award 01-30612	A-379-S
Clarkson University	Dempsey	John	NSF/OPP Award 03-38226	O-316-M
Colorado Boulder, University of	Palo	Scott	NSF/ATM (Division of Atmospheric Sciences) 03-36946	A-284-S
Colorado Boulder, University of	McKnight	Diane	NSF/OPP Award 98-10219	B-421-M
Colorado Boulder, University of	Avallone	Linnea	NSF/OPP Award 04-11437	O-251-M
Colorado State University	Wall	Diana	NSF/OPP Award 98-10219	B-424-M

Columbia University	Gordon	Arnold	NSF/OPP Award 01-25172	O-215-N
Columbia University	Martinson	Douglas	NSF/OPP Award 02-17282	B-021-L
Columbia University	Takahashi	Taro	NSF/OPP Award 03-38248	O-214-L
Connecticut, University of	Kremer	Patricia	NSF/OPP Award 03-38290	B-307-L
Cornell University	Stacey	Gordon	NSF/OPP Award 00-94605	A-377-S
Dartmouth College	Lessard	Marc	NSF/OPP Award 01-32576	A-136-S
Dartmouth College	Virginia	Ross	NSF/OPP Award 98-10219	B-423-M
Dartmouth College	Lessard	Marc	NSF/OPP Award 02-16279	A-362-S
Deakin University	Thiele	Deborah	International Whaling Commission	B-280-N
Delaware, University of	Bieber	John	NSF/ATM (Division of Atmospheric Sciences) 00-00315	A-120-M/S
Delaware, University of	Marsh	Adam	NSF/OPP Award 02-38281	B-029-M
Denver, University of	Murcray	Frank	NSF/OPP Award 02-30370	A-255-M/S
Embry Riddle Aeronautical University	Sivjee	Gulamabas	NSF/OPP Award 03-37618	A-129-S
H.T. Harvey & Associates	Ainley	David	NSF/OPP Award 01-25608	B-031-M
Hawaii Manoa, University of	Firing	Eric	NSF/OPP Award 03-38103	O-315-N
IRIS (Incorporated Research Institutions for Seismology)	Butler	Rhett	NSF/EAR (Division of Earth Sciences) 00-04370	G-090-P/S
			NSF/OPP	

Illinois Chicago, University of	Doran	Peter	Award 98-10219	B-426-M
Illinois Urbana, University of	DeVries	Arthur	NSF/OPP Award 02-31006	B-005-M
Johns Hopkins University	Marsh	Bruce	NSF/OPP Award 02-29306	G-056-M
Kansas Lawrence, University of	Besson	Dave	NSF/OPP Award 03-38219	A-123-S
Magee Scientific Company	Hansen	Anthony	NSF/DBI (Division of Biological Infrastructure) 01-19793	O-314-M
Maryland, University of	Seo	Eun-Suk	NSF/NASA agreement	A-137-M
Massachusetts, University of	Blake	James	NSF/OPP Award 00-86665	B-292-E
Miami University	Lee	Richard	NSF/OPP Award 03-37656	B-256-P
Minnesota, University of	Blanchette	Robert	NSF/OPP Award 02-29570	B-038-E/M
Montana State University Bozeman	Garrott	Robert	NSF/OPP Award 02-25110	B-009-M
Montana State University Bozeman	Priscu	John	NSF/MCB (Division of Molecular and Cellular Biosciences) 02-37335	B-195-M
Montana State University Bozeman	Priscu	John	NSF/OPP Award 98-10219	B-422-M
NASA	Conrad	Pamela	NASA ASTEP (Astrobiology Science and Technology for Exploring Planets) 02-0040-0014	B-330-M
NASA	Mitchell	John	NSF/NASA agreement	A-140-M
NOAA (National Oceanic and Atmospheric Administration)	Hofmann	David	NSF/NOAA agreement	O-257-S
NOAA (National Oceanic and Atmospheric Administration)	Hofmann	David	NSF/NOAA agreement	O-264-P

NOAA (National Oceanic and Atmospheric Administration)	Pitman	Robert	NSF/OPP Award 03-38428	B-289-M
NSBF (National Scientific Balloon Facility)	Stepp	Bill	NSF/NASA agreement	A-145-M
National Institute of Polar Research	Ejiri	Masaki	US/Japan agreement	A-117-S
New Mexico Institute of Mining and Technology	Kyle	Philip	NSF/OPP Award 02-29305	G-081-M
New York State Department of Health	Bowser	Samuel	NSF/OPP Award 02-16043	B-015-M
North Carolina, University of	Emslie	Steven	NSF/OPP Award 01-25098	B-034-M
Oceanites, Inc.	Naveen	Ron	NSF/OPP Award 02-30069	B-086-E
Ohio State University	Lyons	W. Berry	NSF/OPP Award 02-29836	B-259-M
Ohio State University	Lyons	W. Berry	NSF/OPP Award 98-10219	B-420-M
Ohio State University	Wilson	Terry	NSF/OPP Award 02-30285	G-079-M
Ohio State University	Chin	Yu-Ping	NSF/OPP Award 03-38260	B-300-M
Pennsylvania State University	Anandakrishnan	Sridhar	NSF/OPP Award 02-29629	I-205-M
Polar Oceans Research Group	Fraser	William	NSF/OPP Award 02-17282	B-013-L/P
Polar Oceans Research Group	Fraser	William	NSF/OPP Award 02-17282	B-198-P
Portland State University	Fountain	Andrew	NSF/OPP Award 98-10219	B-425-M
Princeton University	Ward	Bess	NSF/OPP Award 02-30276	B-310-M
Rice University	Anderson	John	NSF/OPP Award 01-25922	G-083-N
Rochester, University of	Dye	Timothy	NSF/OPP Award 01-25893	B-027-M

SETI Institute (Search for Extraterrestrial Intelligence)	Caldwell	Douglas	NSF/OPP Award 01-26313	A-103-S
San Jose State University	Kim	Stacy	NSF/OPP Award 01-26319	B-010-M
Scripps Institution of Oceanography	Ponganis	Paul	NSF/OPP Award 02-29638	B-197-M
Scripps Institution of Oceanography	Sprintall	Janet	NSF/OPP Award 00-03618	O-260-L
Scripps Institution of Oceanography	Vernet	Maria	NSF/OPP Award 02-17282	B-016-L/P
Scripps Institution of Oceanography	Hildebrand	John	NSF/OPP Award 99-10007	B-239-L
Scripps Institution of Oceanography	Fricker	Helen	NSF/OPP Award 03-37838	I-277-E
Siena College	Weatherwax	Allan	NSF/OPP Award 03-38105	A-111-M/S
Siena College	Weatherwax	Allan	NSF/OPP Award 03-41470	A-112-M
Smithsonian Institution	Neale	Patrick	NSF/OPP Award 01-27037	B-203-N
Smithsonian Institution	Stark	Antony	NSF/OPP Award 01-26090	A-371-S
South Alabama, University of	Kiene	Ronald	NSF/OPP Award 02-30497	B-002-N
South Dakota State University	Cole-Dai	Jihong	NSF/OPP Award 03-37933	I-355-S
Southern California, University of	Manahan	Donal	NSF/OPP Award 01-30398	B-006-M
Stanford University	Inan	Umran	NSF/OPP Award 02-33955	A-306-P
Stanford University	Fraser-Smith	Antony	NSF/OPP Award 01-38126	A-100-M
Stanford University	Inan	Umran	NSF/OPP Award 00-93381	A-108-S
Stanford University	Church	Sarah	NSF/OPP Award 03-	A-366-S

			38138	
State University of New York Syracuse	Kieber	David	NSF/OPP Award 02-30499	B-266-N
Tennessee, University of	Uhle	Maria	NSF/OPP Award 02-30237	B-011-M
Texas A & M University	Kennicutt	Mahlon	SGER (Small Grant for Exploratory Research)	B-518-M
Texas Austin, University of	Holt	John	NSF/OPP Award 02-30197	I-141-M
The University of Maine	Kreutz	Karl	NSF/OPP Award 02-28052	I-191-M
The University of Maine	Sidell	Bruce	NSF/OPP Award 01-25890	B-036-L/P
The University of Maine	Borns	Harold	NSF/OPP Award 03-38189	I-187-M
UNAVCO	Johns	Bjorn	NSF/EAR (Division of Earth Sciences) 03-21760	G-295-M
United States Air Force	Kemerait	Robert	NSF/DOD agreement	G-078-M
United States Department of Energy	Sanderson	Colin	NSF/DOE agreement	O-275-P/S
United States Geological Survey	Mullins	Jerry	NSF/OPP Award 02-33246	G-052-M/P/S
University of Georgia	Hollibaugh	James	NSF/OPP Award 02-34249	B-114-L/P
Utah State University	Gooseff	Michael	NSF/OPP Award 03-38267	B-268-M
Virginia Institute of Marine Sciences	Ducklow	Hugh	NSF/OPP Award 02-17282	B-045-L/P
Virginia Institute of Marine Sciences	Smith	Walker	NSF/OPP Award 00-87401	B-047-M
Washington, University of	Wilcock	William	NSF/OPP Award 02-30094	G-135-E
Washington, University of	Hernandez	Gonzalo	NSF/OPP Award 02-29251	A-110-M/S

Washington, University of	Warren	Stephen	NSF/OPP Award 00-03826	O-201-M
Washington, University of	Putkonen	Jaakko	NSF/OPP Award 03-38224	G-076-M
Washington, University of	Hallet	Bernard	NSF/OPP Award 02-30338	I-139-M
Washington, University of	Stone	John	NSF/OPP Award 02-21394	I-175-M/S
Washington, University of	Emerson	Steven	NSF/OCE (Division of Ocean Sciences) 02-42139	O-271-L
West Florida, University of	Jeffrey	Wade	NSF/OPP Award 01-27022	B-200-N
Wisconsin Madison, University of	Halzen	Francis	NSF/OPP Award 02-36449, 03-31873	A-333-S
Wisconsin Madison, University of	Morse	Robert	NSF/OPP Award 03-37726	A-130-S
Wisconsin Madison, University of	Stearns	Charles	NSF/OPP Award 01-26262	O-202-M/P/S
Wisconsin Madison, University of	Stearns	Charles	NSF/OPP Award 03-38147	O-283-M/P/S
Woods Hole Oceanographic Institution	Gast	Rebecca	NSF/OPP Award 01-25833	B-207-N
Wyoming, University of	Deshler	Terry	NSF/OPP Award 02-30424	A-131-M

Top of Page

Amundsen-Scott South Pole Station

McMurdo Station

Palmer Station

R/V Nathaniel B. Palmer

R/V Laurence M. Gould

Special Projects

Click on a link to view a list of projects at each station.

2004-2005 USAP Field Season

Projects Sorted by Event Number Digits

	PI Last Name	PI First Name	Award	Project Title	Event #
002	Kiene	Ronald	NSF/OPP Award 02-30497	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea	B-002-N
003	Day	Thomas	NSF/OPP Award 02-30579	Response of terrestrial ecosystems along the Antarctic Peninsula to a changing climate	B-003-P
005	DeVries	Arthur	NSF/OPP Award 02-31006	Antifreeze proteins in antarctic fishes: Integrated studies of freezing environments and organismal freezing avoidance, protein-structure and mechanism, genes and evolution	B-005-M
006	Manahan	Donal	NSF/OPP Award 01-30398	Energetics of protein metabolism during development of antarctic echinoderms	B-006-M
009	Garrott	Robert	NSF/OPP Award 02-25110	Patterns and processes: Dynamics of the Erebus Bay Weddell seal population	B-009-M
010	Kim	Stacy	NSF/OPP Award 01-26319	Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic	B-010-M
011	Uhle	Maria	NSF/OPP Award 02-30237	Biogeochemistry of Victoria Land coastal ponds: Role in terrestrial ecosystem organic carbon dynamics and structure	B-011-M
013	Fraser	William	NSF/OPP Award 02-17282	Long-Term Ecological Research (LTER) on the antarctic marine ecosystem: Climate migration, ecosystem response and teleconnections in an ice-dominated environment (seabird component)	B-013-L/P
015	Bowser	Samuel	NSF/OPP Award 02-16043	Remotely operable micro environmental observatory for antarctic marine biology research	B-015-M
016	Vernet	Maria	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-016-L/P
021	Martinson	Douglas	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-021-L
027	Dye	Timothy	NSF/OPP Award 01-25893	Culture and health in Antarctica: Year 3	B-027-M
028	Ross-Quetin	Robin	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-028-L/P
029	Marsh	Adam	NSF/OPP Award 02-38281	CAREER: Genomic networks for cold-adaptation in embryos of polar marine invertebrates	B-029-M

031	Ainley	David	NSF/OPP Award 01-25608	Geographic structure of Adélie penguin populations: Demography of population expansion	B-031-M
032	Smith	Raymond	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-032-L/P
033	Lange	Andrew	NSF/OPP Award 02-30438	Background Imaging Of Cosmic Extragalactic Polarization (BICEP)	A-033-S
034	Emslie	Steven	NSF/OPP Award 01-25098	Occupation history and diet of Adélie penguins in the Ross Sea region	B-034-M
036	Sidell	Bruce	NSF/OPP Award 01-25890	Cold body temperature as an evolutionary shaping force in the physiology of antarctic fishes.	B-036-L/P
038	Blanchette	Robert	NSF/OPP Award 02-29570	Investigations on deterioration in the historic huts of Antarctica	B-038-E/M
040	Trivelpiece	Wayne	NSF/OPP Award 01-25985	Foraging behavior and demography of Pygoscelis penguins	B-040-E
045	Ducklow	Hugh	NSF/OPP Award 02-17282	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	B-045-L/P
047	Smith	Walker	NSF/OPP Award 00-87401	Interannual Variability in the Antarctic-Ross Sea (IVARS): Nutrients and seasonal production	B-047-M
052	Mullins	Jerry	NSF/OPP Award 02-33246	Geodesy and geospatial data program	G-052-M/P/S
054	Marchant	David	NSF/OPP Award 03-38291	Age, origin, and climatic significance of buried ice in the western Dry Valleys	G-054-M
056	Marsh	Bruce	NSF/OPP Award 02-29306	Magmatism in the Dry Valleys: A workshop	G-056-M
058	Harvey	Ralph	NSF/OPP Award 99-80452	The Antarctic Search for Meteorites (ANSMET)	G-058-M
071	Stock	Joann	NSF/OPP Award 03-38317	Collection of marine geophysical data on transits of the R/V Nathaniel B. Palmer	G-071-N
076	Putkonen	Jaakko	NSF/OPP Award 03-38224	Stability of landscapes and ice sheets in Dry Valleys: A systematic study of exposure ages of soils and surface deposits	G-076-M
078	Kemerait	Robert	NSF/DOD agreement	Dry Valley seismic project	G-078-M
079	Wilson	Terry	NSF/OPP Award 02-30285	Transantarctic Mountains deformation network: GPS measurements of neotectonic motion in the antarctic interior	G-079-M
081	Kyle	Philip	NSF/OPP Award 02-	Mount Erebus Volcano Observatory and Laboratory (MEVOL)	G-081-M

			29305		
083	Anderson	John	NSF/OPP Award 01-25922	SHALDRIL: A demonstration drilling cruise to the James Ross Basin	G-083-N
086	Naveen	Ron	NSF/OPP Award 02-30069	Long-term data collection at select Antarctic Peninsula visitor sites	B-086-E
090	Butler	Rhett	NSF/EAR (Division of Earth Sciences) 00-04370	Global seismograph station at Palmer and South Pole stations	G-090-P/S
100	Fraser-Smith	Antony	NSF/OPP Award 01-38126	The operation of an ELF/VLF radiometer at Arrival Heights	A-100-M
102	Engebretson	Mark	NSF/OPP Award 02-33169	Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites	A-102-M/S
103	Caldwell	Douglas	NSF/OPP Award 01-26313	A search for extrasolar planets from the South Pole	A-103-S
104	Mende	Stephen	NSF/OPP Award 02-30428	Dayside auroral imaging at South Pole	A-104-S
108	Inan	Umran	NSF/OPP Award 00-93381	A VLF beacon transmitter at South Pole (2001-2004)	A-108-S
110	Hernandez	Gonzalo	NSF/OPP Award 02-29251	Austral high-latitude atmospheric dynamics	A-110-M/S
111	Weatherwax	Allan	NSF/OPP Award 03-38105	Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions	A-111-M/S
112	Weatherwax	Allan	NSF/OPP Award 03-41470	Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIN): A new vision for global studies	A-112-M
114	Hollibaugh	James	NSF/OPP Award 02-34249	Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER study area	B-114-L/P
117	Ejiri	Masaki	US/Japan agreement	All-sky imager at South Pole	A-117-S
120	Bieber	John	NSF/ATM (Division of Atmospheric Sciences) 00-00315	Solar and heliospheric studies with antarctic cosmic rays	A-120-M/S
123	Besson	Dave	NSF/OPP Award 03-38219	RICE - Radio Ice Cherenkov Experiment	A-123-S
129	Sivjee	Gulamabas	NSF/OPP Award 03-37618	The antarctic investigations of upper atmospheric disturbances over the South Pole Station	A-129-S
			NSF/OPP		

130	Morse	Robert	Award 03-37726	AMANDA 2004 (Antarctic Muon and Neutrino Detector Array)	A-130-S
131	Deshler	Terry	NSF/OPP Award 02-30424	Measurements addressing quantitative ozone loss, polar stratospheric cloud nucleation, and large polar stratospheric particles during austral winter and spring	A-131-M
135	Wilcock	William	NSF/OPP Award 02-30094	High-resolution seismic tomography and earthquake monitoring at Deception Island volcano	G-135-E
136	Lessard	Marc	NSF/OPP Award 01-32576	A proposal for the measurement and analysis of extremely low frequency waves at South Pole Station	A-136-S
137	Seo	Eun-Suk	NSF/NASA agreement	Cosmic Ray Energetics And Mass (CREAM)	A-137-M
139	Hallet	Bernard	NSF/OPP Award 02-30338	Mechanics of dry-land calving of ice cliffs	I-139-M
140	Mitchell	John	NSF/NASA agreement	Balloon-borne Experiment with a Superconducting Spectrometer (BESS)	A-140-M
141	Holt	John	NSF/OPP Award 02-30197	Airborne Geophysical survey of the Amundsen Sea Embayment, Antarctica (AGASEA)	I-141-M
144	Parks	George	NSF/OPP Award 02-30441	Balloon observations of MeV electron precipitation	A-144-E
145	Stepp	Bill	NSF/NASA agreement	Long Duration Balloon (LDB) program	A-145-M
175	Stone	John	NSF/OPP Award 02-21394	Late Quaternary history of Reedy Glacier	I-175-M/S
187	Borns	Harold	NSF/OPP Award 03-38189	West antarctic ice sheet stability	I-187-M
190	MacAyeal	Douglas	NSF/OPP Award 02-29546	Collaborative research of Earth's largest icebergs	I-190-M
191	Kreutz	Karl	NSF/OPP Award 02-28052	Dry Valleys Late Holocene climate variability	I-191-M
195	Priscu	John	NSF/MCB (Division of Molecular and Cellular Biosciences) 02-37335	Microbial diversity and function in the permanently ice-covered lakes of the Dry Valleys	B-195-M
197	Ponganis	Paul	NSF/OPP Award 02-29638	Diving physiology and behavior of Emperor penguins	B-197-M
198	Fraser	William	NSF/OPP Award 02-17282	Monitoring the effects of tourism and environmental variability on Adélie penguins at Palmer Station	B-198-P
199	Castellini	Michael	NSF/OPP Award 01-	Effects of foraging on the lipid biochemistry of freely diving Weddell seals	B-199-M

			30417		
200	Jeffrey	Wade	NSF/OPP Award 01-27022	Interactive effects of UV and vertical mixing on phytoplankton and bacterial productivity of Ross Sea Phaeocystis bloom	B-200-N
201	Warren	Stephen	NSF/OPP Award 00-03826	Solar radiation on the East Antarctic Plateau	O-201-M
202	Stearns	Charles	NSF/OPP Award 01-26262	Antarctic Meteorological Research Center 2002-2005 (AMRC)	O-202-M/P/S
203	Neale	Patrick	NSF/OPP Award 01-27037	Interactive effects of UV and vertical mixing on phytoplankton and bacterioplankton in the Ross Sea	B-203-N
204	Keeling	Ralph	NSF/ATM (Division of Atmospheric Sciences) 00-00923	A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems	O-204-P/S
205	Anandakrishnan	Sridhar	NSF/OPP Award 02-29629	Tidal modulation of ice stream flow	I-205-M
206	Goes	Joaquim	NSF/OPP Award 01-26150	Ultraviolet radiation induced changes in the patterns of production and biochemical composition of antarctic marine phytoplankton	B-206-N
207	Gast	Rebecca	NSF/OPP Award 01-25833	Comparative and quantitative studies of protistan molecular ecology and physiology in coastal antarctic waters	B-207-N
214	Takahashi	Taro	NSF/OPP Award 03-38248	Processes driving spatial and temporal variability of surface PCO2 in the Drake Passage	O-214-L
215	Gordon	Arnold	NSF/OPP Award 01-25172	ANSLOPE: Cross slope exchanges at the antarctic slope front	O-215-N
217	Arthus-Bertrand	Yann	Artist/Writer Program	Mission Antarctica	W-217-M
218	Rogers	Susan Fox	Artist/Writer Program	Antarctic Anthology	W-218-M/S
219	Glasberg	Elena	Artist/Writer Program	End as beginning: An American antarctic imaginary	W-219-M/S
220	Nutter	Judith	Artist/Writer Program	Time, place, and imagination: Images and poems from Antarctica	W-220-P
221	Samaras	Connie	Artist/Writer Program	Vast active living intelligence system: Photographing the South Pole	W-221-S
223	Walker	Gabrielle	Artist/Writer Program	Antarctica: The biography of a continent	W-223-M
239	Hildebrand	John	NSF/OPP Award 99-10007	Mysticete whale acoustic census in the GLOBEC west antarctic project area	B-239-L
251	Avallone	Linnea	NSF/OPP Award 04-11437	In situ measurements of halogen oxides in the Troposphere	O-251-M
			NSF/OPP		

255	Murcray	Frank	Award 02-30370	Infrared measurements of atmospheric composition over Antarctica	A-255-M/S
256	Lee	Richard	NSF/OPP Award 03-37656	Physiological and molecular mechanisms of stress tolerance in a polar insect	B-256-P
257	Hofmann	David	NSF/NOAA agreement	South Pole monitoring for climatic change: US Department of Commerce NOAA climate monitoring and diagnostic laboratory	O-257-S
259	Lyons	W. Berry	NSF/OPP Award 02-29836	Soil biodiversity and response to climate change: A regional comparison of Cape Hallett and Taylor Valley	B-259-M
260	Sprintall	Janet	NSF/OPP Award 00-03618	The Drake Passage high density XBT / XCTD program	O-260-L
264	Hofmann	David	NSF/NOAA agreement	Collection of atmospheric air for the NOAA/CMDL worldwide flask sampling network	O-264-P
266	Kieber	David	NSF/OPP Award 02-30499	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea	B-266-N
268	Gooseff	Michael	NSF/OPP Award 03-38267	Hydrologic controls over biogeochemistry and microbial community structure and function across terrestrial/aquatic interfaces in a polar desert	B-268-M
271	Emerson	Steven	NSF/OCE (Division of Ocean Sciences) 02-42139	Tracers of biological productivity and gas exchange	O-271-L
275	Sanderson	Colin	NSF/DOE agreement	Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab	O-275-P/S
277	Fricker	Helen	NSF/OPP Award 03-37838	Monitoring an active rift system at the front of Amery Ice Shelf, East Antarctica	I-277-E
280	Thiele	Deborah	International Whaling Commission	International Whaling Commission Southern Ocean Collaboration Program: Cetacean ecology, acoustic detection and sea ice habitat	B-280-N
281	Halanych	Kenneth	NSF/OPP Award 03-38218	Relevance of planktonic larval dispersal to endemism and biogeography of antarctic benthic invertebrates	B-281-L
283	Stearns	Charles	NSF/OPP Award 03-38147	Antarctic Automatic Weather Station (AWS) program 2004-2006	O-283-M/P/S
284	Palo	Scott	NSF/ATM (Division of Atmospheric Sciences) 03-36946	Dynamics of the antarctic MLT region using ground-based radar and TIMED instrumentation	A-284-S
289	Pitman	Robert	NSF/OPP Award 03-38428	Genetic and photogrammetric investigations of three ecotypes of Killer whales in the southern Ross Sea	B-289-M
292	Blake	James	NSF/OPP Award 00-86665	Origin and evolution of antarctic and deep-sea macroinfauna: Systematics and reproductive patterns of polychaetes	B-292-E

295	Johns	Bjorn	NSF/EAR (Division of Earth Sciences) 03-21760	UNAVCO Geodetic GPS Support	G-295-M
300	Chin	Yu-Ping	NSF/OPP Award 03-38260	Biogeochemistry of dissolved organic material in Pony Lake, Ross Island	B-300-M
306	Inan	Umran	NSF/OPP Award 02-33955	Global thunderstorm activity and its effects on the radiation belts and the lower Ionosphere	A-306-P
307	Kremer	Patricia	NSF/OPP Award 03-38290	Salpa thompsoni in the Southern Ocean: Bioenergetics, population dynamics and biogeochemical impact.	B-307-L
310	Ward	Bess	NSF/OPP Award 02-30276	What limits denitrification and bacterial growth in Lake Bonney, Taylor Valley?	B-310-M
314	Hansen	Anthony	NSF/DBI (Division of Biological Infrastructure) 01-19793	Solar / wind powered instrumentation module development for polar environmental research	O-314-M
315	Firing	Eric	NSF/OPP Award 03-38103	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Nathaniel B. Palmer	O-315-N
316	Dempsey	John	NSF/OPP Award 03-38226	Physics and mechanics of the breakup of warm antarctic sea ice: In-situ experiments and modeling	O-316-M
317	Chereskin	Teresa	NSF/OPP Award 03-38103	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Laurence M. Gould	O-317-L
321	Palinkas	Lawrence	NSF/OPP Award 00-90343	Prevention of environment-induced decrements in mood and cognitive performance	B-321-M/S
330	Conrad	Pamela	NASA ASTEP (Astrobiology Science and Technology for Exploring Planets) 02-0040-0014	SPISE3: A non-contact instrument suite for rapid detection of chemical biosignatures	B-330-M
333	Halzen	Francis	NSF/OPP Award 02-36449, 03-31873	IceCube	A-333-S
345	Tulaczyk	Slawek	NSF/OPP Award 03-38295	Is Kamb Ice Stream restarting? Glaciological investigations of the bulge-trunk transition on Kamb Ice Stream, West Antarctica	I-345-M
355	Cole-Dai	Jihong	NSF/OPP Award 03-37933	Investigating atmospheric chemistry through oxygen and sulfur isotopes in volcanic sulfate from South Pole ice cores	I-355-S
357	Zesta	Eftyhia	NSF/OPP Award 03-	Extending the South American Meridional B-field Array (SAMBA) to auroral latitudes in Antarctica	A-357-P

			41861		
362	Lessard	Marc	NSF/OPP Award 02-16279	Development of an Autonomous Real-time Remote Observatory (ARRO)	A-362-S
366	Church	Sarah	NSF/OPP Award 03-38138	Next generation CMB polarization measurements with the QUEST experiment on DASI	A-366-S
369	Bristow	William	NSF/OPP Award 03-37635	South Pole SuperDARN (Super Dual Auroral Radar Network)	A-369-S
371	Stark	Antony	NSF/OPP Award 01-26090	Continued operation of the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO)	A-371-S
375	Peterson	Jeffrey	NSF/OPP Award 03-42448	PAST: The Primeval Structure Telescope	A-375-S
377	Stacey	Gordon	NSF/OPP Award 00-94605	Wide-field imaging spectroscopy in the submillimeter: Deploying SPIFI on AST/RO	A-377-S
378	Holzapfel	William	NSF/OPP Award 02-32009	High resolution observations of the CMB with ACBAR	A-378-S
379	Carlstrom	John	NSF/OPP Award 01-30612	South Pole observations to test cosmological models	A-379-S
420	Lyons	W. Berry	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-420-M
421	McKnight	Diane	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-421-M
422	Priscu	John	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-422-M
423	Virginia	Ross	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-423-M
424	Wall	Diana	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-424-M
425	Fountain	Andrew	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-425-M
426	Doran	Peter	NSF/OPP Award 98-10219	McMurdo Dry Valleys LTER (Long Term Ecological Research)	B-426-M
518	Kennicutt	Mahlon	SGER (Small Grant for Exploratory Research)	Temporal variability in natural and anthropogenic disturbance of McMurdo Station	B-518-M

Top of Page

2004-2005 USAP Field Season
Deploying Participants

Current as of 1 August 2004

Last Name	First Name	Event #
Abresch	Brian	A-137-M
Ackermann	Markus	A-130-S
Ackert	Robert	I-187-M
Adams	Byron	B-259-M
Adams	Byron	B-424-M
Agius	Stephen	B-040-E
Ainley	David	B-031-M
Albershardt	Lou	I-139-M
Allen	Phil	B-011-M
Allen	Phil	B-426-M
Amanullah	Rahman	A-333-S
Anandakrishnan	Sridhar	I-205-M
Anderson	Cynthia	B-013-L/P
Anderson	Britt	B-047-M
Anderson	Mark	B-330-M
Anderson	John	G-083-N
Anderson	Kent	G-090-P/S
Andy	Johnston	O-316-M
Anene-Maidoh	Ogugua	B-029-M
Anglen	Brandy	B-426-M
Applebaum	Sally	B-518-M
Arnold	Brianna	B-422-M
Arthus-Bertrand	Yann	W-217-M
Asmus	Kelly	B-280-N
Asper	Vernon	B-047-M
Aster	Richard	G-090-P/S
Avallone	Linnea	O-251-M
Avery	James	A-284-S
Avery	Susan	A-284-S
Azeem	S. Irfan	A-129-S
Baeseman	Jenny	B-310-M
Bai	Xinhua	A-333-S

Baldwin	Amy	B-200-N
Ballard	Grant	B-031-M
Balser	Elizabeth	B-281-L
Barclay	Andrew	G-135-E
Barkats	Denis	A-033-S
Barlow	Stephen	A-110-M/S
Barrett	John	B-259-M
Barrett	John	B-268-M
Bartel	Beth Ann	G-295-M
Basagic IV	Hassan	B-425-M
Bate	Douglas	B-268-M
Bay	Ryan	A-333-S
Bedard	Jean	G-056-M
Belcher	Rebecca	B-281-L
Below	Ashley	B-206-N
Benati	Danielle	B-266-N
Benson	Terry	A-333-S
Bergantz	George	G-056-M
Bergeron	Beth	A-333-S
Berghaus	Patrick	A-130-S
Berkoff	Tim	O-257-S
Bernardini	Elisa	A-130-S
Besson	Dave	A-123-S
Besson	Dave	A-130-S
Bhartia	Rohit	B-330-M
Billmark	Kaycie	B-011-M
Bindschadler	Robert	I-205-M
Bisgrove	John	B-266-N
Blair	Jeffrey	B-015-M
Blair	Jeffrey	O-314-M
Blake	James	B-292-E
Blanchette	Robert	B-038-E
Blankenship	Donald	I-141-M
Blasczyk	Heather	B-281-L
Blaufuss	Erik	A-333-S
Bloom	Jennifer	B-031-M
Bobb	Michael	B-268-M
Bock	Jamie	A-033-S
Bohaty	Steve	G-083-N
Bolsey	Robin	A-333-S

Bongarzone	Adam	G-071-N
Borley	Kimberley	B-036-L/P
Borns	Harold	I-187-M
Boudreau	Alan	G-056-M
Bowser	Samuel	B-015-M
Boyce	Joe	G-058-M
Boyle	Patrick (Jojo)	A-137-M
Braddock	Peter	I-187-M
Brandt	Richard	O-201-M
Brasfield	Paul	A-145-M
Braun	Jim	A-130-S
Braun	Denise	A-333-S
Braun	Jim	A-333-S
Bromley	Gordon	I-175-M
Broos	Emma	B-424-M
Brundage	Heather	G-071-N
Brunt	Kelly	I-190-M
Bryant	David	B-003-P
Buckelew	Stacey	B-086-P
Budner	Drew	I-355-S
Buettner	Joseph	A-145-M
Bullock	Ian	B-086-P
Burgess	Thomas	A-130-S
Burnette	Adriene	B-281-L
Butler	Rhett	G-090-P/S
Cable	Peter	B-420-M
Cairo	Francesco	A-131-M
Caldwell	Douglas	A-103-S
Calkins	Julie Ann	G-081-M
Campbell-Malone	Regina	B-281-L
Cande	Steven	G-071-N
Carlson	Robert	B-330-M
Carlstrom	John	A-366-S
Carpenter	Lawrence	B-292-E
Carroll	Robert	B-047-M
Castellini	Judith	B-199-M
Castellini	Michael	B-199-M
Castermans	Thierry	A-130-S
Catania	Ginny	I-345-M
Chabot	Nancy	G-057-M

Chakos	Diane	B-028-L/P
Chambers	Reid	A-145-M
Chang	Jeff	A-112-M
Charrier	Amanda	G-056-M
Chaston	John	B-424-M
Cheng-DeVries	Chi-Hing	B-005-M
Chereskin	Teresa	O-315-N
Chereskin	Teresa	O-317-L
Cherwinka	Jeff	A-333-S
Chiang	H.	A-033-S
Childers III	John	A-137-M
Chin	Nancy	B-027-M
Chin	Yu-Ping	B-300-M
Chiuchiolo	Amy	B-422-M
Christiansen	Jessie	A-103-S
Church	Sarah	A-366-S
Churchwell	Steve	A-130-S
Clarke	Andrew	O-257-S
Coats	Larry	B-034-M
Cobble	Mark	A-145-M
Cochran	Michelle	B-045-L/P
Cole-Dai	Jihong	I-355-S
Coleman	Alexander	A-137-M
Conklin	Nicholas	A-137-M
Conlan	Kathleen	B-010-M
Conrad	Pamela	B-330-M
Conway	Howard	I-175-M
Conway	Maurice	I-175-M
Conway	Maurice	I-345-M
Coons	Douglas	B-015-M
Cooper	Jennifer	G-056-M
Cornelius	Scotty	G-056-M
Corrigan	Catherine	G-058-M
Cory	Rose	B-300-M
Coutu	Stephane	A-137-M
Crabill	Robbert	A-145-M
Craig	Totman	O-316-M
Criscitiello	Alison	O-215-N
Croon	Marcel	G-071-N
Curren	Matthew	G-083-N

Cziko	Paul	B-005-M
Dagit	Rosemary	B-086-P
Dahlgren	Thomas	B-281-L
Daisey	Ted	A-137-M
Daniels	Robert	B-045-L/P
Dann	Jeremiah	B-029-M
Danque	Hunter	I-141-M
Darnell	Dennis	I-277-E
Davidson	Jon	G-056-M
Davis	Katie	B-028-L/P
Davis	Sean	O-251-M
Day	Christopher	A-333-S
Day	Thomas	B-003-P
DeLizo	Liza	B-047-M
DeVries	Arthur	B-005-M
DeVries	Clarabelle	B-005-M
Deco	Rachel	G-071-N
Dempsey	Jessica	A-378-S
Dempsey	John	O-316-M
Demyanick	Elizabeth	G-079-M
Denlinger	David	B-256-P
Dennett	Mark	B-207-N
Denney	Andrew	A-145-M
Diehl	Theresa	I-141-M
Dolman	Sarah	B-280-N
Doner	Stacy	B-292-E
Donnellan	Michael	B-010-M
Doran	Peter	B-426-M
Doren	Jesse	G-049-M
Dowell	Charles	A-033-S
Downey	Nathan	G-071-N
Dozier	Ann	B-027-M
Dreyer	Jennifer	B-047-M
Ducklow	Hugh	B-045-L/P
Ducklow	William	B-045-L/P
Dugger	Katie	B-031-M
Duling	Dennis	A-333-S
Duling	Dennis	B-015-M
Dums	Donovan	G-083-N

Dunbar	Nelia	G-081-M
Durel	Justin	G-056-M
Dutton	Geoff	O-257-S
Duvernois	Michael	A-137-M
Dye	Timothy	B-027-M
Ebihara	Yusuke	A-117-S
Ebnet	Jonathan	B-425-M
Edwards	William	A-333-S
Ehasz	Elizabeth	A-371-S
Elliot	David	G-056-M
Ellwood	Robin	B-426-M
Emerson	Steven	O-271-L
Emslie	Steven	B-034-M
Erickson	Matthew	B-114-L
Escher	Sharon	O-317-L
Esser	Richard	G-081-M
Evans	Kenneth	A-130-S
Evans	Clive	B-005-M
Evans	Dan	B-198-P
Evans	Bob	O-257-S
Evenson	Paul	A-333-S
Falkenburg	Catherine	B-239-L
Fernandes	Vera	G-058-M
Ferris	Dave	I-355-S
Field	Paul	B-047-M
Fierli	Federico	A-131-M
Filina	Irina	I-141-M
Fimmen	Ryan	B-300-M
Firing	Eric	O-315-N
Fisher	Jennifer	B-010-M
Fitzgibbon	Timothy	B-259-M
Fleder	Anna	B-423-M
Fodor	Ron	G-056-M
Fogal	Pierre	A-255-M/S
Foley	Kelly	B-420-M
Foo	Wilson	B-195-M
Foreman	Christine	B-300-M
Foreman	Christine	B-422-M
Forrest	Steven	B-086-P
Fountain	Andrew	B-425-M

Fountain	Andrew	I-139-M
France	Kristen	B-045-L/P
Franklin	Linda	B-203-N
Franklin	Denis	O-215-N
Fraser	William	B-013-L/P
Fuke	Hideyuki	A-140-M
Gacke	Terrance	I-191-M
Gaisser	Thomas	A-333-S
Ganel	Opher	A-137-M
Ganga	Kenneth	A-366-S
Garcia	Michael	G-056-M
Garner	Teresa	B-203-N
Garrott	Robert	B-009-M
Gear	Walter	A-366-S
Geary	Lindsey	G-083-N
Geist	Dennis	G-056-M
Geoffrey	Morley	O-316-M
Gerboc	John	I-141-M
Gils	Christian	A-333-S
Ginsburg	David	B-006-M
Glasberg	Elena	W-219-M
Glover	Robert	G-079-M
Godfrey	Jeffrey	B-307-L
Goes	Joaquim	B-206-N
Goldmann	Kirsten	A-130-S
Goldstein	Jonathan	A-378-S
Gomes	Maria	B-206-N
Gooseff	Michael	B-268-M
Goreva	Yulia (Julia)	G-057-M
Gorveatt	William	A-371-S
Gottlieb	David	I-139-M
Graham	Margaret	B-423-M
Green	Allison	B-006-M
Greenberg	Jim	G-295-M
Greenler	Leland	A-333-S
Grenfell	Thomas	O-201-M
Griffin	Gregory	A-033-S
Grisell	Andre	A-333-S
Grom	Jackie	B-426-M
Groppi	Christopher	A-371-S

Guerard	Jennifer	B-300-M
Guerrero	Raul	O-215-N
Haase	Tami	B-199-M
Hadley	Scott	A-145-M
Hadley	Gillian	B-009-M
Hage	Melissa	B-011-M
Haino	Sadakazu	A-140-M
Halanych	Kenneth	B-281-L
Hall	Jerome	G-079-M
Hall	Brenda	I-175-M
Hallam	Cheryl	G-052-M/P/S
Ham	Tom	A-333-S
Hamilton	Darrell	A-333-S
Hand	Kevin	B-330-M
Hannaford	Terry	A-333-S
Hansen	Anthony	B-015-M
Hansen	Anthony	O-314-M
Hanson	Kael	A-333-S
Harada	Hyakubun	B-002-N
Harper	Shawn	B-199-M
Harpp	Karen	G-056-M
Harris	Katherine	B-420-M
Hart	Henry	A-137-M
Harvey	Ralph	G-058-M
Harwood	David	G-049-M
Hawat	Toufic	A-255-M/S
Hays	David	A-333-S
Hayward	Scott	B-256-P
Head	James	G-054-M
Held	Benjamin	B-038-E
Hellwig	Marc	A-130-S
Hellwig	Marc	A-333-S
Henderson	Grace	B-047-M
Hernandez	Gonzalo	A-110-M/S
Heroy	David	G-083-N
Hersum	Taber	G-056-M
Hill	Gary	A-333-S
Hill	Kenneth	B-268-M
Hinderks	James	A-366-S
Hinkel	Natalie	A-371-S

Hobbie	John	A-145-M
Hoefling	Kevin	B-005-M
Hoffmann	Cliff	B-028-L/P
Holloway	Stephen	B-028-L/P
Holt	John	I-141-M
Holzapfel	William	A-378-S
Horgan	Erich	B-307-L
Horgan	Huw	I-205-M
Horne	Peter	B-013-L/P
Hothem	Larry	G-052-M/P/S
Howat	Ian	I-345-M
Hubert	Daan	A-130-S
Hudson	Stephen	O-201-M
Hulth	Per Olof	A-130-S
Hultqvist	Klas	A-130-S
Hummon	Julia	O-315-N
Humphrey	Jim	A-145-M
Hundertmark	Stephan	A-130-S
Iimura	Hiroyuki	A-284-S
Inglis	Susan	B-199-M
Ingram	Wesley	G-083-N
Jacobel	Robert	I-345-M
Jacobs	Stanley	O-215-N
Jaeckle	William	B-281-L
Janches	Diego	A-284-S
Jarnyk	Mark	A-103-S
Jaros	Chris	B-300-M
Jayred	Michael	A-333-S
Jeffrey	Wade	B-200-N
Jennings	Robert	B-281-L
Jerram	Dougal	G-056-M
Johnson	Tina	B-047-M
Johnston	Mark	B-009-M
Jones	Arthur	A-333-S
Jonke	Patrick	G-135-E
Joslin	Justin	B-421-M
Joughin	Ian	I-205-M
Juneau	Jill	A-145-M
Jungenberg	Ronald	A-333-S

Kaiser	Henry	B-015-M
Kalnajs	Lars	O-251-M
Kaltenbach	Alfred	B-420-M
Kappel	Nicholas	G-078-M
Karentz	Deneb	B-200-N
Karle	Albrecht	A-333-S
Karner	James	G-058-M
Kattenhorn	Simon	G-056-M
Keating	Brian	A-033-S
Kelley	John	A-333-S
Kelly	Peter	G-081-M
Kempf	Scott	I-141-M
Kendall	Lindsay	B-029-M
Key	Jeff	O-202-M/P/S
Kieber	David	B-266-N
Kiene	Ronald	B-002-N
Kikuchi	Masayuki	A-117-S
Kim	Thomas	A-137-M
Kim	Stacy	B-010-M
Kim	Young-Jin	I-190-M
King	Louis	A-131-M
Kirsch	Katherine	G-083-N
Klein	Andrew	B-518-M
Knower Stockard	Andrea	B-197-M
Koci	Bruce	B-015-M
Koehler	James	A-333-S
Kokorowski	MIchael	A-144-E
Kooi	Jacob	A-371-S
Koutnik	Michelle	I-139-M
Kovac	John	A-033-S
Kowalewski	Douglas	G-054-M
Krahmann	Gerd	O-215-N
Krasberg	Mark	A-333-S
Kravchenko	Ilya	A-123-S
Kravchenko	Ilya	A-130-S
Kremer	Patricia	B-307-L
Kreutz	Karl	I-191-M
Kulesa	Craig	A-371-S
Kumazawa	Teruyuki	A-140-M
Kuo	Chao-lin	A-033-S

Kyle	Philip	G-081-M
Lane	Arthur	B-330-M
Lange	Andrew	A-033-S
Lanoil	Brian	B-195-M
Lau	Elias	A-284-S
Lauser	John	G-078-M
Laybourn-Parry	Johanna	B-195-M
Lazzara	Matthew	O-202-M/P/S
Lazzara	Matthew	O-283-M
LeBel	Deborah	O-215-N
LeCleir	Gary	B-114-L
LeRoi	Don	B-289-M
Lee	Moo	A-137-M
Lee	Richard	B-256-P
Leitch	Erik	A-366-S
Leuro	Erick	I-141-M
Levy	Richard	G-049-M
Levy	Joseph	G-054-M
Lewis	Adam	G-054-M
Lidstrom	Sven	A-333-S
Lin	Candice	B-040-E
Link	Janessa	G-071-N
Liston	Glen	B-425-M
Loehr	Andrea	A-371-S
Loomis	Eli	B-016-L/P
Love	Stanley	G-058-M
Lundberg	Johan	A-130-S
Lutz	Larry	A-137-M
Lutz	Mathew	G-049-M
Lyons	W. Berry	B-420-M
MacAyeal	Douglas	I-190-M
MacDonald	Mikel	G-078-M
MacDonald	Mark	B-239-L
Mackenzie	Cynthia	A-333-S
Madgar II	Robert	G-078-M
Madin	Laurence	B-307-L
Makida	Yasuhiro	A-140-M
Malinine	Alexandre	A-137-M
Mallie	Olivier	A-366-S
Malmquist	David	B-047-M

Manahan	Donal	B-006-M
Manga	Michael	G-056-M
Manley	Patricia	G-083-N
Marchant	David	G-054-M
Margolin	Jayme Brooke	G-081-M
Marsh	Adam	B-029-M
Marsh	Bruce	G-056-M
Martin	Christopher	A-371-S
Martin	Kevin	B-047-M
Maruca	Bennett	A-375-S
Mason	Pete	A-033-S
Mastroianni	Joseph	O-314-M
Mathez	Ed	G-056-M
Mathieu	Guy	O-215-N
Matsuda	Shinya	A-140-M
Matt	Terry	A-333-S
Matus	Michael	A-145-M
Maxson	Robert	B-006-M
McCabe	Nathan	A-145-M
McCallum	Ian	G-056-M
McCarthy	Michael	A-110-M/S
McCreedy	Chris	B-031-M
McEwen	Donald	A-129-S
McIntosh	William	G-081-M
McKay	Christopher	B-330-M
McKnight	Diane	B-300-M
McKnight	Diane	B-421-M
McParland	Charles	A-333-S
Mckiernan	Bernard	G-135-E
Mefford	Tom	O-257-S
Meir	Jessica	B-197-M
Mercer	Jennifer	A-131-M
Messarius	Alf Timo	A-130-S
Michalchuk	Bradley	G-083-N
Middaugh	Nicole	B-045-L/P
Mikelich	Shauna	G-081-M
Mikucki	Jill	B-422-M
Miller	Penney	B-300-M
Mironov	Anatoliy	I-141-M
Mitchell	John	A-140-M

Mittlefehldt	David	G-057-M
Moldwin	Mark	A-357-P
Montzka	Steve	O-257-S
Moore	Rudy	A-130-S
Moore	Michael	B-006-M
Moore	Joel	B-195-M
Morbidini	Roberto	A-131-M
Morgan	Daniel	G-076-M
Morse	David	I-141-M
Mueller	Loren	O-215-N
Mukasa	Samuel	G-056-M
Mukhopadhyay	Sujoy	I-187-M
Mullins	Jerry	G-052-M/P/S
Murcray	Frank	A-255-M/S
Nadin	Elisabeth	G-071-N
Nakamura	Keiko	G-058-M
Nam	Jiwoo	A-130-S
Naslund	Howard	G-056-M
Naveen	Ron	B-086-P
Neale	Patrick	B-203-N
Nguyen	Hien	A-033-S
Nichols	James	B-009-M
Nikola	Thomas	A-377-S
Norman	Shaun	G-058-M
Nutter	Judith	W-220-P
Nylen	Thomas	B-259-M
Nylen	Thomas	B-425-M
Nylen	Thomas	I-139-M
O'Donovan	Kieran	B-198-P
O'Mullan	Gregory	B-310-M
Oberst	Thomas	A-377-S
Ojima	Claire	B-424-M
Okal	Emile	I-190-M
Okal	Marianne	I-190-M
Olbrechts	Philip	A-130-S
Oliver	Jacques	B-047-M
Oliver	Leah	B-047-M
Oppenheimer	Clive	G-081-M
Pace	Douglas	B-006-M

Padin	Stephen	A-379-S
Padman	Laurence	O-215-N
Pakulski	Joseph	B-200-N
Palmer	Terry	B-518-M
Palmer	Jeremy	G-052-M/P/S
Palmintier	Bryan	B-005-M
Palo	Scott	A-284-S
Parish	Thomas	O-283-M
Park	Na Hee	A-137-M
Parsley	Steven	A-377-S
Parsons	Rebecca	G-054-M
Paschal	Evans	A-108-S
Paterson	Scott	G-056-M
Patton	Simon	A-333-S
Paulos	Robert	A-333-S
Pechan	Brian	A-333-S
Pekar	Stephen	G-049-M
Pernic	Dave	A-333-S
Perryman	Wayne	B-289-M
Peters	Matthew	I-141-M
Peters	Leo	I-205-M
Peterson	Jeffrey	A-375-S
Petford	Nick	G-056-M
Pettersson	Rickard	I-345-M
Pettit	Erin	I-139-M
Phillips	Brennan	B-307-L
Phillips	Eric	G-135-E
Phillips-Kress	Jesse	B-203-N
Pickering	Brett	B-013-L/P
Pineda	Jesus	B-281-L
Pisano	William	A-284-S
Pitman	Robert	B-289-M
Plagge	Amanda	A-362-S
Poage	Michael	B-423-M
Polito	Michael	B-040-E
Polk	Scott	B-047-M
Ponganis	Edward	B-197-M
Ponganis	Katherine	B-197-M
Ponganis	Paul	B-197-M
Potter	Gillian	B-047-M

Potter	Jeremy	B-047-M
Powell	Ross	G-049-M
Pretz	John	A-333-S
Priscu	John	B-422-M
Proffitt	Kelly	B-009-M
Pryke	Clement	A-366-S
Przybylski	Gerald	A-333-S
Putkonen	Jaakko	G-076-M
Quetin	Gregory	B-028-L/P
Quetin	Langdon	B-028-L/P
Quetin	Gregory	B-032-L/P
Rachelson	William	A-112-M
Rea	Lorrie	B-199-M
Reddish	Jeffrey	A-137-M
Reichardt	Christian	A-378-S
Rentmeesters	Charles	A-333-S
Richter	Steffen	A-333-S
Richter	Thomas	I-141-M
Rinehart	Joseph	B-256-P
Roberts	Donald	A-145-M
Roberts	Stephen	G-090-P/S
Robertson	Robin	O-215-N
Robinson	John	I-139-M
Robock	Alan	A-131-M
Rogers	Delisa	B-422-M
Rogers	Susan	W-218-M
Rose	Julie	B-207-N
Ross	Ronald	I-190-M
Ross-Quetin	Robin	B-028-L/P
Rotella	Jay	B-009-M
Roth	James	A-333-S
Ruhl	John	A-378-S
Ruhland	Christopher	B-003-P
Rusholme	Benjamin	A-366-S
Said	Ryan	A-306-P
Samaras	Connie	W-221-S
Sample	John	A-144-E
San Sebastian	Frank	A-140-M
Sanderson	Marta	B-047-M
Sandro	Lucas	B-256-P

Sasaki	Makoto	A-140-M
Sato	Katsufumi	B-197-M
Schafer	Joerg	G-054-M
Scheer	Terra	B-009-M
Scheltema	Rudolf	B-281-L
Schlenstedt	Stefen	A-130-S
Schmitt	Stuart	G-071-N
Schneider	Darryn	A-333-S
Schnell	Russell	O-257-S
Schutt	John	G-057-M
Schwager	Katherine	B-032-L/P
Schwartz	Robert	A-366-S
Scolardi	Kerri	B-307-L
Searson	Sarah	O-215-N
Sechrist	Daniel	G-052-M/P/S
Seefeldt	Mark	O-283-M
Selby	Ralph	A-137-M
Seo	Eun-Suk	A-137-M
Sergienko	Olga	I-190-M
Shean	David	G-054-M
Shen	Wang	O-316-M
Shepanek	Marc	B-321-M/S
Shields	Amy	B-047-M
Short	John	A-333-S
Shulman	Leonard	A-120-M/S
Shultz	Edward	A-333-S
Sidell	Bruce	B-036-L/P
Silvestri	Andrea	A-130-S
Simon	Adam	G-056-M
Simon	Daniel	O-257-S
Sines	Karie	B-016-L/P
Sivjee	Gulamabas	A-129-S
Slezak	Dorothea	B-002-N
Smith	Casey	A-137-M
Smith	Craig	A-145-M
Smith	Walker	B-047-M
Smith	Julie	G-058-M
Smith	Russell	G-083-N
Smolinski	Michael	A-137-M
Smykla	Jerzy	B-034-M

Sniffen	Peter	I-139-M
Sobrino	Cristina	B-203-N
Southey	Ian	O-215-N
Speece	Marvin	G-049-M
Spence	Jessica	B-016-L/P
Spinhirne	James	O-257-S
Sprague	Joshua	B-028-L/P
Sprintall	Janet	O-260-L
St. Leger	Judy	B-197-M
Stacey	Gordon	A-377-S
Staniszewski	Zachary	A-378-S
Stanton	Basil	O-215-N
Stapf	Frederick	A-137-M
Starczak	Vicki	B-281-L
Stark	Antony	A-371-S
Stegall	Vicki	B-199-M
Stepp	William	A-145-M
Sterling	Rick	A-112-M
Sterling	Karen	B-015-M
Stewart	Brent	B-009-M
Stezelberger	Thorsten	A-333-S
Stockard	Edward	B-197-M
Stone	John	G-076-M
Stone	John	I-175-M
Strathmann	Richard	B-029-M
Strauss	Sarah	B-003-P
Stucker	Rebekka	B-423-M
Stump	Charles	O-271-L
Sulanke	Karl-Heinz	A-333-S
Sullivan	David	A-145-M
Sullivan	Greg	A-333-S
Sumner	Mathew	G-083-N
Sun	Henry	B-330-M
Swanger	Kate	G-054-M
Swearingen	Marshall	A-362-S
Sweeney	Dawn	G-081-M
Sweet	Stephen	B-518-M
Swordy	Simon	A-137-M
Takacs-Vesbach	Cristina	B-268-M

Takahashi	Yuki	A-033-S
Takeuchi	Kazuma	A-140-M
Taylor	Ronald	A-137-M
Thom	Jonathan	I-190-M
Thom	Jonathan	O-283-M
Thoma	Mark	A-333-S
Thomas	Austen	B-016-L/P
Thomas	Austen	B-032-L/P
Thomey	Michell	B-003-P
Thurber	Andrew	B-010-M
Tierney	Jon	I-191-M
Tilav	Serap	A-333-S
Todd	Claire	I-175-M
Toniolo	Viola	B-031-M
Tozzi	Sasha	B-047-M
Tramp	Kristy	G-083-N
Trick	Charles	B-310-M
Trivelpiece	Susan	B-040-E
Trivelpiece	Wayne	B-040-E
Tuit	Caroline	B-310-M
Tulaczyk	Slawek	I-345-M
Turner	Jane	G-079-M
Uhle	Maria	B-011-M
Ulrich	Paul	B-029-M
Valicenti	Lyndon	B-016-L/P
Valicenti	Lyndon	B-028-L/P
Valicenti	Lyndon	B-032-L/P
VanTongeren	Jill	G-056-M
Vazquez	Esteban	G-079-M
Venema	Bryan	A-110-M/S
Vernet	Maria	B-016-L/P
Vigil	Arturo	A-137-M
Virginia	Ross	B-259-M
Voigt	Donald	I-205-M
Wagner	Wolfgang	A-130-S
Walker	Gabrielle	W-223-M
Wall	Diana	B-259-M
Walpole	Peter	A-137-M
Walter	Michael	A-130-S
Ward	Bess	B-310-M

Waszkiewicz	Michael	I-191-M
Waterfield	John	A-137-M
Waterson	Elizabeth	B-045-L/P
Weaver	Fred	G-083-N
Webb	Spahr	G-135-E
Wefel	Mark	A-145-M
Weidner	George	O-283-M
Weintraub	Lawrence	A-033-S
Welch	Kathleen	B-420-M
Wellner	Julia	G-083-N
Wells	Mark	B-310-M
Wendricks	Tony	A-333-S
Westby	George	B-266-N
Whorton	Erin	I-139-M
Wiedemann	Christin	A-333-S
Wilcock	William	G-135-E
Williams	Isabelle	B-281-L
Williamson	Bruce	I-191-M
Willis	Mike	G-079-M
Wilson	Terry	G-079-M
Wise	Sherwood	G-083-N
Witteborn	Fred	A-103-S
Woschnagg	Kurt	A-333-S
Wright	Gregory	A-371-S
Wujcik	Jody	B-036-L/P
Wujcik	Jody	B-036-L/P
Yamamoto	Akira	A-140-M
Yang	Chi	B-421-M
Yeck	James	A-333-S
Yngvesson	Sigfrid	A-371-S
Yochem	Pamela	B-009-M
Yoon	Kiwon	A-033-S
Yoshida	Tetsuya	A-140-M
Zadeh	Holley	B-424-M
Zenteno-Savin	Tania	B-197-M
Zieg	Michael	G-056-M
Zinn	Shun	A-137-M
Zook	Robert	B-010-M
de la Pena	Santiago	A-284-S
del Valle	Daniela	B-002-N

Top of Page

Scouting in Antarctica

NSF Contact:

Guy G. Guthridge
National Science Foundation
4201 Wilson Blvd.
Arlington, VA 22230
703.292.7414
gguthrid@nsf.gov

Cooperative programs between the National Science Foundation and America's two major scouting organizations, Girl Scouts of the USA and Boy Scouts of America, sponsor a national competition every two years to select a scout for participation in the United States Antarctic Program.

The goal is to acquaint the boy or girl scout with a variety of science disciplines and with career opportunities in polar research and operational support. The scout, through scouting publications and sites on their home pages, shares his or her Antarctic experience with the many other members of the two scouting groups. Inclusion of a scout in the USAP began when Paul Siple joined Richard E. Byrd's expedition 70 years ago.

For the 2004-2005 season Devon Vail of Fairbanks has been selected. Ms. Vail has completed the freshman year at University of Alaska, Fairbanks, where she is majoring in biology. The daughter of military parents, Devon graduated in 2003 from Robert D. Edgren High School, Misawa Air Base, Japan. During High School she worked in the ophthalmology clinic at the local hospital and was the only student in the school's history to take the Science Research class by telecommunication. As a scout she studied rivers for pollution based on macro-invertebrate population for which she received a Gold Award. She was awarded the Gold Medal for Community Service from Prudential Youth Spirit and has received a variety of recognitions for her achievements in mathematics, calculus, science and volunteer work.

Ms Vail will work at McMurdo and surrounding field camps from October 2004 through January 2005. She will join science events whose PIs or project leaders have volunteered to integrate her into their teams for several weeks.

Devon Vail
P.O. Box 750506
Fairbanks, AK 99775

Next season, the opportunity will go to a Boy Scout.

Top of Page

NSF Contact:

Peter West, Public Affairs Officer
Office of Legislative and Public Affairs
National Science Foundation
pwest@nsf.gov

4201 Wilson Blvd., Room 1245
Arlington, VA 22230
703.292.8070

Each year the National Science Foundation selects a limited number of journalists to visit USAP research stations and report on the scientific work being done. The program's goal is inform American taxpayers about the publicly supported program. Without NSF support, these visits would be difficult or impossible since there is no commercial transportation to the continent or within it.

Public affairs officers from NSF's Office of Legislative and Public Affairs (OLPA) assist reporters during their stay in Antarctica. Many reporters maintain their interest in the program for years after they visit the southernmost continent. A reporter may join a research cruise or spend an extended time at a field camp. They may focus on research in a particular discipline, pursue a broader interest in the science program as a whole, or concentrate on a specific project taking place that season.

The Antarctic "group media tour" of the past has been replaced by individual visits, and there are many more requests than can be met. Journalists apply to the program by proposing a reporting plan based on ideas often developed in conjunction with OLPA's staff. Candidates are selected on a competitive basis by a committee drawn from OLPA and the Office of Polar Programs (OPP). The program is open to media professionals and representatives from a variety of media may be selected in a given year.

Top of Page

2004-2005 USAP Field Season

McMurdo Station

Table of Contents | List projects by PI | List projects by program | List projects by institution | List projects by station | List projects by event number digits | List deploying team members

Event #	Award	PI Last Name	PI First Name	Project Title
B-031-M	NSF/OPP Award 01-25608	Ainley	David	Geographic structure of Adélie penguin populations: Demography of population expansion
I-205-M	NSF/OPP Award 02-29629	Anandakrishnan	Sridhar	Tidal modulation of ice stream flow
W-217-M	Artist/Writer Program	Arthus-Bertrand	Yann	Mission Antarctica
O-251-M	NSF/OPP Award 04-11437	Avallone	Linnea	In situ measurements of halogen oxides in the Troposphere
A-120-M/S	NSF/ATM (Division of Atmospheric Sciences) 00-00315	Bieber	John	Solar and heliospheric studies with antarctic cosmic rays
I-187-M	NSF/OPP Award 03-38189	Borns	Harold	West antarctic ice sheet stability
B-015-M	NSF/OPP Award 02-16043	Bowser	Samuel	Remotely operable micro environmental observatory for antarctic marine biology research
B-199-M	NSF/OPP Award 01-30417	Castellini	Michael	Effects of foraging on the lipid biochemistry of freely diving Weddell seals
B-300-M	NSF/OPP Award 03-38260	Chin	Yu-Ping	Biogeochemistry of dissolved organic material in Pony Lake, Ross Island
B-330-M	NASA ASTEP (Astrobiology Science and Technology for Exploring Planets) 02-0040-0014	Conrad	Pamela	SPISE3: A non-contact instrument suite for rapid detection of chemical biosignatures
B-005-M	NSF/OPP Award 02-31006	DeVries	Arthur	Antifreeze proteins in antarctic fishes: Integrated studies of freezing environments and organismal freezing avoidance, protein-structure and mechanism, genes and evolution
O-316-M	NSF/OPP Award 03-38226	Dempsey	John	Physics and mechanics of the breakup of warm antarctic sea ice: In-situ experiments and modeling
A-131-M	NSF/OPP Award 02-	Deshler	Terry	Measurements addressing quantitative ozone loss, polar stratospheric cloud nucleation, and large polar stratospheric

	30424			particles during austral winter and spring
B-426-M	NSF/OPP Award 98-10219	Doran	Peter	McMurdo Dry Valleys LTER (Long Term Ecological Research)
B-027-M	NSF/OPP Award 01-25893	Dye	Timothy	Culture and health in Antarctica: Year 3
B-034-M	NSF/OPP Award 01-25098	Emslie	Steven	Occupation history and diet of Adélie penguins in the Ross Sea region
A-102-M/S	NSF/OPP Award 02-33169	Engebretson	Mark	Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites
B-425-M	NSF/OPP Award 98-10219	Fountain	Andrew	McMurdo Dry Valleys LTER (Long Term Ecological Research)
A-100-M	NSF/OPP Award 01-38126	Fraser-Smith	Antony	The operation of an ELF/VLF radiometer at Arrival Heights
B-009-M	NSF/OPP Award 02-25110	Garrott	Robert	Patterns and processes: Dynamics of the Erebus Bay Weddell seal population
W-219-M/S	Artist/Writer Program	Glasberg	Elena	End as beginning: An American antarctic imaginary
B-268-M	NSF/OPP Award 03-38267	Gooseff	Michael	Hydrologic controls over biogeochemistry and microbial community structure and function across terrestrial/aquatic interfaces in a polar desert
I-139-M	NSF/OPP Award 02-30338	Hallet	Bernard	Mechanics of dry-land calving of ice cliffs
O-314-M	NSF/DBI (Division of Biological Infrastructure) 01-19793	Hansen	Anthony	Solar / wind powered instrumentation module development for polar environmental research
G-058-M	NSF/OPP Award 99-80452	Harvey	Ralph	The Antarctic Search for Meteorites (ANSMET)
A-110-M/S	NSF/OPP Award 02-29251	Hernandez	Gonzalo	Austral high-latitude atmospheric dynamics
I-141-M	NSF/OPP Award 02-30197	Holt	John	Airborne Geophysical survey of the Amundsen Sea Embayment, Antarctica (AGASEA)
G-295-M	NSF/EAR (Division of Earth Sciences) 03-21760	Johns	Bjorn	UNAVCO Geodetic GPS Support
G-078-M	NSF/DOD agreement	Kemerait	Robert	Dry Valley seismic project
	SGER (Small Grant for			Temporal variability in natural and anthropogenic disturbance of

B-518-M	Exploratory Research)	Kennicutt	Mahlon	McMurdo Station
B-010-M	NSF/OPP Award 01-26319	Kim	Stacy	Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic
I-191-M	NSF/OPP Award 02-28052	Kreutz	Karl	Dry Valleys Late Holocene climate variability
G-081-M	NSF/OPP Award 02-29305	Kyle	Philip	Mount Erebus Volcano Observatory and Laboratory (MEVOL)
B-259-M	NSF/OPP Award 02-29836	Lyons	W. Berry	Soil biodiversity and response to climate change: A regional comparison of Cape Hallett and Taylor Valley
B-420-M	NSF/OPP Award 98-10219	Lyons	W. Berry	McMurdo Dry Valleys LTER (Long Term Ecological Research)
I-190-M	NSF/OPP Award 02-29546	MacAyeal	Douglas	Collaborative research of Earth's largest icebergs
B-006-M	NSF/OPP Award 01-30398	Manahan	Donal	Energetics of protein metabolism during development of antarctic echinoderms
G-054-M	NSF/OPP Award 03-38291	Marchant	David	Age, origin, and climatic significance of buried ice in the western Dry Valleys
B-029-M	NSF/OPP Award 02-38281	Marsh	Adam	CAREER: Genomic networks for cold-adaptation in embryos of polar marine invertebrates
G-056-M	NSF/OPP Award 02-29306	Marsh	Bruce	Magmatism in the Dry Valleys: A workshop
B-421-M	NSF/OPP Award 98-10219	McKnight	Diane	McMurdo Dry Valleys LTER (Long Term Ecological Research)
A-140-M	NSF/NASA agreement	Mitchell	John	Balloon-borne Experiment with a Superconducting Spectrometer (BESS)
A-255-M/S	NSF/OPP Award 02-30370	Murcray	Frank	Infrared measurements of atmospheric composition over Antarctica
B-321-M/S	NSF/OPP Award 00-90343	Palinkas	Lawrence	Prevention of environment-induced decrements in mood and cognitive performance
B-289-M	NSF/OPP Award 03-38428	Pitman	Robert	Genetic and photogrammetric investigations of three ecotypes of Killer whales in the southern Ross Sea
B-197-M	NSF/OPP Award 02-29638	Ponganis	Paul	Diving physiology and behavior of Emperor penguins
B-195-M	NSF/MCB (Division of Molecular	Priscu	John	Microbial diversity and function in the permanently ice-covered

	and Cellular Biosciences) 02-37335			lakes of the Dry Valleys
B-422-M	NSF/OPP Award 98-10219	Priscu	John	McMurdo Dry Valleys LTER (Long Term Ecological Research)
G-076-M	NSF/OPP Award 03-38224	Putkonen	Jaakko	Stability of landscapes and ice sheets in Dry Valleys: A systematic study of exposure ages of soils and surface deposits
W-218-M/S	Artist/Writer Program	Rogers	Susan Fox	Antarctic Anthology
A-137-M	NSF/NASA agreement	Seo	Eun-Suk	Cosmic Ray Energetics And Mass (CREAM)
B-047-M	NSF/OPP Award 00-87401	Smith	Walker	Interannual Variability in the Antarctic-Ross Sea (IVARS): Nutrients and seasonal production
A-145-M	NSF/NASA agreement	Stepp	Bill	Long Duration Balloon (LDB) program
I-175-M/S	NSF/OPP Award 02-21394	Stone	John	Late Quaternary history of Reedy Glacier
I-345-M	NSF/OPP Award 03-38295	Tulaczyk	Slawek	Is Kamb Ice Stream restarting? Glaciological investigations of the bulge-trunk transition on Kamb Ice Stream, West Antarctica
B-011-M	NSF/OPP Award 02-30237	Uhle	Maria	Biogeochemistry of Victoria Land coastal ponds: Role in terrestrial ecosystem organic carbon dynamics and structure
B-423-M	NSF/OPP Award 98-10219	Virginia	Ross	McMurdo Dry Valleys LTER (Long Term Ecological Research)
W-223-M	Artist/Writer Program	Walker	Gabrielle	Antarctica: The biography of a continent
B-424-M	NSF/OPP Award 98-10219	Wall	Diana	McMurdo Dry Valleys LTER (Long Term Ecological Research)
B-310-M	NSF/OPP Award 02-30276	Ward	Bess	What limits denitrification and bacterial growth in Lake Bonney, Taylor Valley?
O-201-M	NSF/OPP Award 00-03826	Warren	Stephen	Solar radiation on the East Antarctic Plateau
A-111-M/S	NSF/OPP Award 03-38105	Weatherwax	Allan	Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions
A-112-M	NSF/OPP Award 03-41470	Weatherwax	Allan	Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIN): A new vision for global studies
G-079-M	NSF/OPP Award 02-30285	Wilson	Terry	Transantarctic Mountains deformation network: GPS measurements of neotectonic motion in the antarctic interior

Top of Page

2004-2005 USAP Field Season

Amundsen-Scott South Pole Station

Event #	Award	PI Last Name	PI First Name	Project Title
A-123-S	NSF/OPP Award 03-38219	Besson	Dave	RICE - Radio Ice Cherenkov Experiment
A-120-M/S	NSF/ATM (Division of Atmospheric Sciences) 00-00315	Bieber	John	Solar and heliospheric studies with antarctic cosmic rays
A-369-S	NSF/OPP Award 03-37635	Bristow	William	South Pole SuperDARN (Super Dual Auroral Radar Network)
G-090-P/S	NSF/EAR (Division of Earth Sciences) 00-04370	Butler	Rhett	Global seismograph station at Palmer and South Pole stations
A-103-S	NSF/OPP Award 01-26313	Caldwell	Douglas	A search for extrasolar planets from the South Pole
A-379-S	NSF/OPP Award 01-30612	Carlstrom	John	South Pole observations to test cosmological models
A-366-S	NSF/OPP Award 03-38138	Church	Sarah	Next generation CMB polarization measurements with the QUEST experiment on DASI
I-355-S	NSF/OPP Award 03-37933	Cole-Dai	Jihong	Investigating atmospheric chemistry through oxygen and sulfur isotopes in volcanic sulfate from South Pole ice cores
A-117-S	US/Japan agreement	Ejiri	Masaki	All-sky imager at South Pole
A-102-M/S	NSF/OPP Award 02-33169	Engebretson	Mark	Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites
A-333-S	NSF/OPP Award 02-36449, 03-31873	Halzen	Francis	IceCube
A-110-M/S	NSF/OPP Award 02-29251	Hernandez	Gonzalo	Austral high-latitude atmospheric dynamics
O-257-S	NSF/NOAA agreement	Hofmann	David	South Pole monitoring for climatic change: US Department of Commerce NOAA climate monitoring and diagnostic laboratory
	NSF/OPP			

A-378-S	Award 02-32009	Holzapfel	William	High resolution observations of the CMB with ACBAR
A-108-S	NSF/OPP Award 00-93381	Inan	Umran	A VLF beacon transmitter at South Pole (2001-2004)
O-204-P/S	NSF/ATM (Division of Atmospheric Sciences) 00-00923	Keeling	Ralph	A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems
A-033-S	NSF/OPP Award 02-30438	Lange	Andrew	Background Imaging Of Cosmic Extragalactic Polarization (BICEP)
A-136-S	NSF/OPP Award 01-32576	Lessard	Marc	A proposal for the measurement and analysis of extremely low frequency waves at South Pole Station
A-362-S	NSF/OPP Award 02-16279	Lessard	Marc	Development of an Autonomous Real-time Remote Observatory (ARRO)
A-104-S	NSF/OPP Award 02-30428	Mende	Stephen	Dayside auroral imaging at South Pole
A-130-S	NSF/OPP Award 03-37726	Morse	Robert	AMANDA 2004 (Antarctic Muon and Neutrino Detector Array)
A-255-M/S	NSF/OPP Award 02-30370	Murcray	Frank	Infrared measurements of atmospheric composition over Antarctica
B-321-M/S	NSF/OPP Award 00-90343	Palinkas	Lawrence	Prevention of environment-induced decrements in mood and cognitive performance
A-284-S	NSF/ATM (Division of Atmospheric Sciences) 03-36946	Palo	Scott	Dynamics of the antarctic MLT region using ground-based radar and TIMED instrumentation
A-375-S	NSF/OPP Award 03-42448	Peterson	Jeffrey	PAST: The Primeval Structure Telescope
W-221-S	Artist/Writer Program	Samaras	Connie	Vast active living intelligence system: Photographing the South Pole
O-275-P/S	NSF/DOE agreement	Sanderson	Colin	Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab
A-129-S	NSF/OPP Award 03-37618	Sivjee	Gulamabas	The antarctic investigations of upper atmospheric disturbances over the South Pole Station
A-377-S	NSF/OPP Award 00-94605	Stacey	Gordon	Wide-field imaging spectroscopy in the submillimeter: Deploying SPIFI on AST/RO
A-371-S	NSF/OPP Award 01-26090	Stark	Antony	Continued operation of the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO)

A-111-M/S	NSF/OPP Award 03-38105	Weatherwax	Allan		Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions

Top of Page

2004-2005 USAP Field Season

Palmer Station

Event #	Award	PI Last Name	PI First Name	Project Title
G-090-P/S	NSF/EAR (Division of Earth Sciences) 00-04370	Butler	Rhett	Global seismograph station at Palmer and South Pole stations
B-003-P	NSF/OPP Award 02-30579	Day	Thomas	Response of terrestrial ecosystems along the Antarctic Peninsula to a changing climate
B-045-L/P	NSF/OPP Award 02-17282	Ducklow	Hugh	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
B-013-L/P	NSF/OPP Award 02-17282	Fraser	William	Long-Term Ecological Research (LTER) on the antarctic marine ecosystem: Climate migration, ecosystem response and teleconnections in an ice-dominated environment (seabird component)
B-198-P	NSF/OPP Award 02-17282	Fraser	William	Monitoring the effects of tourism and environmental variability on Adélie penguins at Palmer Station
O-264-P	NSF/NOAA agreement	Hofmann	David	Collection of atmospheric air for the NOAA/CMDL worldwide flask sampling network
B-114-L/P	NSF/OPP Award 02-34249	Hollibaugh	James	Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER study area
A-306-P	NSF/OPP Award 02-33955	Inan	Umran	Global thunderstorm activity and its effects on the radiation belts and the lower Ionosphere
O-204-P/S	NSF/ATM (Division of Atmospheric Sciences) 00-00923	Keeling	Ralph	A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems
B-256-P	NSF/OPP Award 03-37656	Lee	Richard	Physiological and molecular mechanisms of stress tolerance in a polar insect
W-220-P	Artist/Writer Program	Nutter	Judith	Time, place, and imagination: Images and poems from Antarctica
B-028-L/P	NSF/OPP Award 02-17282	Ross-Quetin	Robin	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
O-275-P/S	NSF/DOE agreement	Sanderson	Colin	Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab
B-032-L/P	NSF/OPP Award 02-17282	Smith	Raymond	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

B-016-L/P	NSF/OPP Award 02-17282	Vernet	Maria	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
A-357-P	NSF/OPP Award 03-41861	Zesta	Eftyhia	Extending the South American Meridional B-field Array (SAMBA) to auroral latitudes in Antarctica

Top of Page

2004-2005 USAP Field Season
Research Vessel/Icebreaker Nathaniel B Palmer

(RV/IB NBP)

Event #	Award	PI Last Name	PI First Name	Project Title
G-083-N	NSF/OPP Award 01-25922	Anderson	John	SHALDRIL: A demonstration drilling cruise to the James Ross Basin
O-315-N	NSF/OPP Award 03-38103	Firing	Eric	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Nathaniel B. Palmer
B-207-N	NSF/OPP Award 01-25833	Gast	Rebecca	Comparative and quantitative studies of protistan molecular ecology and physiology in coastal antarctic waters
B-206-N	NSF/OPP Award 01-26150	Goes	Joaquim	Ultraviolet radiation induced changes in the patterns of production and biochemical composition of antarctic marine phytoplankton
O-215-N	NSF/OPP Award 01-25172	Gordon	Arnold	ANSLOPE: Cross slope exchanges at the antarctic slope front
B-200-N	NSF/OPP Award 01-27022	Jeffrey	Wade	Interactive effects of UV and vertical mixing on phytoplankton and bacterial productivity of Ross Sea Phaeocystis bloom
B-266-N	NSF/OPP Award 02-30499	Kieber	David	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea
B-002-N	NSF/OPP Award 02-30497	Kiene	Ronald	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea
B-203-N	NSF/OPP Award 01-27037	Neale	Patrick	Interactive effects of UV and vertical mixing on phytoplankton and bacterioplankton in the Ross Sea
G-071-N	NSF/OPP Award 03-38317	Stock	Joann	Collection of marine geophysical data on transits of the R/V Nathaniel B. Palmer
B-280-N	International Whaling Commission	Thiele	Deborah	International Whaling Commission Southern Ocean Collaboration Program: Cetacean ecology, acoustic detection and sea ice habitat

Top of Page

2004-2005 USAP Field Season
Research Vessel Laurence M Gould

(R/V LMG)

Table of Contents | List projects by PI | List projects by program | List projects by institution | List projects by station | List projects by event number digits | List deploying team members

Event #	Award	PI Last Name	PI First Name	Project Title
O-317-L	NSF/OPP Award 03-38103	Chereskin	Teresa	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Laurence M. Gould
B-045-L/P	NSF/OPP Award 02-17282	Ducklow	Hugh	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
O-271-L	NSF/OCE (Division of Ocean Sciences) 02-42139	Emerson	Steven	Tracers of biological productivity and gas exchange
B-013-L/P	NSF/OPP Award 02-17282	Fraser	William	Long-Term Ecological Research (LTER) on the antarctic marine ecosystem: Climate migration, ecosystem response and teleconnections in an ice-dominated environment (seabird component)
B-281-L	NSF/OPP Award 03-38218	Halanych	Kenneth	Relevance of planktonic larval dispersal to endemism and biogeography of antarctic benthic invertebrates
B-239-L	NSF/OPP Award 99-10007	Hildebrand	John	Mysticete whale acoustic census in the GLOBEC west antarctic project area
B-114-L/P	NSF/OPP Award 02-34249	Hollibaugh	James	Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER study area
B-307-L	NSF/OPP Award 03-38290	Kremer	Patricia	Salpa thompsoni in the Southern Ocean: Bioenergetics, population dynamics and biogeochemical impact.
B-021-L	NSF/OPP Award 02-17282	Martinson	Douglas	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
B-028-L/P	NSF/OPP Award 02-17282	Ross-Quetin	Robin	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
B-032-L/P	NSF/OPP Award 02-17282	Smith	Raymond	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.
O-260-L	NSF/OPP Award 00-03618	Sprintall	Janet	The Drake Passage high density XBT / XCTD program
O-214-L	NSF/OPP Award 03-38248	Takahashi	Taro	Processes driving spatial and temporal variability of surface PCO2 in the Drake Passage
B-016-	NSF/OPP			Palmer Long Term Ecological Research Project (PLTER): Climate migration,

L/P	Award 02-17282	Vernet	Maria	ecological response and teleconnections in an ice-dominated environment.

Top of Page

Four USAP-supported Antarctic deep-field camps will be used by McMurdo-based researchers.

Byrd Surface Camp

80° 05' S, 119° 32' W

Byrd Surface Camp will support Charles Stearns' automatic weather stations (O-283-M) and John Holt's airborne geophysical survey (I-141-M). The primary function of this camp is to serve as a fueling station to assist LC-130 aircraft operations to Pine Island and Thwaites Glacier. Three resident staff will operate this camp.

Siple Dome

81° 39' S, 149° 04' W

Siple Dome will support two science groups: Sridhar Anandakrishnan (I-205-M) and Slawek Tulaczyk (I-345-M). This camp will operate as a logistical hub and staging area for these two science groups. Two resident staff will operate this camp.

Thwaites Glacier Camp

79° 30' S, 118° 30' W

Thwaites Glacier Camp will support one science group, John Holt (I-141-M). The camp will operate as a logistical hub for Twin Otter operations. Five resident staff will operate this camp.

Pine Island Camp

77° 34.2' S, 95° 55.8' W

Pine Island Camp will be a collaboration project between USAP and the British Antarctic Survey (BAS). Pine Island will support one USAP science group, John Holt (I-141-M). The camp will operate as a logistical hub for Twin Otter operations for BAS and a supplemental hub for the Holt group. Two resident USAP staff and six BAS staff will operate this camp.

Top of Page

McMurdo Station Air Operations

Table of Contents | Project Indexes | Station Schedules | Technical Events | Event Numbering System

McMurdo-based aircraft (Helicopters, Twin Otter and LC-130 fixed-wing aircraft) will continue to support USAP researchers and program logistical functions.

Petroleum Helicopters Inc. (PHI) will provide helicopter support with four helicopters (two AS-350-B2 “A-Stars” and two Bell 212s) based out of McMurdo Station. They will support researches in the McMurdo Dry Valleys, Royal Society Range and on Ross Island.

http://www.phihelico.com/

New York Air National Guard will provide re-supply and research support to South Pole Station. They will support research activities at Siple Dome, Byrd Surface Camp, Thwaites Glacier Camp, Pine Island Camp, and Beardmore Glacier.

http://www-105aw.ang.af.mil/

Twin Otter aircraft, operated by Kenn Borek Air will be used by a number of projects throughout the USAP area of operations.

http://www.borekair.com/

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-031-M

NSF/OPP Award 01-25608

Station: McMurdo Station

RPSC POC: Melissa Rider

Research Site(s): Cape Bird, Cape Crozier, Cape Royds, Beaufort Island, Franklin Island, Terra Nova Bay

Dates in Antarctica: Early November to early February

Geographic structure of Adélie penguin populations: Demography of population expansion

Dr. David G. Ainley
H.T. Harvey & Associates
dainley@penguinscience.com
http://www.penguinscience.com

Geographic structure of Adelie Penguin populations: Demography of population expansion.

Deploying Team Members: David G. Ainley . Grant Ballard . Jennifer Bloom . Katie Dugger . Chris McCreedy . Viola Toniolo

Research Objectives: For several years now, this group has studied Adélie penguins. Specifically, they investigate the mechanisms responsible for the geographic structuring, the founding of new colonies, and the recent population expansion of the Adélie penguins of Ross and Beaufort Islands. It is an isolated group that comprises a single 'metapopulation' of interacting colonies. Population expansion in a similar fashion has been occurring throughout the Ross Sea, where 30% of this species' World population resides, and is in some way related to ameliorating climate.

Only one of the colonies is limited by nesting space (Beaufort Island) and project researchers have shown how sea-ice extent and concentration affect diet, foraging effort (and ultimately chick growth and survival), and over-winter survival. The largest colony (Cape Crozier) affects the foraging patterns of smaller ones within foraging range and, perhaps ultimately, the sizes of those smaller colonies.

Researchers hypothesize, first, that age structure of the Cape Crozier colony has changed since the 1960s and 1970s when populations were declining, and does not represent the smaller colonies which have been growing much more rapidly. Based on recent analyses, researchers propose, second, that the Ross Island penguins winter in a narrow band of sea ice north of the Antarctic Circle (where daylight persists) and south of the southern boundary of the Antarctic Circumpolar Current (where food abounds). More extensive winter ice takes the penguins north of that boundary, with naïve juveniles incurring higher mortality than experienced adults. Finally, researchers hypothesize that higher annual mortality of adults from Cape Royds, the southernmost colony of all, and smallest in the study, is because of their late nesting season and subsequent problems with autumn sea-ice freeze up.

The extreme sensitivity of Adélie Penguins to climate change has been noted by geologists and glaciologists, as well as biologists. Not surprisingly the Adélie penguin is one of the most often studied wild vertebrates on earth. Therefore, understanding more thoroughly the demographic mechanisms behind this species' sensitivity to climate change will contribute greatly to the recent, wide-spread interest in understanding the effects of climate change on antarctic marine organisms.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-205-M
NSF/OPP Award 02-29629

Station: McMurdo Station
RPSC POC: Charles Kaminski
Research Site(s): Siple Dome, South Pole Station
Dates in Antarctica: Mid November to early January

Tidal modulation of ice stream flow

Dr. Sridhar Anandakrishnan

Pennsylvania State University
Dept. of Geosciences, EMS Environment Institute
sak@essc.psu.edu
http://www.geosc.psu.edu/~sak/Tides

Photo not available.

Deploying Team Members: Sridhar Anandakrishnan . Robert A. Bindschadler . Huw Horgan . Ian R. Joughin . Leo Peters . Donald E. Voigt

Research Objectives: Ice from the West Antarctic Ice Sheet (WAIS) flows to the sea through a number of ice streams but the factors controlling the flow of the ice streams are not well understood. Prior work demonstrated the surprisingly sensitive response of the Siple Coast ice streams' flow speed to tide height beneath the Ross Ice Shelf.

Measuring the response of the ice streams to the rise and fall of the tide is an excellent natural experiment that researchers can use to improve understanding of controls on the ice streams, and improve their to model the WAIS. To measure in detail the flow-speed response to tidal forcing project team members will install an array of GPS receivers on the ice plain of Whillans Ice Stream up to tributaries B2 and B1. They will conduct ground geophysics (seismics and radar) in conjunction with GPS to continuously monitor the state of the base of ice stream.

This second season of the TIDES project will focus on the high frequency, fine scale motion of Whillans Ice Stream. Working in two groups, Team One will operate from Siple Dome to install the "backbone" array of GPS receivers and cache snowmobiles, sleds, science equipment and fuel at B140 and B010 for use by Team Two. Team Two will conduct ground geophysical experiments at B140 including a tight GPS array, a seismic array, and ground radar at various locations on the ice plain of Whillans Ice Stream. At the end of the field season, Team Two will retrieve the backbone array and retro all equipment and trash to Siple Dome for return to McMurdo.

Improved knowledge of ice-stream behavior will contribute to researchers' ability to assess the potential for rapid ice-sheet change affecting global sea levels. Results will be disseminated through scientific publications and talks at professional meetings, as well as contacts with the press, university classes, visits to schools and community groups, and other activities.

Top of Page

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-083-N

NSF/OPP Award 01-25922

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Ashley Lowe
Research Site(s): Off the coast of Seymour Island, Antarctic Peninsula
Dates in Antarctica: Mid February to mid April

SHALDRIL: A demonstration drilling cruise to the James Ross Basin

Dr. John B. Anderson
Rice University
Earth Science Department
johna@ruf.rice.edu
http://www.arf.fsu.edu/shaldril.cfm

Photo not available.

Deploying Team Members: John B. Anderson . Steve Bohaty . Matthew Curren . Donovan Dums . Lindsey Geary . David C. Heroy . Wesley C., II Ingram . Katherine Morse Kirsch . Patricia L. Manley . Bradley Michalchuk . Russell Tyler Smith . Mathew S. Sumner . Kristy Tramp . Fred M. Weaver . Julia S. Wellner . Sherwood Wise

Research Objectives: For over three decades, U.S. scientists and their international colleagues exploring the shallow shelves and seas along the margins of Antarctica have been consistently frustrated by their inability to penetrate through the over-compacted glacial diamictons encountered at shallow subbottom depths (within the upper 10 meters) over these terrains. This is particularly frustrating because advanced high resolution seismic reflection techniques clearly show in many areas the presence of older successions of Neogene and even Paleogene sequences lying just beneath this thin veneer of diamictons. Until the means are developed to recover these sequences, a detailed history of the antarctic ice sheets, which is an essential prerequisite to understanding Cenozoic paleoclimates and future climate change on a global scale, will remain an elusive and unobtainable goal.

After four years of study and evaluation with the aid of a professional engineer (and over the course of two workshops), the SHALDRIL Committee, an interested group of U.S. scientists, has identified at least two diamond coring systems deemed suitable for use on existing ice-breaking U.S. Antarctic Research Program vessels. The project will employ one of these systems (to be determined) on the R/V Nathaniel B. Palmer in order to test and demonstrate the feasibility of both ship-based diamond coring and downhole logging. For this demonstration cruise project team members will core along a high-resolution seismic reflection dip line off Seymour Island in the Antarctic Peninsula, an area of high scientific interest in its own right. Here the well-defined geologic section is estimated to range from Eocene to Quaternary in age, effectively spanning the "Greenhouse-Icehouse" transition in the evolution of antarctic/global climate. A complete record of this transition has yet to be obtained anywhere along the antarctic margin. Researchers expect to be able to correlate the record we obtain with detailed fluctuations of the ice margin recorded at higher latitudes in the eastern Ross Sea by the recently concluded fast-ice-based Cape Roberts Project.

If successful, this mobile and flexible drilling system will then be available to the broader scientific community for further exploration of the present gap that currently exists in technical capabilities to explore the antarctic shelves between the shore-line/fast-ice margin and the continental slope. SHALDRIL will operate effectively in the "no man’s land" that presently exists between the nearshore (where the fast-ice-based Cape Roberts Project was successful) and the upper slope (where ODP’s JOIDES Resolution becomes most efficient). This technological breakthrough will not only allow major outstanding scientific problems of the last three decades to be addressed, but will also favorably impact many current U.S. and SCAR (ICSU Scientific Committee on Antarctic Research) Antarctic or drilling-related initiatives, such as WAIS, ANTIME, ANDRIL, ANTEC, IMAGES, PAGES, GLOCHANT (including PICE), MARGINS, ODP, and STRATAFORM.

Top of Page

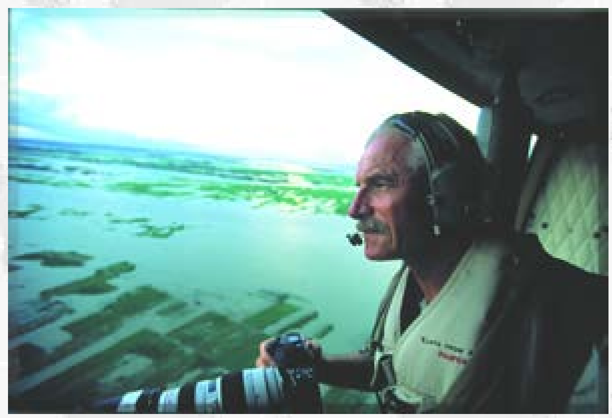
Artists & Writers

Mr. Guy Guthridge
Program Manager
Artist/Writer Program

W-217-M
Station: McMurdo Station
RPSC POC: Elaine Hood
Research Site(s): McMurdo Station, Dry Valleys
Dates in Antarctica: October

Mission Antarctica

Mr. Yann Arthus-Bertrand
assistant@yannarthusbertrand.com
http://www.yannarthusbertrand.com/



Yann Arthus-Bertrand.

Deploying Team Members: Yann Arthus-Bertrand

Research Objectives: Human interaction with nature is the subject of Yann Arthus Bertrand's work. Mr. Bertrand has devoted the previous decade of his career to capturing man's influence on the earth with his aerial photos. From the Brazilian rainforest to Japan, his photos show amazing beauty.

Yann Arthus Bertrand has undertaken to record the state of the planet. He has shown the photos he has taken in a book and in an art exhibit titled *Earth From Above*. Aerial photographs from the McMurdo area will be in his next *Earth From Above* book and exhibit. Mr. Bertrand is the author of over 40 books. His *Earth From Above* series is in partnership with UNESCO.

Mr. Bertrand will work out of McMurdo for approximately three weeks. He will photograph the Ross Island and Dry Valleys area from a helicopter.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-251-M
NSF/OPP Award 04-11437

Station: McMurdo Station
RPSC POC: Charles Kaminski
Research Site(s): Sea Ice
Dates in Antarctica: Mid August to mid November

In situ measurements of halogen oxides in the Troposphere

Dr. Linnea M. Avallone
University of Colorado Boulder
Laboratory for Atmospheric and Space Physics
avallone@lasp.colorado.edu
[No website]

Gannet Hallar adjusts an intake line for measurements of carbon dioxide and nitrogen oxides at Arrival Heights. Photo by Linnea Avallone.

Deploying Team Members: Linnea M. Avallone . Sean Michael Davis . Lars E. Kalnajs

Research Objectives: The phenomenon of sudden and complete boundary-layer (the part of the atmosphere closest to the surface) ozone loss has been observed at many northern high-latitude sites and more recently at sites in Antarctica. In the Arctic, ozone loss is, in part, related to pollution from the northern continents. Although the exact mechanisms remain uncertain, scientists have determined that there is also a link between active bromine (in part, from sea salt dissolved in surface snow) and low ozone on the large scale in the Arctic.

Considerably less is known about the mechanisms for sudden ozone losses in the Antarctic region. There is evidence for widespread bromine activation in coastal regions that seems to coincide with the average edge of the annual sea ice. It is important to study these events in Antarctica to help elucidate the role of pollution in low-ozone events.

This group undertook measurements of halogen oxides (ClO and BrO), ozone, and nitrogen oxides during the Winfly period (mid-August to October) of 2002 at McMurdo Station. The data, still being analyzed, revealed some quite surprising results that bear further investigation.

During this second research season at McMurdo, project team members will address the issues raised during the first study. Specifically, three questions will be asked:

+ How often is surface ozone at McMurdo affected by local pollution?

+ What reactive bromine compounds, in addition to BrO, are present and can we identify their source(s)?, and

+ How much is the snow surface directly impacting ozone?

The answer to each of these questions is important to achieving the broader goal of understanding the impact of natural halogen chemistry on boundary-layer ozone at high latitudes.

As sea-ice coverage changes in response to a changing climate, there may be attendant changes in the frequency and duration of boundary-layer ozone loss related to the availability of bromine gases derived from sea-salt. Gaining a more thorough understanding of the nature and mechanism(s) for boundary-layer ozone losses will enable better prediction of the impacts of future climate change on the chemical composition of the high latitude troposphere.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-123-S

NSF/OPP Award 03-38219

Station: South Pole Station

RPSC POC: Charles Kaminski

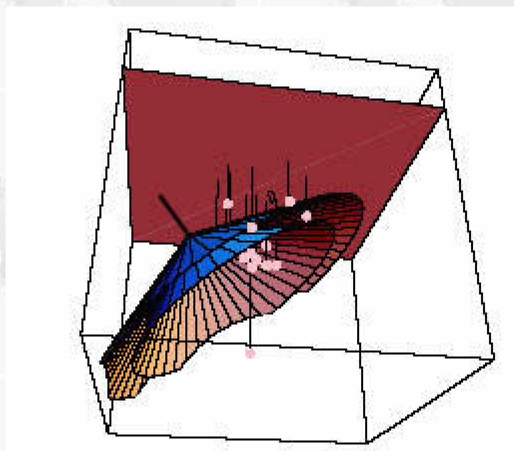
Research Site(s): MAPO

Dates in Antarctica: Maintenance in December, instruments operate continuously

---

RICE - Radio Ice Cherenkov Experiment

Dr. Dave Besson
University of Kansas Lawrence
Physics Department
dbesson@ku.edu
http://kuhep4.phsx.ukans.edu/~iceman



Geometry of radio detection.

Deploying Team Members: Dave Besson . Ilya V. Kravchenko

Research Objectives: Cosmic rays have historically been the source of much of our information about the extraterrestrial world. It is believed that among the most energetic cosmic rays are those which may be produced by massive black holes which could exist at the centers of some galaxies. These celestial accelerators, achieving energies 10E9 times higher than those made by humans, can produce protons, photons, and neutrinos. At the highest energies only the neutrino can elude the cosmic microwave background and penetrate, undeflected by magnetic fields, to Earth and yield a wealth of science when detected: Neutrinos may also resolve the question of the origin of greater than 10E19 eV (electron volt) cosmic rays observed by the AGASA (Akeno Giant Air Shower Array) experiment. As exciting as all of these opportunities are, perhaps the greatest intellectual merit of constructing a neutrino detector lies in the mysteries yet-to-be-discovered with a new technology operating in a new energy regime.

This project is a new experimental effort to detect ultra high-energy electron neutrinos through their interactions with ice molecules in the antarctic icecap, based on the principle of "radio coherence." Experimentally, project team members will measure a long-wavelength (radiofrequency) pulse resulting from this interaction.

RICE (‘Radio Ice Cherenkov Experiment’) has primary goals similar to the larger AMANDA (Bob Morse, A-130-S) experiment. Both seek to measure high-energy neutrinos by detection of Cherenkov radiation. Whereas AMANDA uses optical-based techniques, RICE uses radio-based techniques to detect compact electromagnetic cascades initiated by higher energy events.

The IceCube project (Halzen, A-333-S) presents a singular and not-to-be-repeated scientific opportunity to co-deploy radio receivers in IceCube holes, thereby scaling up RICE sensitivity to neutrinos by at least two orders of magnitude at minimal cost. By deploying three radio receiver “clusters” (two dual-polarization, high bandwidth antennas per cluster) per hole, researchers will also conduct world-class, in situ radioglaciology measurements, in addition to astrophysics.

RICE data from the last four years have allowed the most detailed study of in situ radio detection systematics thus far. RICE has demonstrated the radio technique’s viability, as well as its cost effectiveness. RICE has been an extremely successful vehicle for education both inside and outside the classroom. All of the RICE data and the reconstruction software is publicly accessible on the Internet.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

NSF/ATM (Division of Atmospheric Sciences) 00-00315

A-120-M/S

Station: McMurdo Station, South Pole Station

RPSC POC: Charles Kaminski

Research Site(s): USCG Polar Star, COSRAY, SkyLab

Dates in Antarctica: Calibration and maintenance in January, instruments operate continuously

---

Solar and heliospheric studies with antarctic cosmic rays

Dr. John Bieber
University of Delaware
Bartol Research Institute
john@bartol.udel.edu
http://www.bartol.udel.edu/~neutronm/

Solar and heliospheric studies with antarctic cosmic rays.

Deploying Team Members: Leonard Shulman

Research Objectives: Neutron monitors in Antarctica provide a vital three-dimensional perspective on the anisotropic flux of cosmic rays that continuously bombards the earth. At McMurdo and South Pole stations, year-round observations of cosmic rays with energies upwards of one billion electron Volts will continue. These data will be used to advance our understanding of a variety of fundamental plasma processes occurring on the Sun and in interplanetary space.

Neutron monitor records, which begin in 1960 at McMurdo and 1964 at South Pole, will play a crucial role in efforts to understand the nature and causes of cosmic-ray and solar-terrestrial variations occurring over the 11-year sunspot cycle, the 22-year Hale cycle, and even longer time scales. At the other extreme, data from South Pole and McMurdo will be analyzed in concert with data from the "Spaceship Earth" neutron monitor network to understand variations associated with solar energetic particles which occur on time scales of minutes to hours. In a new application made possible by real-time data availability, the observations will also be used for space weather forecasting and specification

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-292-E

NSF/OPP Award 00-86665

Station: Special Project
RPSC POC: John Evans
Research Site(s): Capetown to Punta Arenas onboard the German icebreaker, R/V Polarstern
Dates in Antarctica: Mid January to early April

Origin and evolution of antarctic and deep-sea macroinfauna: Systematics and reproductive patterns of polychaetes

Dr. James A. Blake
University of Massachusetts
ENSR Marine & Coastal Center
jablake@ix.netcom.com
[No website]

Photo not available.

Deploying Team Members: James A. Blake . Lawrence W. Carpenter . Stacy Ann Doner

Research Objectives: This project is an interdisciplinary collaboration with German scientists onboard the German Icebreaker, R/V Polarstern. Researchers will address:

+ The origins of the deep-sea benthic fauna in relation to the antarctic shelf and linkages to the deep-sea faunas of the Atlantic and Pacific oceans;

+ Hypotheses proposed to explain high biodiversity in the deep sea;

+ Deep-sea benthic community structure in the Southern Ocean; and

+ Biological processes including reproduction and larval development of benthic invertebrates.

To deal with these themes of the overall international effort, Dr. Blake’s group will focus on seven polychaete families: Orbiniidae, Oweniidae, Paraonidae, Spionidae, Cirratulidae, Scalibregmatidae, and Opheliidae. Other polychaete families will be studied by other members of the team.

Continuing work begun in 2002 by ANDEEP I and II surveys, this project will collect data across South Orkney Islands, the deep Weddell Sea Basin, off Cape Norwegia, on the Scotia Arc, and off South Georgia Island. Samples will be collected with box corers, multiple corers, epibenthic sled (nets), and plankton nets. Samples will be carefully sieved using an elutriation technique to separate very small larval and postlarval polychaetes from the sediment. These will be studied alive, photographed, and preserved for further study in the laboratory. Some of these methods were originally tested at McMurdo Station by Dr. Blake in January 2000, and on a cruise to the Larsen Ice shelf (Weddell Sea) on the R/V Nathaniel B. Palmer in May 2000 and then fully refined on ANDEEP I and II.

There are very few data that address the origins of polychaetes in general in the Southern Ocean and even fewer for the families that are the subject of this program. These investigations will improve our understanding of these families as well as broader patterns of reproduction and larval dispersal in the deep sea. Members of the international team will compile a benthic community database that will also permit comparisons with deep-sea faunas in other parts of the world as a means to test hypotheses concerning high biodiversity in the deep sea.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager
NSF/OPP Award 02-29570

B-038-E/M
Station: M/E
RPSC POC: Melissa Rider
Research Site(s): Palmer Station and vicinity
Dates in Antarctica: March

Investigations on deterioration in the historic huts of Antarctica

Dr. Robert A. Blanchette
University of Minnesota
robertb@umn.edu
[No website]

Investigations on deterioration in the historic huts of Antarctica.

Deploying Team Members: Robert A. Blanchette . Benjamin W. Held

Research Objectives: During the first two decades of the 20th century, Europeans mounted scientific and exploratory expeditions to many parts of Antarctica. Base camps were abandoned once the expeditions were over, leaving behind thousands of artifacts, as well as the huts the explorers built for shelter and storage. Over the intervening 90 years, the extremes of the polar environment have actually protected some of the artifacts from rapid decay. More recently however, conservators have become concerned about the serious degradation of historical archaeological sites throughout the continent.

This season, project researchers will identify the microbial diversity associated with sites near Palmer Station. The study will evaluate microbes present in soils and in organic materials. These samples will provide cultures so that studies can be carried out on the biology and physiology of these unusual organisms in the laboratory. Research findings from this work will provide basic new knowledge on the microbes present at these sites and will elucidate decomposition processes in polar environments

Some of the gravest threats to the sites include

+ Wood in contact with the ground is being destroyed by a specific wood-destroying fungus. Various molds and cellulose-degrading fungi are attacking artifacts made of leather, textiles, and other organic materials.

+ Exterior wood is being degraded by nonbiological processes as well, including salt, ultraviolet radiation, and wind erosion.

+ Chemical damage within the huts is apparent, and the soils on the site are contaminated with aromatic hydrocarbons from petroleum products.

At three sites near Palmer Station, team members will collect soil samples and place experiments in the soil, buried to a depth of 5-10 centimeters. Then station personnel will retrieve the experiments once a year for the next two to three years. Retrieved materials will be placed in sterile bags and shipped to the principal investigator's home institution.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-187-M
NSF/OPP Award 03-38189

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Darling Ridge, Mercer Ridge
Dates in Antarctica: Mid December to late January

West antarctic ice sheet stability

Dr. Harold W. Borns

The University of Maine
Institute for Quarternary & Climate Studies

borns@maine.edu
[No website]

Photo not available.

Deploying Team Members: Robert Ackert . Harold W. Borns . Peter Braddock . Sujoy Mukhopadhyay

Research Objectives: The future behavior of the West Antarctic Ice Sheet (WAIS) is of interest because its potential effect on global sea levels. Because theWAIS is largely grounded below sea level, it is subject to gravitational collapse. This collapse may be on-going or it could be triggered by global warming. The goal of this project is to reconstruct past ice sheet elevations in the Ohio Range in the southernmost Transantarctic Mountains near the onset region of the Mercer Ice Stream (formerly Ice Stream A). Fieldwork will take place in the "Bottleneck", a unique, relatively narrow passage in the Transantarctic Mountains connecting the West and East Antarctic ice sheets. The location lies near the ice divide and is thus well situated to determine past interior ice elevation.

Data collected by team researchers will contribute to the development of time-dependent, non-equilibrium models of the WAIS, at and since the last glacial maximum 20,000 years ago, a major objective of the West Antarctic Ice Sheet Initiative. Age control on ice sheet elevation from this key location, near the head of the Mercer Ice Stream, will complete chronologic coverage extending from the ice age terminus in the Ross Sea, through McMurdo Sound and the southern Transantarctic Mountains, to the onset area near the ice divide.

Data along the entire length of this ice stream is critical to testing and calibrating the dynamic ice sheet models necessary to predict the future behavior of the ice sheet in response to climate changes. This research will therefore significantly improve understanding of ice sheet behavior. In addition, the glacial geologic record in the Bottleneck will reflect the history of the interaction of WAIS and EAIS (East Antarctic Ice Sheet), which could be used to test hypotheses of Pleistocene collapse of the WAIS.

Past ice sheet elevations will be determined by mapping moraines, erratics, and trimlines in the exposed ice-free areas. Project team members will collect samples from these geologic features for surface exposure dating using cosmogenic nuclides. Chronologic control of these features is essential if they are to be used to constrain dynamic models of the Mercer Ice Stream that hope to predict future ice sheet behavior.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-015-M

NSF/OPP Award 02-16043

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Explorers Cove, Lake Hoare
Dates in Antarctica: Early October to late January

Remotely operable micro environmental observatory for antarctic marine biology research

Dr. Samuel S. Bowser
New York State Department of Health
Division of Molecular Medicine
bowser@wadsworth.org
http://www.bowserlab.org

Photo not available.

Deploying Team Members: Jeffrey R. Blair . Samuel S. Bowser . Douglas Coons . Dennis Duling . Anthony D. Hansen . Henry Kaiser . Bruce Koci . Karen Henrichs Sterling

Research Objectives: Field research over the past two decades has yielded important insights into the ecological importance of giant (larger than 1 mm) foraminifera in McMurdo Sound. Unfortunately, the in situ behavior of these single-celled organisms and their interactions within the food web can be observed only in snapshotsduring summer dives, when algal production is at a maximum under 24-hour light. Much would be learned by observing foraminifera over extended periods, studying the organisms' mobility, response to food availability, and other directed behaviors. It is similarly important to extend observations to the winter months, studying these organisms in the dark, with no algal production, and to experimentally manipulate in situ conditions and observe the behavioral response.

Research diving requires costly support and cannot provide extended observation of individual organisms. Moreover, the logistical requirements, costs, complexities, and risks of winter diving at remote locations in Antarctica are prohibitive. However, human diving is not required to make long-term in situ observations. With modern technology and communications, it is feasible and practical to install video macro- and microview cameras in a submersible enclosure, transmitting both live and sequential time-lapse images over the Internet to a remote observer throughout the year. Such an instrumentation platform could also be used for experimental manipulation of the environment.

This project has developed a submersible, remotely operable underwater observatory for the study of foraminifera and associated benthic fauna. The observatory will be connected to onshore equipment by fiberoptic cable and linked by radio to the Internet for year-round access. The design and operation of this observatory is a technology template that will meet other year-round antarctic research requirements by means of telescience rather than personnel deployment.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-369-S
NSF/OPP Award 03-37635

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Instruments operate continuously

South Pole SuperDARN (Super Dual Auroral Radar Network)

Dr. William Bristow
University of Alaska Fairbanks
Geophysical Institute
Bill.Bristow@gi.alaska.edu
http://superdarn.jhuapl.edu

Photo not available.

Research Objectives: Super Dual Auroral Radar Network is an international network of high-frequency radar pairs used to study plasma convection in the ionosphere. By observing ionospheric plasma motion, a multitude of geophysical processes can be studied. These processes range from E-region plasma instabilities, to the relationships between auroral luminosity and electric fields, to the global-scale convective response to changes in the solar wind and interplanetary magnetic field. Each of these areas of study contributes to the overall goals of space physics: Developing an understanding of the coupling of energy from the solar wind into Earth's upper atmosphere and its effects on humans or human-made systems.

Each pair of these Doppler radars is capable of measuring a large-scale map (about four million square kilometers) in the F region of the ionosphere. Electric fields are generated in the outer regions of the earth's magnetosphere where the solar wind interacts with the earth's magnetic field. They are a direct measure of the transfer of energy from the solar wind to the earth.

The SuperDARN radars almost entirely cover the north and south poles. These radars can collect data and relay it around the world in real-time, which is essential for predictions or forecasts of space weather such as substorms which can damage or destroy power and communication systems. Data from the radar will be used, in conjunction with data from the rest of the SuperDARN network and the wealth of other space physics instruments in Antarctica, to study a variety of topics, including:

+ Responses of global convection to solar wind and IMF changes,

+ Plasma entry into, and exit from, the polar cap, and the accompanying response of the magnetotail, magnetospheric cusp response to changes in the solar wind,

+ The motions of plasma patches through the polar cap, mesospheric winds, and thermospheric gravity waves.

By establishing global-scale coverage in the southern hemisphere, the radar will help address questions about geomagnetic conjugacy and the differences caused by the asymmetry of solar illumination. The project includes direct participation from scientists in Canada, the USA, Britain, France, Japan, South Africa, and Australia, and associates in many other nations.

Top of Page

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-090-P/S
NSF/EAR (Division of Earth Sciences) 00-04370

Station: Palmer Station, South Pole Station

RPSC POC: Charlie Kaminski/ Rob Edwards

Research Site(s): Palmer Station, South Pole Station

Dates in Antarctica: Instruments operate continuously, project team deploys to South Pole late November to mid December

---

Global seismograph station at Palmer and South Pole stations

Dr. Rhett G. Butler
Incorporated Research Institutions for Seismology
Global Seismograph Network Program Manager
rhett@iris.edu
http://www.iris.edu/about/GSN/

Photo not available.

Deploying Team Members: Kent Anderson . Richard C. Aster . Rhett G. Butler . Stephen C. Roberts

Research Objectives: Seismic waves resulting from earthquakes and other events can only be interpreted through simultaneous measurements at strategic points all over the planet. The measurement and analysis of these seismic waves are not only fundamental for the study of the earthquakes, but also serve as the primary data source for the study of the earth's interior. To help establish the facilities required for this crucial scientific mission, IRIS (the Incorporated Research Institution for Seismology) was created in 1985.

IRIS is a consortium of universities with research and educational programs in seismology. Ninety-seven universities are currently members, including nearly all U.S. universities that run seismological research programs. Since 1986, IRIS (through a cooperative agreement with the

National Science Foundation and in cooperation with the U.S. Geological Survey) has developed and installed the Global Seismographic Network (GSN). The GSN now has about 135 broadband, digital, high-dynamic-range, seismographic stations around the world, all with real-time communications.

The GSN seismic equipment at South Pole and Palmer stations was installed jointly by IRIS and USGS, who together continue to operate and maintain them. The GSN sites in Antarctica are vital to seismic studies of Antarctica and the Southern Hemisphere.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-103-S
NSF/OPP Award 01-26313

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): Dark Sector
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

A search for extrasolar planets from the South Pole

Dr. Douglas A. Caldwell
SETI Institute
NASA Ames Research Center
dcaldwell@mail.arc.nasa.gov
http://web99.arc.nasa.gov/~vulcan/south

A search for extrasolar planets from the South Pole.

Deploying Team Members: Douglas A. Caldwell . Jessie Christiansen . Mark Jarnyk . Fred C. Witteborn

Research Objectives: This group operates a small optical telescope at the South Pole to search for and characterize extrasolar planets by continuously following a southern galactic star field with a charge-coupled device photometer and searching for the periodic dimming that occurs as a planet transits its parent star.

The recent discovery of many close-in giant exoplanets has expanded our knowledge of other planetary systems and has demonstrated how different such systems can be from the solar system. However, their discovery poses important questions about the effects of such planets on the presence of habitable planets. To date only one extrasolar planet—HD 209458b—has been observed transiting a parent star. This project has the potential for a 10-fold increase in observations of such transits.

The South Pole is an prime location for finding extrasolar planets by observing transits for several reasons: The long winter night allows researchers to observe stars continuously for several months. At lower latitudes, daylight hours prevents observations of 1/2 to 2/3 of all transits. During the polar night, the stars never rise or set thus minimizing the brightness change associated with the rising and setting of lower latitudes. The cold stable atmosphere also minimizes the changes in brightness that occur as the stars twinkle (scintillation noise). Both of these noise sources hinder precise brightness measurements.

Researchers will establish and operate an automated planet-finding photometer at the South Pole for two austral winters. The statistics of planetary systems of nearby solar-type stars would indicate that about 10 to 15 extrasolar planets should be detected. There is also the possibility of finding lower mass planets that have not previously been detectable. Combining the transit results (which give the size of the planet) with Doppler velocity measurements (which give the planetary mass) will allow the planetary density to be determined, thus indicating whether the planet is a gas giant like Jupiter, an ice giant like Uranus, or a rocky planet like Earth.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-379-S
NSF/OPP Award 01-30612

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: January

South Pole observations to test cosmological models

Dr. John E. Carlstrom
University of Chicago
Astronomy and Astrophysics
jc@hyde.uchicago.edu
[No website]

Photo not available.

Deploying Team Members: Stephen Padin

Research Objectives: One of the most important discoveries in cosmology is that apparently much, if not most, of the mass in the Universe is made up not of stars and glowing gas, but of dark matter, which emits little or no light or other electromagnetic radiation and makes its presence known only through the gravitational force it exerts on luminous matter. There is some indication that dark matter may in fact not even be baryonic (Baryons are subatomic particles that are built from quarks and interact via strong nuclear force). Just what fraction of the mass is in the form of non-interacting nonbaryonic particles is of great interest to cosmologists and physicists.

The University of Chicago will lead a consortium of six institutions to design and use a 10-meter off-axis telescope at the Amundsen-Scott South Pole Station to survey galaxy clusters. This survey will allow researchers to study integrated cluster abundance and its red shift evolution and will yield precise cosmological constraints that are completely independent of those from supernova distance and cosmic microwave background (CMB) anisotropy measurements.

Measuring the mass in baryons along with the total mass in a region of the Universe that could be considered a fair sample would provide a crucial direct determination of the dark matter content. In recent years, just such a test-bed has been found in massive clusters of galaxies, which contain large amounts of gas (baryons) in the form of a highly ionized gas atmosphere that emits x rays. Nearly all of the baryons in the clusters are believed to be in the hot phase (millions of degrees), and so it is likely that we are truly measuring the baryonic mass in the cluster.

In addition to emitting X-rays, the hot cluster gas also scatters CMB radiation. This scattering, called the Sunyaev-Zel'dovich Effect (SZE), is measurable using radio telescopes. The SZE is important to the study of cosmology and the CMB for two main reasons:

+ The observed hotspots created by the kinetic effect will distort the power spectrum of CMB anisotropies. These need to be separated from primary anisotropies in order to probe inflation properties.

+ The thermal SZE can be measured and combined with X-ray observations to determine the values of cosmological parameters, in particular the Hubbell constant.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-199-M

NSF/OPP Award 01-30417

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Sea Ice McMurdo Station
Dates in Antarctica: Early October to early December

Effects of foraging on the lipid biochemistry of freely diving Weddell seals

Dr. Michael A. Castellini
University of Alaska Fairbanks
Institute of Marine Sciences
mikec@ims.uaf.edu
[No website]

Photo not available.

Deploying Team Members: Judith Margaret Castellini . Michael A. Castellini . Tami Jeanine Haase . Shawn Harper . Susan Dale Inglis . Lorrie D. Rea . Vicki Kristine Stegall

Research Objectives: The primary goal of this program is to quantify the dynamics of lipid uptake and utilization in a naturally foraging mammalian carnivore by examining freely diving Weddell seals in Antarctica. The species and the antarctic environment offers a unique opportunity to follow the biochemistry and physiology of nutrient utilization in a large carnivore that may not be possible in any other system. As such, this project will provide rare and perhaps unparalleled data on the foraging biochemistry of freely living carnivore.

Project team members will establish a sea-ice camp a few miles from McMurdo Station on the fast-ice in an area where there are no other holes or cracks for the seals to use. Seals are then selected at a site along the coastline and brought to the camp. The seal is then allowed to dive through a hole in the sea ice under a hut at the camp. The seal must always come back to the hut to breathe and rest between diving bouts since there is no nearby access to the surface.

Dr. Castellini has used this method of study Weddell seals since 1977. The seals naturally hunt for fish and squid under these conditions and blood samples can be taken whenever the seal is at the surface. Researchers expect to study eight adults (non-lactating females) in the 2004 season. Samples may also be collected in the field from pups to test for lipid levels in their blood after they have been nursing.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

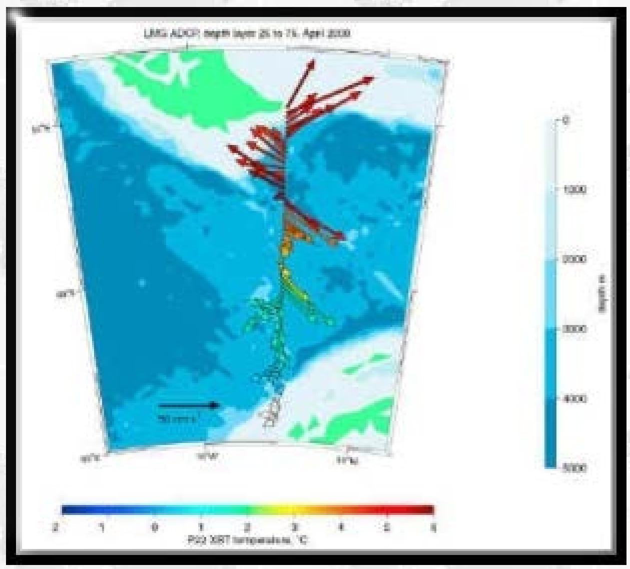
O-317-L

NSF/OPP Award 03-38103

Station: R/V Laurence M. Gould
RPSC POC: Jerry Bucher
Research Site(s): Drake Passage
Dates in Antarctica: Instruments operate continuously

Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Laurence M. Gould

Dr. Teresa K. Chereskin
University of California San Diego
Scripps Institution of Oceanography
tchereskin@ucsd.edu
http://tryfan.ucsd.edu/antarctic/



Currents from an April 2000 crossing of Drake Passage. Velocity vectors are colored according to ocean temperature. Courtesy of Teresa Chereskin.

Deploying Team Members: Teresa K. Chereskin . Sharon Escher

Research Objectives: Currents in the Southern Ocean have a profound influence on the world's oceans, and therefore upon global temperature and the planet's ecosystem. Yet some remote regions receive little scientific attention. Using Doppler technology (sound-wave transmission and reflection), this project is exploring upper ocean current velocities. Researchers are building a quality-controlled data set in one such sparsely sampled and remote region, which nonetheless appears to play a significant role in global ocean circulation. They will develop and maintain a shipboard acoustic Doppler current profiler (ADCP) program on board the USAP research vessel Laurence M. Gould (R/V LMG).

Part of the long-term science goal is to characterize the temporal and spatial velocity structure in the Southern Ocean. This entails measuring the seasonal and annual changes in upper ocean currents within the Drake Passage and then combining this information with similar temperature observations to see how the heat exchange varies and how it drives upper ocean currents.

For five years, this project's ADCP and TSG (thermosalinograph) instruments have been installed on the R/V LMG. During each cruise, data is collected and transmitted to the home institution. Shipboard electronics technicians and computer support staff maintain and monitor the systems.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager
NSF/OPP Award 03-38260

B-300-M
Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Pony Lake, Dry Valleys
Dates in Antarctica: Early November to late January

Biogeochemistry of dissolved organic material in Pony Lake, Ross Island

Dr. Yu-Ping Chin
Ohio State University
Byrd Polar Research Center
yo@geology.ohio-state.edu
http://www.rose-hulman.edu/biogeochemponylake

Photo not available.

Deploying Team Members: Yu-Ping Chin . Rose Merin Cory . Ryan L. Fimmen . Christine M. Foreman . Jennifer Guerard . Chris L. Jaros . Diane M. McKnight . Penney Leigh Miller

Research Objectives: Dissolved organic matter (DOM) is a significant chemical component in aquatic systems because it acts as an important carbon source for microorganisms, absorbs harmful radiation in sunlight, is able to complex metals, and can participate in important biogeochemical redox reactions. This project will study the biogeochemical cycling of DOM in Pony Lake, a small coastal antarctic pond on Cape Royds.

Because there are no higher plants present at this site all of the DOM in this lake is microbially derived from photoautotrophic, heterotrophic, and mixotrophic organisms. Thus, Pony Lake is an ideal site to study the effect of photolysis, redox changes, and microbial processes on the composition and character of the DOM pool. Pony Lake's abundant levels of DOM (50-100 mg/L as C) and proximity to the laboratory resources at McMurdo Station, makes it an ideal site to collect an International Humic Substances Society (IHSS) fulvic acid standard. Unlike other IHSS standards, this standard will not contain DOM components derived from higher land plants.

This work is expected to greatly increase understanding of DOM dynamics in the biogeochemical cycling of carbon. This research will also provide much needed information regarding the relationship between microbial diversity and DOM biogeochemistry. If the approach is successful, the group will have developed a methodology that can be utilized by other scientists to study DOM dynamics in other types of systems. Moreover, making this DOM material available to the scientific community through the IHSS will ultimately advance our knowledge of the reactivity of DOM in aquatic systems.

The project will also involve middle school science students by allowing them to be active participants through the Internet, while we are in the field, and by "shadowing" scientists back home in their labs while conducting the assays.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-366-S NSF/OPP Award 03-38138

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Installation in the austral summer, observing in the winter

---

Next generation CMB polarization measurements with the QUEST experiment on DASI

Dr. Sarah E. Church
Stanford University
schurch@stanford.edu
http://www.stanford.edu/group/quest_telescope/

Photo not available.

Deploying Team Members: John E. Carlstrom . Sarah E. Church . Kenneth Ganga . Walter K. Gear . James Hinderks . Erik M. Leitch . Olivier E. Mallie . Clement Pryke . Benjamin A. Rusholme . Robert Schwartz

Research Objectives: QUaD is a major upgrade to the DASI (Degree Angular Scale Interferometer) telescope (Carlstrom, A-373-S) in order to map the polarization structure of the cosmic microwave background (CMB), which was first detected by DASI. The CMB is the faint, relic heat from the Big Bang, and its appearance today is sensitive to both the formation and evolution of the Universe. The advantages of Antarctica to QUaD are

+ The high atmospheric transparency at the frequencies of interest (the altitude and cold leads to little overhead water vapor);

+ The atmospheric stability, allowing long observations;

+ The ability to perform identical observations of the same areas of sky throughout the year by being on the pole or axis of rotation; and

+ The absence or low elevation of the interfering Sun and Moon.

The QUaD receiver will be transported to the South Pole Station and installed on the DASI mount this season in preparation for observations through the following winter. This installation will be internal to the existing structure.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-355-S
NSF/OPP Award 03-37933

Station: South Pole Station
RPSC POC: Rob Edwards
Research Site(s): South Pole Station
Dates in Antarctica: Mid December to mid January

Investigating atmospheric chemistry through oxygen and sulfur isotopes in volcanic sulfate from South Pole ice cores

Dr. Jihong Cole-Dai
South Dakota State University
Department of Chemistry and Biochemistry
jihong.cole-dai@sdstate.edu
[No website]

Photo not available.

Deploying Team Members: Drew Budner . Jihong Cole-Dai . Dave Ferris

Research Objectives: This is a collaborative study to investigate the oxygen and sulfur isotope composition of sulfates from a number of large volcanic eruptions in the past 1,000 years. The project aims to drill a number of shallow ice cores at South Pole and return them to the principal investigators' laboratories for chemical and isotope analysis. Preliminary results from measurements of isotopes in sulfate samples from several volcanic eruptions in Antarctic snow and ice indicate that isotopic composition of volcanic sulfate contains abundant valuable information on atmospheric chemical and dynamic processes that have not been previously investigated. One tentative conclusion is that mass-independently fractionated sulfur isotopes reveal that atmospheric photolysis of sulfur compounds occurs at longer UV wavelengths than those in the Archean atmosphere, possibly reflecting the atmospheric ozone and/or oxygen concentration. This suggests that isotopic composition of atmospheric sulfate may be used to understand the role of UV radiation in sulfur dioxide conversion in the atmosphere and to track the evolution (i.e., oxygenation) of the atmosphere and the origin of life on Earth.

Other major research objectives include understanding what impact massive volcanic eruptions have on the oxidative capacity of the atmosphere, what oxidants and mechanisms are involved in the oxidation or conversion of volcanic sulfur dioxide to sulfate in the stratosphere and what isotopic criteria may be used to differentiate ice core signals of stratospheric eruptions from those of tropospheric eruptions.

At the South Pole, project team members will drill several shallow ice cores and extract volcanic sulfate from them. They will analyze isotopes in extracted volcanic sulfate, and interpret isotope data in terms of atmospheric chemistry and dynamics. The science team will be assisted by a crew from ICDS (Ice Core Drilling Services) to drill and package about 400 meters of ice cores.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-330-M

NASA ASTEP (Astrobiology Science and Technology for Exploring Planets) 02-0040-0014

Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Dry Valleys
Dates in Antarctica: Early January to early February

SPISE3: A non-contact instrument suite for rapid detection of chemical biosignatures

Dr. Pamela G. Conrad
National Aeronautics and Space Administration
Jet Propulsion Lab - Astrobiology Research
conrad@jpl.nasa.gov
[No website]

Photo not available.

Deploying Team Members: Mark S. Anderson . Rohit Bhartia . Robert Carlson . Pamela G. Conrad . Kevin Hand . Arthur L. Lane . Christopher McKay . Henry J. Sun

Research Objectives: Project researchers have developed the SPISE3 instrument package, a portable, non-destructive suite of spectroscopic life detection instruments designed to detect subtle chemical biosignatures associated with the activities of life. Without touching the rocks, the instruments can detect some of the biosignatures of endolithic microbial communities. The project's goal is to develop the tools and strategies for life detection in preparation for in situ life detection missions to Mars and other planets, where the evidence for life may be very subtle.

The instrument suite consists of a spectroradiometer, portable gas chromatograph, and UV-VIS fluorescence spectrometer/Raman band detector. Investigators will also use a Raman spectrometer for providing mineralogical identification and context. After gathering data from cryptoendolithic communities in the Mojave Desert, and in the arctic (Svalbard), this austral summer project team members will non-destructively measure the signatures of the organisms in rocks in the Dry Valley environment of Antarctica. SPISE3 may become an important tool for rapidly assessing the potential of a rock (or even an outcrop) as a habitat for endolithic life.

The hypotheses to be tested are:

1. That one can reliably and reproducibly detect chemical biosignatures, which are differentiable from geochemical signatures.

2. That biosignatures are observable over various spatial scales which, in part, define how far away one can be from a sample or how much sample is needed for chemical biosignatures to be observable.

3. That time-resolved studies of chemical fluctuations can distinguish fluxes associated with metabolism from those associated with abiological, geochemical activities.

4.That microbial endolithic communities living in cold deserts will exhibit different chemical signatures than those adapted to life in hot deserts, and these differences will be observable in terms of spatial and temporal scales and chemical concentrations.

5.The chemistry of the sandstone hosting endolithic communities in the Antarctic Dry Valleys is relatively simple, mostly Silicon and Oxygen from the almost pure quartz mineral content. There are a variety of endolithic communities in the Mojave desert that inhabit more mineralogically and chemically complex rocks and sediment, e.g., mixed carbonates, silicates and evaporite rocks. What does the addition of more complex chemistry do to the instruments' ability to differentiate between geological and biological contributions to the chemical environment, both in terms of chemical and spatial separation?

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-003-P

NSF/OPP Award 02-30579

Station: Palmer Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station
Dates in Antarctica: Late October to late March

Response of terrestrial ecosystems along the Antarctic Peninsula to a changing climate

Dr. Thomas A. Day
Arizona State University Tempe
Department of Plant Biology
tadday@asu.edu
[No website]

A graduate student measures the photosynthesis of Antarctic hairgrass near Palmer Station. Photo by Thomas A. Day.

Deploying Team Members: David M. Bryant . Thomas A. Day . Christopher T. Ruhland . Sarah L. Strauss . Michell L. Thomey

Research Objectives: This project will examine how climate change alters nutrient pools and cycling among plants, litter and soils in vascular-plant dominated communities, with the overall goal of predicting long-term climate change impacts on ecosystem productivity. The researchers' main approach is to manipulate temperature, water availability, and UV-B radiation exposure of tundra microcosms. These microcosms, or small patches or cores of plants and their associated soil, are in plots in an area adjacent to Palmer Station. The manipulations involve raising temperatures of some microcosms with overhead infrared lighting, adding water to some microcosms to simulate greater precipitation, and placing UV-B filters over some microcosms to remove UVB enhancements associated with stratospheric ozone depletion.

Investigators will assess how these manipulations influence plant growth and primary productivity, carbon and nitrogen fluxes and pools, litter decomposition, and soil microbial/arthropod communities. They will also examine the influence of snowpack and snowmelt date on plant survival, since winter snowpack may be increasing along the Peninsula. Early in the season, plants will be transplanted under snowbanks along a gradient in snowpack depth and snowmelt date. Plant survival, carbon storage status, and photosynthesis will be monitored as plants melt out from the snowbank over the growing season.

Project team members will also study the effects of penguin colonies on adjacent plant communities by measuring soil and plant nutrient concentrations and water availability, and atmospheric nutrient deposition along transects running from the edge of the colonies to adjacent plant communities. These transects should represent gradients of nutrient concentrations and water availability, and will be located on three or four islands or points near Palmer Station where plant communities are adjacent to penguin colonies. Soils and plants will be sampled for nutrient concentrations and moisture availability, and nutrient deposition collectors will allow investigators to quantify nutrient inputs. Lastly, project team members will continue surveying and censusing of young populations of vascular plant at several recently deglaciated sites near Palmer Station.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-005-M

NSF/OPP Award 02-31006

Station: McMurdo Station

RPSC POC: Melissa Rider

Research Site(s): McMurdo Station, Cape Evans, Cape Royds, McMurdo Sound, Cape Bird, Bratina Island

Dates in Antarctica: Mid August to early February

Antifreeze proteins in antarctic fishes: Integrated studies of freezing environments and organismal freezing avoidance, protein-structure and mechanism, genes and evolution

Dr. Arthur Leland DeVries

University of Illinois Urbana
Molecular and Integrative Physiology Department
adevries@uiuc.edu
[No website]

Antifreeze proteins in antarctic fishes: Integrated studies of freezing environments and organismal freezing avoidance, protein structure-function and mechanism, genes, and evolution

Deploying Team Members:

Chi-Hing C. Cheng-DeVries . Paul Cziko . Arthur Leland DeVries . Clarabelle A. DeVries . Clive Evans . Kevin Hoefling . Bryan Stephen Palmintier

Research Objectives: Despite temperatures that can dip below 0°C, antarctic waters provide a life sustaining environment for a number of fish species. How are they able to take the most frigid waters on earth through their gills without themselves freezing? A primary reason are the so-called antifreeze proteins, an adaptation found in a number of polar and subpolar species. The Southern Ocean provides the ideal laboratory and molecular biology the ideal probe to study this phenomenon.

This group studies the physiology of fish and larvae from these waters to see how ice grows in biological tissues -- a crystallization process called nucleation -- and how antifreeze glycoproteins (AFGP) inhibit it. The antifreeze function has enabled the antarctic notothenioids to colonize their frigid habitats very successfully. These researchers are mounting comprehensive multidisciplinary analyses of this adaptation at the level of the gene as well as the protein.

This season, deploying team members will:

+ Investigate the relationship between the severity of different antarctic marine environments (McMurdo vs. Peninsula) on notothenoid fish antifreeze capacity and function.

+ Characterize the antifreeze capacity at both the gene and protein levels of representative species from the five antarctic families of notothenoid fish.

+ Characterize the evolution of AFGP gene families and the suborder Notothenoidei using molecular and cytogenetics techniques.

Top of Page

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-316-M
NSF/OPP Award 03-38226

Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Sea Ice
Dates in Antarctica: Mid October to early December

Physics and mechanics of the breakup of warm antarctic sea ice: In-situ experiments and modeling

Dr. John Dempsey

Clarkson University
Department of Civil and Environmental Engineering
john@clarkson.edu
http://www.clarkson.edu/~john/JPD_Docs/Award_Number_0338226.htm

Photo not available.

Deploying Team Members: John Dempsey . Geoffrey Morley . Andy Johnston . Craig Totman . Shen Wang

Research Objectives: The goal of this research is to investigate the breakup process of antarctic sea ice in light of recent findings indicating that the fracture strength of first-year ice is strongly size dependent, that the deformation and fracture on the scale of tens of meters is influenced by microstructural anisotropy, and that the characteristic flaws of sea ice (such as brine drainage features) give rise to length scales relevant to transitions in fracture behavior. There is an urgent need to investigate the fracture behavior of warm McMurdo Sound sea ice, given its operational importance with regard to research and tourism at McMurdo Station.

Important topics to be investigated include coupled deformation-diffusion influences on the fracture of sea ice (due to fluid transport within the ice matrix), the influence of loading rate versus specimen size on the fracture behavior, fractal descriptions of the failure surfaces, and a new cyclic loading geometry that should benefit the constitutive measurements. These findings will give important insight into the underlying mechanisms of ice breakup and will significantly improve the reliability of models of this process. This work will improve the understanding of and ability to model the deformation and fracture of Antarctic sea ice at scales applicable to the breakup of ice sheets.

Typically the ice in McMurdo Sound nearest to McMurdo Station is thick multi-year ice. North of this multi-year ice, out as far as Cape Royds typically, mixed ice conditions are to be expected, including trash ice, platelet ice, pressure ridging, and rafted ice. The objective for the field test portion of this project is to be located well north of this mixed ice, on newly-formed thin ice that has not been trashed or ridged. Project team members will search for the requisite sea ice conditions along a path midway between the cutter channel and the McMurdo-Cape Royds path.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-131-M
NSF/OPP Award 02-30424

Station: McMurdo Station
RPSC POC: Charles Kaminski
Research Site(s): Ross Ice Shelf, Dumont d'Urville
Dates in Antarctica: Mid August to early February

Measurements addressing quantitative ozone loss, polar stratospheric cloud nucleation, and large polar stratospheric particles during austral winter and spring

Dr. Terry Deshler
University of Wyoming
Department of Atmospheric Science
deshler@uwyo.edu
[No website]

Measurements addressing quantitative ozone loss, polar stratospheric cloud nucleation, and large polar stratospheric particles during austral winter and spring

Deploying Team Members: Francesco Cairo . Federico Fierli . Louis King . Jennifer L. Mercer . Roberto Morbidini . Alan Robock

Research Objectives: Polar stratospheric clouds (PSCs) play a pivotal role in polar ozone depletion. Heterogeneous chemistry occurs on the surface of the particles in these clouds releasing active chlorine that destroys ozone. There are two foci of this project: The development and status of the antarctic ozone hole and the characteristics of polar stratospheric clouds.

To continue data collection on the ozone hole begun in 1986, team members will launch small balloons with instrument payloads from McMurdo Station beginning at WINFLY and continuing about 3 months. Approximately about 40 ozonesondes and 8 aerosol counters will provide concentration profiles of ozone and aerosol from the surface to 30-35 kilometers altitude.

Measurements of vertical ozone profiles are archived in the database of the Network for the Detection of Stratospheric Change, a global set of high-quality remote-sounding research stations for observing and understanding the physical and chemical state of the atmosphere (see www.ndsc.ws on the Internet).

Observations of Polar stratospheric clouds began in 1990. During the dark periods of WINFLY and over the austral winter project team members and station personnel will take LIDAR (LIght Detecting and Ranging) measurements. The LIDAR measurements will also be used to supplement the balloon-borne aerosol measurements. LIDAR enables researchers to study PSCs, stratospheric aerosol, and the thermal behavior and dynamics of the atmosphere above McMurdo Station. Continuous LIDAR observations provide insight into these PSCs, more specifically, estimates of the size and concentration of the particles that form in them and estimates of the surfaces available for heterogeneous chemistry (the activation of chlorine so it can destroy ozone), of the rates of denitrification and dehydration, and of particle composition.

This project is a collaboration between Italian researchers and the University of Wyoming.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-426-M
NSF/OPP Award 98-10219

Station: McMurdo Station

RPSC POC: Jessie Crain

Research Site(s): Lake Hoare, Dry Valleys, Lake Fryxell, Lake Bonney, Hjorth Hill, Garwood Valley, Don Juan Pond, Lake Vanda, Lake Vida, Victoria Valley, Wright Valley

Dates in Antarctica: Early November to early February

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. Peter T. Doran

University of Illinois Chicago
Department of Earth and Environmental Sciences
pdoran@uic.edu
http://tigger.uic.edu/~pdoran/home.htm

Making holes in the lake ice on Lake Fryxell to collect samples. Photo by Peter Doran.

Deploying Team Members: Phil Allen . Brandy L. Anglen . Peter T. Doran . Robin Ellwood . Jackie Dee Grom

Research Objectives: The scientific and technical objectives of this project follow those of the main LTER project: Addressing the central hypothesis that "past climates in polar desert environments strongly overprint present ecosystem structure and function." This season, the group's central tasks are:

+ Maintain long-term automated lake monitoring equipment in the Dry Valleys (lake temperature, stage, etc.),

+ Carry out lake hydrologic balance measurements (lake level and ablation),

+ Further characterize the carbon and nitrogen signatures and controls in the dry valley region.

Major activities are:

+ Collect data and reset a number of long-term environmental sensors in and on the lakes.

+ Measure lake ice movements on Lake Hoare using GPS.

+ Collect surface sediment, water, and microbial mats from surrounding streams and lakes for biogeochemical analyses.

+ Dive in Lake Hoare to perform benthic ecology and sedimentology experiments.

The group works out in Crary Lab and out of established field camps, Fryxell, Bonney, and Hoare, with planned day trips to Wright and Victoria Valleys. They This also oversee the recollection of a sediment addition experiment (one of the original LTER experiments) which is resampled by divers every other year.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager
NSF/OPP Award 02-17282

B-045-L/P

Station: R/V Laurence M. Gould, Palmer Station

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): Palmer Station, R/V Laurence M. Gould

Dates in Antarctica: Mid October to mid April

Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

Dr. Hugh Ducklow
Virginia Institute of Marine Sciences
The College of William & Mary
duck@vims.edu
http://www.icess.ucsb.edu/lter/lter.html

Palmer Station, as seen from the Adelie penguin colony on Torgersen Island in Arthur Harbor, Anvers Island, Antarctica. Photo by Hugh Ducklow.

Deploying Team Members:

Michelle A. Cochran . Robert M. Daniels . Hugh Ducklow . William Thomas Ducklow . Kristen France . Nicole Middaugh . Elizabeth Waterson

Research Objectives: The Palmer Long-Term Ecological Research Project (PAL LTER) seeks to understand the structure and function of the antarctic marine and terrestrial ecosystem in the context of physical forcing by seasonal to interannual variability in atmospheric and sea-ice dynamics, as well as long-term climate change. The PAL LTER grid is designed to study marine and terrestrial food webs consisting principally of diatom primary producers, the dominant herbivore antarctic krill, Euphausia superba, and the apex predator Adélie penguin, Pygoscelis adeliae. An attenuated microbial food web, consisting of planktonic bacteria and Archaea and bacterivorous protozoa, is also a focus of study.

This project monitors western Antarctic Peninsula ecosystems annually over a grid of oceanographic stations and seasonally at Palmer Station. The extent and variability of sea ice affect changes at all trophic levels. In recent years, sea ice has diminished in response to a general regional warming. A long-term population decline of ice-dependent Adélie penguins provides a clear example of the impact of this trend in the Palmer region. Adélie populations at the five major rookeries located near Palmer Station and studied for the past 30 years have all shown a gradual decrease in numbers. The western Antarctic Peninsula, the site of PAL-LTER research, runs perpendicular to a strong climatic gradient between the cold, dry continental regime to the south, characteristic of the interior, and the warm, moist maritime regime to the north. More maritime conditions appear to be replacing the original polar ecosystem in the northern part of the peninsula as the climatic gradient shifts southward. To date, this shift appears to be matched by an ecosystem shift along the peninsula, as evidenced by declines in Adélie penguins, which require longer snow-cover seasons.

Researchers hypothesize that ecosystem migration is most clearly manifested by changes in upper-level predators (penguins) and certain polar fishes in predator-foraging environments because these longer-lived species integrate recent climate trends and because individual species are more sensitive indicators than aggregated functional groups. In the years ahead, analogous modifications will also become evident at lower trophic levels, although these changes are likely to be seen only through long-term studies of ecosystem boundaries along the peninsula.

By studying extant food webs in both the marine and terrestrial environments, we will continue to investigate ecosystem changes at lower trophic levels; changes in response to continued, dramatic warming; and shifts in the poleward climatic gradient along the western Antarctic Peninsula.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-027-M

NSF/OPP Award 01-25893

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): McMurdo Station
Dates in Antarctica: Early January to mid February

Culture and health in Antarctica: Year 3

Dr. Timothy D. Dye
University of Rochester
Division of Public Health Practice
tim_dye@urmc.rochester.edu
[No website]

Photo not available.

Deploying Team Members: Nancy P. Chin . Ann M. Dozier . Timothy D. Dye

Research Objectives: The emergence of a long-term population in space will, in many ways, parallel the emergence of a sustained population in Antarctica, where development has expanded beyond the initial population of scientific and military personnel and now includes support staff and construction personnel. Experts speculate that a similar mix of residents may emerge as space populations develop. Such organizational and cultural merging in restricted environments undoubtedly creates new cultural landscapes (ethnoscapes) that could influence health and health behavior. Because of the extreme environmental circumstances, health risks and health care are particularly important. The study of cultural emergence in Antarctica as an analog to space could prove useful in the development of models of health and health behavior in an isolated confined environment (ICE) and could help planners better structure these environments to reduce health risks and identify factors that predispose people to those risks.

This group will

+ Model the emergence of cultural stages in ICE ethnoscapes as experienced by both short- and long-term populations,

+ Identify those elements of ICE ethnoscapes that are specific to an individual season and those that are repeated,

+ Relate how the temporal and content stages of ICE ethnoscapes interact with risk, behavior, and injury, and

+ Demonstrate the utility of electronic and distance-based assisted ethnography in the conduct of social research in ICE environments of Antarctica, and possibly in space.

Researchers will begin with key informant interviews and focus groups conducted throughout the United States with people who have spent at least one season on the ice within the past three years. The purpose is to elucidate the behaviors, risks, and health events that face residents, particularly in the emergence of ethnoscapes. During the next phase, researchers will reside in Antarctica for an extended period and conducting onsite participant observation and interviews at two different sites. This phase will include the Self-Disclosure Technique (SDT), an anthropological method for identifying the conceptual structure of a cultural event. SDT will be used to describe cultural dynamics in occupational, recreational, spiritual, and other group activities. Fieldwork will involve both short- and long-term residence. The data will be processed, and models will be tested for validity with informants on the ice.

This research could contribute to the development of screening procedures for long-term residence in ICEs and context-sensitive explanatory models of culture and injury risk, as well as illustrate the utility of distance-based ethnography.

Top of Page

Aeronomy & Astrophysics

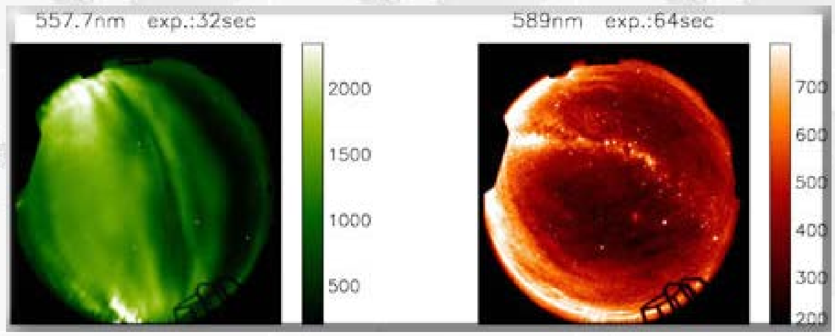
Dr. Vladimir Papitashvili
Program Manager

US/Japan agreement

A-117-S
Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): SkyLab
Dates in Antarctica: November

All-sky imager at South Pole

Dr. Masaki Ejiri
National Institute of Polar Research
Upper Atmosphere Physics
ejiri@nipr.ac.jp
http://polaris.isc.nipr.ac.jp/~asi-dp/



Air glow and green aurora taken by the All Sky Imager instrument. near-simultaneously. Photo courtesy of National Institute of Polar Research, Japan.

Deploying Team Members: Yusuke Ebihara . Masayuki Kikuchi

Research Objectives: The South Pole is a unique platform for observing aurora during the austral winter. It provides a unique vantage point for observing the airglow and to discern the characteristics of acoustic gravity waves in the polar region as they vary in altitude and wavelength. The continuous observation available at the South Pole allows researchers to collect data on auroras that develop from precipitating low-energy particles entering the magnetosphere from the solar wind:

+ Dayside polar cusp/cleft aurora,

+ Afternoon aurora that are closely associated with the nightside magnetospheric storm/substorm activities,

+ The polar cap aurora, which is dependent on the polarity of the interplanetary magnetic field.

Though data have been acquired at the South Pole since 1965 using a film-based, all-sky camera system, newer technology produces digital images and permits automatic processing of large amounts of information. This group uses the all-sky-imager (ASI), a digital CCD imager monitored and controlled by the Japanese NIPR (National Institute of Polar Research).

These international collaborations should enhance knowledge of the magnetosphere, the ionosphere and of upper/middle atmosphere physics. The HF (high frequency) radars at Halley Bay, Sanae, and Syowa Station provide the vector velocity of ionospheric plasma over the South Pole.

These studies should provide further insight into the physics of the magnetosphere, the convection of plasma in the polar cap, and solar wind effects - specifically dayside auroral structure, nightside substorm effects, and polar-cap arcs.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-271-L
NSF/OCE (Division of Ocean Sciences) 02-42139

Station: R/V Laurence M. Gould
RPSC POC: Karl Newyear
Research Site(s): R/V Laurence M. Gould
Dates in Antarctica: Mid September to early October

Tracers of biological productivity and gas exchange

Dr. Steven Emerson
University of Washington
School of Oceanography
emerson@u.washington.edu
[No website]

Photo not available.

Deploying Team Members: Steven Emerson . Charles L. Stump

Research Objectives: The export of carbon from the surface of the ocean is one of the processes controlling the partial pressure of carbon dioxide (pCO2) in the atmosphere, which greatly influences the climate of the earth. Changes in atmospheric pCO2 over glacial timescales are often interpreted as a response to changes in the ocean's biological carbon pump. Models of the carbon pump are limited by our understanding of mechanisms that control it in different areas of the ocean. Satellite color images hold great promise for determining the biological pump globally, but only if the images can be ground truthed by field measurements. To date this calibration has been achieved in only four places in the ocean: The long-term time series locations and parts of the Equator.

In this project, researchers will develop experimental methods of improving our knowledge of the ocean's biological carbon pump. The research program is twofold: First team members will deploy four oxygen sensors and a CTD (Conductivity, Temperature, Depth) to measure a profile of oxygen in the euphotic zone and the surface concentrations of nitrogen. They believe that this will be sufficient to determine the net biological oxygen production. Two methods will be tested for calibrating the oxygen sensors in situ. This research will develop methods to determine the oxygen mass balance and hence biological carbon pump on moorings at other locations in the ocean.

The second and much smaller aspect of the project builds on the research team's analytical ability to determine nitrogen, argon, and neon in seawater. They will conduct a field program to study the concentrations of these gases as a function of wind speed on several short cruises in the Drake Passage. The goal is to develop a correlation between bubble flux and wind speed. This knowledge could be used to characterize the bubble process in locations where it is not possible to measure these gases and to improve estimates of the biologically produced oxygen flux from the ocean using climatological surface ocean oxygen concentrations.

Broader impacts of the work include the benefits to society that will result from understanding the marine biological pump well enough to incorporate it into ocean-atmosphere models that will be used to predict future climate.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-034-M

NSF/OPP Award 01-25098

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Cape Royds, Beaufort Island, Franklin Island, Terra Nova Bay
Dates in Antarctica: Late December to early February

Occupation history and diet of Adélie penguins in the Ross Sea region

Dr. Steven D. Emslie

University of North Carolina
Department of Biological Sciences
emslies@uncwil.edu
http://oak.ucc.nau.edu/llc7/Antarctica2004.htm

An abandoned penguin colony near Australia's Casey Station before excavation. The mounded concentration of pebbles stands out from the rest of the natural landscape and makes these sites easy to identify. The mound was formed after penguins collected pe

Deploying Team Members: Larry Coats . Steven D. Emslie . Jerzy Smykla

Research Objectives: This project builds on previous studies investigating the occupation history and diet of Adélie penguins (Pygoscelis adeliae) with excavations of the many abandoned and active penguin colonies in the Ross Sea region, more specifically, the Victoria Land coast from Cape Adare to Marble Point. Some of these sites have been radiocarbon-dated and indicate that Adélie penguins have occupied these sites for 13,000 years. The material recovered by project team members, as demonstrated from previous investigations, will include penguin bones, tissue, and eggshell fragments, as well as abundant remains of prey (fish bones, otoliths, squid beaks) preserved in ornithogenic soils (formed from bird guano). These organic remains will be quantified and subjected to radiocarbon analyses to obtain a colonization history of the penguins in this region. Identification of prey remains in the sediment will allow researchers to assess penguin diet.

The group collaborates with New Zealand scientists to analyze other data from these sites (ancient DNA) and interprets past climatic conditions from published ice-core and marine-sediment records. These data will be used to test the hypothesis that Adélie penguins respond predictably to climate change, past and present. Scientists will also test the hypothesis that these penguins alter their diet in accordance with climate, sea-ice conditions, and other marine environmental variables along a latitudinal gradient. Graduate and undergraduate students will be involved, and a website will be developed to report results and maintain educational interaction between project personnel and students at local middle and high schools in Wilmington, North Carolina.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-102-M/S

NSF/OPP Award 02-33169

Station: McMurdo Station, South Pole Station

RPSC POC: Charles Kaminski

Research Site(s): Arrival Heights, Cusp Lab

Dates in Antarctica: Instruments operate continuously

Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites

Dr. Mark J. Engebretson
Augsburg College
Department of Physics
engebret@augsburg.edu
http://www.augsburg.edu/physics/antindex.htm

Photo not available.

Research Objectives: The earth's magnetic field arises from its mass and motion around the polar axis, but it creates a powerful phenomenon at the edge of space known as the magnetosphere, which has been described as a comet-shaped cavity or bubble around the earth, carved in the solar wind. When that supersonic flow of plasma emanating from the sun encounters the magnetosphere, the result is a long cylindrical cavity, flowing on the lee side of the earth, fronted by the blunt nose of the planet itself. With the solar wind coming at supersonic speed, this collision produces a “bow shock” several Earth radii in front of the magnetosphere proper.

One result of this process is fluctuations in the earth's magnetic field, called micropulsations, which can be measured on time scales between 0.1 second and 1,000 seconds. It is known that magnetic variations can significantly affect power grids and pipelines. Investigators will use magnetometers (distributed at high latitudes in both the antarctic and arctic regions) to learn more about how variations in the solar wind can affect the earth and manmade systems.

This project will study these solar-wind-driven variations and patterns at a variety of locations and over periods up to a complete solar cycle. Since satellite systems are now continuously observing solar activity and also monitoring the solar wind, it is becoming feasible to develop models to predict the disruptions caused by such magnetic anomalies. While this work is geared specifically toward a better understanding of the world and the behavior of its manmade systems, it will also involve space weather prediction.

Top of Page

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

NSF/OPP Award 03-38103

O-315-N

Station: RV/IB Nathaniel B. Palmer

RPSC POC: Jerry Bucher

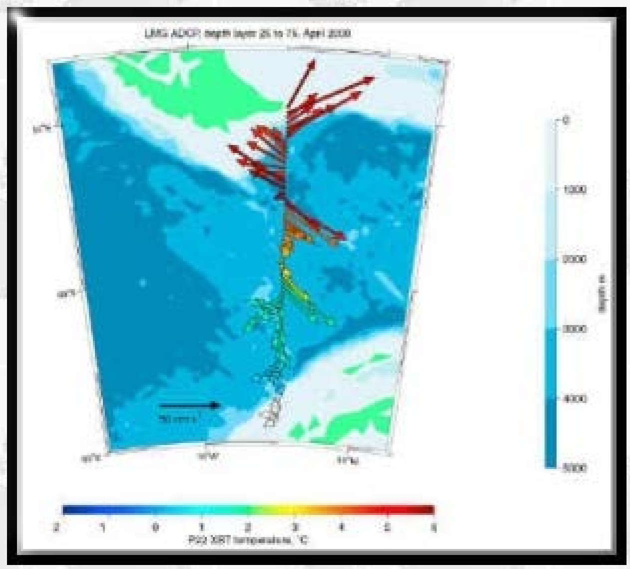
Research Site(s): Science of opportunity on all cruises

Dates in Antarctica: Instruments operate continuously

Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Nathaniel B. Palmer

Dr. Eric Firing

University of Hawaii Manoa
Department of Oceanography
efiring@hawaii.edu
http://currents.soest.hawaii.edu/antarctic/index.html



Currents from an April 2000 crossing of Drake Passage. Velocity vectors are colored according to ocean temperature. Courtesy of Teresa Chereskin.

Deploying Team Members: Teresa K. Chereskin . Eric Firing . Julia M. Hummon

Research Objectives: Currents in the Southern Ocean have a profound influence on the world's oceans, and therefore upon global temperature and the planet's ecosystem. Yet some remote regions receive little scientific attention. Using Doppler technology (sound-wave transmission and reflection), this project is exploring upper ocean current velocities. Researchers are building a quality-controlled data set in one such sparsely sampled and remote region, which nonetheless appears to play a significant role in global ocean circulation. They will develop and maintain a shipboard Acoustic Doppler Current Profiler (ADCP) program on board the USAP research vessel Nathaniel B. Palmer (R/V NBP).

Part of the long-term science goal is to characterize the temporal and spatial velocity structure in the Southern Ocean. This entails measuring the seasonal and annual changes in upper ocean currents within the Drake Passage and then combining this information with similar temperature observations to see how the heat exchange varies and how it drives upper ocean currents.

For six years, this project's ADCP and TSG (thermosalinograph) instruments have been installed on the R/V NBP. During each cruise, data is collected and transmitted to the home institution. Shipboard electronics technicians and computer support staff maintain and monitor the systems.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-425-M
NSF/OPP Award 98-10219

Station: McMurdo Station

RPSC POC: Jessie Crain

Research Site(s): Beacon Valley, Commonwealth Glacier, Explorers Cove, Howard Glacier, Hughes Glacier, Lake Bonney, Lake Brownworth , Lake Fryxell, Lake Hoare, Lake Vanda, Lake Vida, Taylor Glacier, Victoria Valley, Suess Glacier

Dates in Antarctica: Late October to early February

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. Andrew George Fountain

Portland State University
Department of Geology
andrew@pdx.edu
http://glaciers.pdx.edu/fountain/

The Role of Natural Legacy on Ecosystem Structure and Function in a Polar Desert: The McMurdo Dry Valley Long Term Ecological Research Program

Deploying Team Members: Hassan Jules Basagic IV . Jonathan Clifford Ebnet . Andrew George Fountain . Glen Liston . Thomas Henry Nylen

Research Objectives: This project is the glacier mass balance, melt and energy balance component of the McMurdo LTER. The glaciers of the McMurdo Dry Valleys are fundamental to the hydrology and biology of the valleys because they are the only significant source of water to the valley streams and lakes. Therefore, understanding the controls on the glacial extent and meltwater runoff is fundamental to a process-oriented approach to studying the dry valleys ecosystem.

The glacier studies currently in progress in the valleys include: mass balance measurements, GPS measurements, and ice radar on four glaciers, the Canada, Commonwealth, Howard, and

Taylor glaciers; surface energy balance calculations on the Canada Glacier, applicable to all glaciers in the valley; and repeat photography for a subset of the glaciers to determine long-term change.

Mass balance measurements are based on an ablation stake network established in the 1993/94 austral summer. The stakes, approximately 130 spread over 4 glaciers, are measured twice a year, early November and late January, to establish winter and summer mass changes. Information from these measurements is being used to assess whether the glaciers are in balance with the current climate, how ablation is affected by surface slope and aspect, and to provide data for modeling glacial melt. This data also clarifies the spatial and temporal changes on the glaciers and with climate data furthers our understanding of how small changes in the climate can have large-scale affects on glacier runoff.

The mass balance work is supported by surface energy balance calculations which have been made on Canada Glacier starting in 1994/95. Results indicate that sublimation accounts for up to 80% of the total summer ablation. Snow cover on the glacier surface is perhaps the second largest control on glacier melt. Snow on glacier ice effectively shuts off radiation absorption into the ice, which is the dominant source of energy for melt. In these circumstances, such as snowy years or early and late in the season, streamflow is limited to melt from near vertical ice surfaces which do not accumulate snow, such as the ice cliffs that form the lower margin of the many glaciers. These results can be extrapolated to other glaciers in the valley using data from the LTER Automatic Weather Network of stations.

Other information being collected for the glaciers includes repeated GPS measurements of the ablation stakes to determine ice velocity. Radar measurements are being collected to establish the glacier thicknesses and shape of the glacier beds. Repeat photography of the glacier front is continuing to provide a more long-term perspective on glacier expansion or shrinkage. The repeat photography makes use of photos taken during Scott's expeditions to the valley, as well as more current photography in the 1970's to establish the behavior of these glaciers over the past 90 years.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-013-L/P
NSF/OPP Award 02-17282

Station: R/V Laurence M. Gould, Palmer Station

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): Palmer Station, Marguerite Bay

Dates in Antarctica: Mid October to late March

Long-Term Ecological Research (LTER) on the antarctic marine ecosystem: Climate migration, ecosystem response and teleconnections in an ice-dominated environment (seabird component)

Dr. William R. Fraser
Polar Oceans Research Group
bfraser@3rivers.net
[No website]

Palmer Long Term Ecological Research Project: Climate, ecological migration, and teleconnections in an ice-dominated environment

Deploying Team Members: Cynthia D. Anderson . William R. Fraser . Peter Horne . Brett C. Pickering

Research Objectives: The seabird component of the Long-Term Ecological Research (LTER) project will continue its research in the Palmer Station area and the greater LTER sampling grid. Specific objectives of this project are to:

+ Determine the at-sea abundance and distribution of seabirds and marine mammals;

+ Examine aspects of the foraging ecology, breeding biology and abundance of seabirds on Renaud and Avian islands south of the Palmer region; and

+ Maintain the Palmer vicinity time series on seabird population trends, demography, foraging ecology, breeding biology and behavior.

Fieldwork includes work in the vicinity of Palmer Station and onboard the R/V Laurence M. Gould during the annual January LTER cruise. Aboard the research vessel, personnel will focus on seabird and marine mammal censuses to determine how oceanographic conditions, including sea ice and prey availability, influence their abundance and distribution. During Zodiac trips to Renaud and nearby islands, researchers will census and sample the diets of penguins and other seabirds. Establishing a brief field camp on Avian Island, they will census and map Adélie Penguin colonies, obtain diet samples and instrument birds with satellite transmitters and dive-depth recorders. Work in the Palmer vicinity will complement that aboard the research vessel, but the focus will be on the larger seabird community, especially the three breeding species of Pygoscelid penguins, timed to coincide with the entire October-March breeding season.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-198-P
NSF/OPP Award 02-17282

Station: Palmer Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station
Dates in Antarctica: Mid October to late March

Monitoring the effects of tourism and environmental variability on Adélie penguins at Palmer Station

Dr. William R. Fraser
Polar Oceans Research Group
bfraser@3rivers.net
[No website]

Photo not available.

Deploying Team Members: Dan M. Evans . Kieran Seamus O'Donovan

Research Objectives: The potential consequences of antarctic tourism on Adélie penguins (Pygoscelis adeliae) have been debated for more than 20 years. However, the rapid proliferation of these activities since 1970, particularly on the Antarctic Peninsula, has not only forced an extension of these questions to wildlife populations in general, but also colored them with a sense of urgency and controversy that has polarized opinions. The key concern is that continued increases in these activities will eventually overcome the ability of research to address critical issues in a timely and biologically meaningful manner. This is a valid concern, since studies to examine human impacts have either not been implemented at critical sites or are limited in scope because of logistic and experimental constraints.

Understanding how tourism might affect Adélie penguins rests fundamentally on the need to quantify and understand the natural variability manifested by breeding populations over spatial and temporal scales. However, although it is generally recognized that without these data it will be difficult to critically assess any localized changes from tourism, this ecosystem approach is expensive and complex and is not likely to be justified by the need to understand tourist impacts.

This group will continue a tourist monitoring program underway at Palmer Station as part of a large ecosystem-scale study. Palmer Station mirrors current patterns in tourism and tourist–wildlife interactions in the western Antarctic Peninsula. It also provides unique opportunities for research on human impacts. This includes the presence of long-term databases that document environmental variability over time and space scales in both marine and terrestrial habitats, as well as the ability to examine potential tourist impacts as part of controlled experiments.

This research is expected to capitalize and expand on two key findings to date. One is the discovery of a previously unrecognized source of variability in the Adélie penguin population that results from interactions between landscape geomorphology and changing patterns of snow deposition due to climate warming. The other is the observation that penguins breeding in less desirable landscapes may be more susceptible to cumulative impacts induced by the presence of human activity.

These findings have important implications for understanding interactions between climate change and ecosystem response, and for detecting, mitigating, and managing the consequences of human activities such as tourism.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

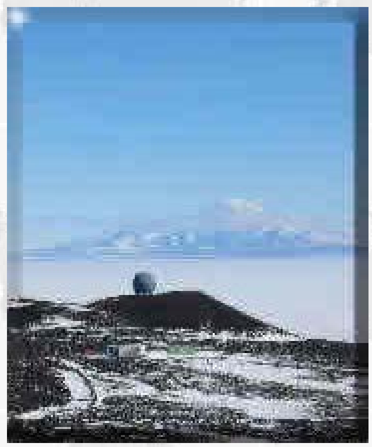
Dr. Vladimir Papitashvili
Program Manager

NSF/OPP Award 01-38126

A-100-M
Station: McMurdo Station
RPSC POC: Charles Kaminski
Research Site(s): Arrival Heights
Dates in Antarctica: Instruments operate continuously

The operation of an ELF/VLF radiometer at Arrival Heights

Dr. Antony C. Fraser-Smith
Stanford University
STAR Laboratory
acfs@alpha.stanford.edu
[No website]



View from the ELF/VLF radio antenna on the "Second Crater" at Arrival Heights. Mt. Discovery provides a backdrop for the New Zealand communications satellite installation on top of the "First Crater." US (white) and New Zealand (green) huts are also visable.

Research Objectives: Since it was discovered in the 1930s that natural phenomena emit the lowest form of electromagnetic energy (radio waves), the field of radio astronomy has joined the scientific effort to analyze both atmospheric and extraterrestrial signals. The extremely-low-frequency and very-low-frequency (ELF/VLF) record of data collected by this project at Arrival Heights now extends unbroken for almost 20 years. This is a remarkably long period of data that enables us to look for weak effects, for example, those that might be associated with global warming, with some confidence.

Because ELF/VLF radio noise is closely associated with global thunderstorm activity, correlations with phenomena associated with the weather and other global changes can be anticipated. The Arrival Heights measurements supplement those being made at the same frequency by the AGO's deep within the antarctic continent. Arrival Heights and the AGOs in the deep field are ideal sites for this research because they are unusually free of human-generated electromagnetic interference.

The radiometers at McMurdo operate in both the ELF and VLF ranges, monitoring radio noise from natural sources such as thunderstorms. Characterizing the possible sources of radio interference is important for operational purposes. Since thunderstorms generate telltale radio signals, tracking variations in global noise reflects thunderstorm activity and thus can provide information on changes in global climate. The Arrival Heights site is one of a network of eight such radiometers operated by Stanford University for the Office of Naval Research.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-277-E
NSF/OPP Award 03-37838

Station: Special Project
RPSC POC: John Evans
Research Site(s): Amery Ice Shelf Rift, Davis Station (Australia)
Dates in Antarctica: Early December to late February

Monitoring an active rift system at the front of Amery Ice Shelf, East Antarctica

Dr. Helen Fricker
Scripps Institution of Oceanography
Institute for Geophysics and Planetary Physics
hafricker@ucsd.edu
[No website]

Photo not available.

Deploying Team Members: Dennis Darnell

Research Objectives: The main focus of the proposal is to develop an understanding of the mechanics of ice shelf rift initiation and propagation, leading up to an iceberg calving event on one of Antarctica’s largest ice shelves, and to determine the effect that the calving event has on the residual ice shelf.

The three objectives of the project are:

1. Measure simultaneously the propagation and widening of two transverse-to-flow ice shelf rifts that make up the active part of a rift system at the front of the Amery Ice Shelf using a combination of satellite and in situ measurements, and to investigate further the apparent relationship between the behavior of these two rifts.

2. Study governing stresses controlling the initiation of rifts at the front of the ice shelf and the propagation of the rift system.

3. Investigate the effect the calving event will have on the stress field in the ice shelf and on the currently inactive rifts, e.g. will calving precipitate propagation of another rift?

The research site is the Amery Ice Shelf in East Antarctica. The project is also supported by the Australian Antarctic Division and team members will work from Australia's Davis Station.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-009-M
NSF/OPP Award 02-25110

Station: McMurdo Station

RPSC POC: Patricia Jackson

Research Site(s): Sea Ice, Cape Evans, Cape Royds, Hutton Cliffs, Scott Base, Turtle Rock, White Island, Big Razorback Island, Beaufort Island, Marble Point, Wohlschlag Bay

Dates in Antarctica: Early October to mid February

Patterns and processes: Dynamics of the Erebus Bay Weddell seal population

Dr. Robert Andrew Garrott

Montana State University Bozeman
Ecology Department
rgarrott@montana.edu
http://www.homepage.montana.edu/~rgarrott/antarctica/index.htm

Jeff Warren records the tag numbers of a mother and her pup on the north side of the Erebus Glacier tongue. Photo by Darren Ireland.

Deploying Team Members: Robert Andrew Garrott . Gillian L. Hadley . Mark Dorney Johnston . James Dale Nichols . Kelly Michelle Proffitt . Jay Joseph Rotella . Terra Marie Scheer . Brent Scott Stewart . Pamela K. Yochem

Research Objectives: The Erebus Bay Weddell seal (Leptonychotes weddellii) population study in eastern McMurdo Sound was initiated in 1968 and represents one of the longest intensive field investigations of a long-lived mammal in existence. Over nearly 35 years, a total of 15,636 animals have been tagged, with 144,927 resighting records logged in the database. This study is a valuable resource for understanding population dynamics not only of Weddell seals, but also of other species of both terrestrial and marine mammals. Project team members will continue two lines of investigation that combine the long-term database with new field initiatives.

The continuity of the demographic data will be maintained by annually marking all pups born, replacing lost or broken tags, and performing censuses. Researchers will combine the new data with the existing database and perform a progressively complex series of demographic analyses that will allow testing of specific hypotheses about population regulation and evaluate previously determined temporal and spatial patterns of variation in vital rates among colonies.

The primary new field initiative will involve an intensive study of mass dynamics of both pups and adult females to assess annual variation in marine resources and their potential role in limiting or regulating the population. In addition to collecting data on body mass dynamics, investigators will use satellite imagery to develop an extended time-series of sea ice in McMurdo Sound. (Regional extent of sea ice affects both regional primary productivity and availability of haul-out areas.) Increased primary productivity may increase marine resources, which would be expected to have a positive effect on foraging efficiency, leading to increased body mass.

Understanding the mechanisms that limit or regulate Weddell seal populations and the specific linkages between climate, oceans, ice, and antarctic food webs can make important contributions to knowledge of pinniped population dynamics, as well as theoretical understanding of populations, communities, and ecosystems.

Such knowledge can be readily applied to enhance the ability of natural resource managers to effectively maintain assemblages of other large mammal species and the ecological processes they facilitate. Continuation of this long-term study may also contribute to understanding the potential impacts of human activities such as global warming and the commercial exploitation of antarctic marine resources.

A field camp will be established at Big Razorback Island and all pups born in the eight colonies that make up the Erebus Bay population will be tagged, with a smaller effort to tag adults encountered that have not been tagged previously. The entire population will be censused seven to eight times after the pupping season. In addition, seals (both adults and pups) will be weighed and photographed from several perspectives using digital camera systems to develop methods to predict the mass of seals based on body morphometrics obtained from the photographs.

A large sample of seals will be photographed throughout the field season to document body mass dynamics of pups and adult females. These data will be correlated with a variety of variables including sea ice condition, colony, age, time of year, survival, and reproduction to understand the role of climate, local colony, and individual characteristics on both mass and population dynamics. A sample of study animals may be outfitted with data recorders to examine correlations between foraging, body mass, and breeding success. Data on health (physical exams and hematological and serum biochemical analyses, etc.) of these and other seals will also be collected. Scat and blubber biopsy samples will be collected to document diet.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-207-N
NSF/OPP Award 01-25833

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): R/V Nathaniel B. Palmer
Dates in Antarctica: Mid December to late January

Comparative and quantitative studies of protistan molecular ecology and physiology in coastal antarctic waters

Dr. Rebecca J. Gast
Woods Hole Oceanographic Institution
rgast@whoi.edu
http://www.whoi.edu/science/B/protist

Photo not available.

Deploying Team Members: Mark R. Dennett . Julie Rose

Research Objectives: Phototrophic and heterotrophic protists (single-cell organisms) are ubiquitous in extreme cold water environments where they are central to the production and utilization of energy and the cycling of elements. The dominance of protists in antarctic food webs indicates major ecological and biogeochemical roles for these unicellular eukaryotes (meaning the cells contain a nucleus). Understanding the structure and diversity of these communities and the adaptations that allow them to flourish near the lower limit of temperature in the ocean is of fundamental importance to biological oceanography.

The diversity of protistan assemblages has traditionally been studied using microscopy and morphological characterization. Such an approach is inadequate for ecological studies of these communities due to its tedious nature and the inherent lack of taxonomic characters associated with most small protists. Molecular methods that use gene sequences to identify and quantify naturally occurring protists offer a better solution to this problem.

Project team members will perform molecular and physiological studies on protistan assemblages in the sea water and ice habitats of the Ross Sea in order to address community structure, population abundance, and adaptation to life in extreme cold. They will collect and filter seawater samples for molecular analysis and culturing of protists from the upper 200 meters using a CTD (conductivity, temperature, depth) rosette. At seawater collection stations several ice cores will be taken along with meltwater (slush) samples. Driftnet tows will collect samples of the plankton communities

Their focus is primarily on species of phagotrophic protists (protozoa) that are ecologically important but for which no information exists. This work is designed to contribute to the understanding of the biodiversity of the protistan assemblages of coastal Antarctica, to provide tools for ecological studies, and to produce benchmark data on the basic physiological processes of protistan species in this extreme cold-water environment.

Top of Page

2004-2005 USAP Field Season

Artists & Writers

Mr. Guy Guthridge
Program Manager
Artist/Writer Program

W-219-M/S
Station: McMurdo Station
RPSC POC: Elaine Hood
Research Site(s): McMurdo Station area
Dates in Antarctica: December to early January

End as beginning: An American antarctic imaginary

Dr. Elena Glasberg
eleg@duke.edu
[No website]

Elena Glasberg.

Deploying Team Members: Elena Glasberg

Research Objectives: Elena Glasberg has been teaching and publishing on American antarctic fiction and exploration narrative for ten years beginning with her dissertation, *Antarcticas of the Imagination*. At Duke University's John Hope Franklin Center for Interdisciplinary Research she led interdisciplinary seminars on such topics as science and ethics and directed the Program in Sexuality Studies. Ms. Glasberg will complete her book, *Final Arrivals: A US Antarctic Imaginary*, on American antarctic fiction from 1818 to the present.

Ms. Glasberg will be at McMurdo Station and throughout Antarctica observing the natural and built environment as well as human activities including science and support work.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-206-N
NSF/OPP Award 01-26150

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): R/V Nathaniel B. Palmer
Dates in Antarctica: Mid December to late January

Ultraviolet radiation induced changes in the patterns of production and biochemical composition of antarctic marine phytoplankton

Dr. Joaquim I. Goes
Bigelow Marine Laboratory
Department of Ocean Sciences
jgoes@bigelow.org
http://www.bigelow.org/arctic/goes/index.html

Photo not available.

Deploying Team Members: Ashley Below . Joaquim I. Goes . Maria Fatima Helga do Rosario Gomes

Research Objectives: There is enough evidence to show that present levels of incident ultraviolet (UV) radiation—280 to 400 nanometers (nm)—are impairing phytoplankton productivity in the Southern Ocean. Yet efforts aimed at extrapolating these findings to allow accurate and unambiguous predictions of the consequences of UV radiation on the antarctic marine food web and biogeochemical cycles in the sea have been confounded by uncertainty. Estimates of the effects of UV radiation on the antarctic marine ecosystem range from insignificant to catastrophic. This disparity has been attributed to lack of information in key areas of photobiology and photochemistry.

Generally, studies have been based on broadband UV radiation and do not take into account competing responses of phytoplankton at different wavelengths across the waveband. Such information is critical if we are to understand the consequences of UV radiation enhancement on carbon assimilation by marine phytoplankton and its consequences for the food web and biogeochemical cycles. This is especially true in regions like the Antarctic, where stratospheric ozone concentrations can decrease by about 50 percent each spring, thereby altering the proportion of UV–B (280 to 320 nm) and UV–A (320 to 400 nm) radiation that phytoplankton receive during their growth season.

This study is aimed at understanding the impact of UV under the ozone hole on phytoplankton photosynthesis, growth, and community succession. The principal research objectives are to:

+ Examine the extent of changes in the rates of synthesis and composition of biochemical compounds in antarctic marine phytoplankton during UV exposure,

+ Examine how these changes are impacted by the interplay between the different UV radiation wavelengths and visible light,

+ Examine whether UV sensitivity varies across taxonomic groups of phytoplankton and whether this difference in sensitivity is responsible for the dominance of one species over the other,

+ Determine whether changes in the biochemical composition of phytoplankton resulting from exposure to UVBR are responsible for the decrease in the ability of the cells to take up nitrogenous nutrients, and

+ Observe whether UVR induced changes in the biochemical composition of phytoplankton are large enough, to influence the quality of material sinking out of the euphotic zone.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-268-M

NSF/OPP Award 03-38267

Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Lake Fryxell, Lake Joyce
Dates in Antarctica: Early December to early February

Hydrologic controls over biogeochemistry and microbial community structure and function across terrestrial/aquatic interfaces in a polar desert

Dr. Michael N. Gooseff
Utah State University
michael.gooseff@usu.edu
[No website]

Lake Joyce. Photo courtesy of Mike Gooseff.

Deploying Team Members: John E. Barrett . Douglas Bradley Bate . Michael Bobb . Michael N. Gooseff . Kenneth Hill . Cristina Takacs-Vesbach

Research Objectives: Aquatic-terrestrial transition zones are crucial environments in understanding the biogeochemistry of landscapes. In temperate watersheds, these areas are generally dominated by riparian zones, which have been identified as biogeochemical "hot-spots" because of the increased microbial activity in these locations, and because of the importance of these hydrological margins in facilitating and buffering hydrologic and biogeochemical exchanges between terrestrial and aquatic ecosystems. In the antarctic Dry Valleys, terrestrial-aquatic transition zones are intriguing landscape features because of the vast importance of water in this polar desert, and because the material and energy budgets of dry valley ecosystems are linked by hydrology. Hydrological margins in aquatic-terrestrial transition zones (both lentic and lotic) will be studied to answer two overarching questions: 1) What are the major controls over hydrologic and biogeochemical exchange across aquatic-terrestrial transition zones? 2) To what extent do trends in nutrient cycling (e.g. nitrogen cycling) across these transition zones reflect differences in microbial communities or function vs. differences in the physical and chemical environment (e.g. redox potential)?

The hydrologic gradients that define these interfaces provide the opportunity to assess the relative influence of physical conditions (i.e. water availability, redox conditions), and microbial biodiversity and functioning upon biogeochemical cycling. Coordinated hydrologic, biogeochemical, and molecular microbial studies will be executed within hydrologic margins with the following research objectives:

+ Determine the role of sediment characteristics, permafrost and active layer dynamics, and topography on sub-surface water content and distribution in hydrologic margins,

+ Determine the extent to which transformations of nitrogen (N) in hydrological margins are influenced by physical conditions (i.e. moisture, redox potential and pH) or by the presence of specific microbial communities (e.g. denitrifiers), and

+ Characterize the microbial community structure and function of saturated zones.

Project team members will identify nine to ten study plots across aquatic-terrestrial transitions in the Dry Valleys, near streams and lakes. Researchers will sample each of these plots for soil water, nutrients, pH, and microbial communities to determine the diversity and hydrologic, biogeochemical, and microbial patterns in each aquatic-terrestrial transition location. They will also deploy data logging systems to acquire sub-surface soil temperature dynamics at three of these plots. Data will be collected throughout the austral winter and into the next austral spring/summer (2005).

Top of Page

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-215-N
NSF/OPP Award 01-25172

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Karl Newyear
Research Site(s): Ross Sea, New Zealand waters, transit from Lyttelton to McMurdo
Dates in Antarctica: Early October to mid December

ANSLOPE: Cross slope exchanges at the antarctic slope front

Dr. Arnold L. Gordon
Columbia University
Lamont-Doherty Earth Observatory
agordon@ldeo.columbia.edu
http://www.ldeo.columbia.edu/res/div/ocp/projects/anslope.shtml

The first AnSlope cruise. Photo by Arnold Gordon.

Deploying Team Members: Alison Criscitiello . Denis Franklin . Raul A. Guerrero . Stanley S. Jacobs . Gerd Krahmann . Deborah A. LeBel . Guy Mathieu . Loren Mueller . Laurence Padman . Robin Robertson . Sarah Searson . Ian Southey . Basil Stanton

Research Objectives: The AnSlope project seeks to better understand the role of the Antarctic Slope Front (ASF) and continental slope morphology in the exchanges of mass, heat and freshwater between the continental shelf and oceanic regimes. AnSlope objectives include determination of the mean ASF structure, its principal scales of variability and instability, its role in diapycnal and lateral mixing of adjacent water masses, and the function of benthic boundary layer transports, tides and other oscillatory processes.

The primary goal is to identify the principal physical processes that govern the transfer of shelf-modified dense water into intermediate and deep layers of the adjacent deep ocean, as well as understand the compensatory poleward flow of waters from the oceanic regime. The upper continental slope is the critical gateway for the exchange of shelf and deep ocean waters. Here the topography, velocity, and density fields associated with the nearly ubiquitous ASF must strongly influence the transfer of water properties between the shelf and oceanic regimes.

AnSlope has four specific objectives:

+ Determine the ASF's mean structure and the principal scales of spatial and temporal variability, and estimate the ASF's role in cross-slope exchanges and mixing of adjacent water masses;

+ Determine the influence of slope topography on frontal location and outflow of dense shelf water;

+ Establish the role of frontal instabilities, benthic boundary layer transports, tides, and other oscillatory processes on cross-slope advection and fluxes; and

+ Assess the effect of shear-driven and double-diffusive mixing, lateral mixing identified through intrusions, and nonlinearities in the equation of state on the rate of descent and the fate of outflowing, near-freezing shelf water.

AnSlope cruise III (NBP04-08) is the last and 'late winter' component of the project. Researchers plan to occupy as many CTD/LADCP (Conductivity Temperature Depth/Lowered Acoustic Doppler Current Profiler) stations as possible across and along the ASF in the Ross Sea, including a transect near previously deployed bottom-moored arrays of current, temperature, conductivity and pressure sensors. Synergistic projects will sample for geochemical tracers, nutrients and oxygen isotopes, make casts to measure ocean microstructure, investigate surface water properties during transects to and from New Zealand, and survey the near-surface environment, including elements of its ecosystem and sea ice field.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-281-L

NSF/OPP Award 03-38218

Station: R/V Laurence M. Gould
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): Argentinean waters, Antarctic Peninsula, Drake Passage
Dates in Antarctica: Late November to late December

Relevance of planktonic larval dispersal to endemism and biogeography of antarctic benthic invertebrates

Dr. Kenneth Halanych
Auburn University
Biology Department
ken@auburn.edu
[No website]

Photo not available.

Deploying Team Members:

Elizabeth Joyce Balser . Rebecca Belcher . Heather Blasczyk . Adriene Burnette . Regina Patrice Campbell-Malone . Thomas Dahlgren . Kenneth Halanych . William Bruce Jaeckle . Robert Michael Jennings . Jesus Pineda . Rudolf S. Scheltema . Vicki Starczak . Isabelle P. Williams

Research Objectives: The primary objective of the project is to explore the genetic continuity of benthic marine invertebrates across the Drake Passage and along Antarctic Peninsula to more accurately understand the role endemism and larval dispersal play in the antarctic environment. Project team members will conduct plankton tows to document larval transport and use molecular approaches on benthic adults to document historical gene flow.

Because the opening of the Drake Passage is hypothesized to have played a critical role in establishing antarctic endemism, investigators will sample in Argentinean waters (south of Tierra del Fuego between Staten Island and Cape Horn), across the Drake Passage, and along the Antarctic Peninsula. Looking for a potential genetic break point in antarctic waters, they will collect in the western edge of the Weddell Sea just east of the northern tip of the Peninsula.

Sampling will consist of plankton tows and sampling benthic invertebrates in all localities, except the Drake where only plankton tows will be conducted. Collection of polychaetes and echinoderms will be emphasized. All benthic sampling will be along or shallower than the 200 meter isobath line.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-139-M

NSF/OPP Award 02-30338

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): McMurdo Station, Blood Falls, Lake Hoare
Dates in Antarctica: Late October to early February

Mechanics of dry-land calving of ice cliffs

Dr. Bernard Hallet
University of Washington
Quaternary Research Center
hallet@u.washington.edu
[No website]

Photo not available.

Deploying Team Members: Lou Albershardt . Andrew George Fountain . David Alfred Gottlieb . Michelle Koutnik . Thomas Henry Nylen . Erin Christine Pettit . John Robinson . Peter James Sniffen . Erin Nicole Whorton

Research Objectives: Taylor Glacier's terminus is a 30 meter high dry-land calving ice cliff. It is the most actively calving terminus in the Dry Valleys. This project will monitor the behavior of the ice cliff to determine the dominant processes involved in its evolution and study the similarities and differences with water-calving cliffs. At three sites, project team members will measure the ice deformation and temperature fields near the cliff face using a combination of strain gages, tilt sensors, thermistors, and a GPS surface strain network.

An ablation stake network will augment existing energy balance data, and a small seismic network will monitor local “ice quakes” associated with ice cracking at the terminus and calving events. The instruments will be left over one winter to identify the effect of the seasonal cycles of temperature and solar radiation. These data will be combined with time lapse photography to document ice cliff evolution.

Ultimately, the field data will be used to test and validate a computer model which will enable researchers to explore the sensitivity of ice cliff evolution to diverse glacier characteristics, including basal sliding rate, ice temperature, and angle of incident solar radiation.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-333-S

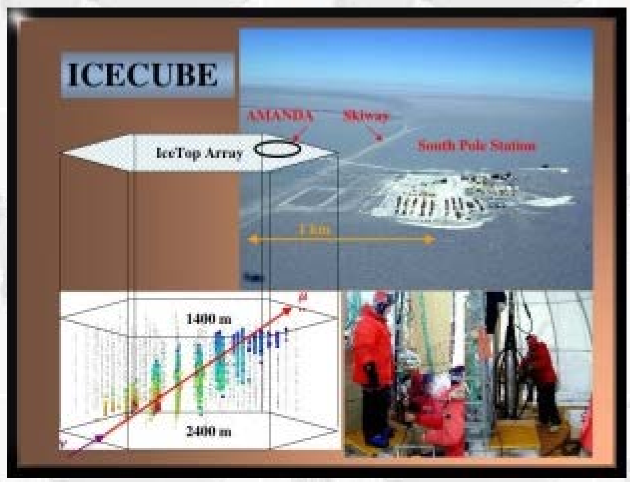
NSF/OPP Award 02-36449, 03-31873

Station: South Pole Station
RPSC POC: Charlie Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Late October to early November

IceCube

Dr. Francis Halzen

University of Wisconsin Madison
Physics Department
halzen@pheno.physics.wisc.edu
http://icecube.wisc.edu



Occupying a volume of one cubic kilometer, the IceCube neutrino telescope uses the Antarctic ice sheet as its window to the cosmos.

Deploying Team Members:

Rahman Amanullah . Xinhua Bai . Ryan C. Bay . Terry Leroy Benson . Beth Bergeron . Erik Karl Blaufuss . Robin J. Bolsey . Denise Braun . Jim Braun . Jeff Cherwinka . Christopher Timothy Day . Dennis Duling . William Richard Edwards . Paul Evenson . Thomas K. Gaisser . Christian Gils . Leland Stewart Greenler . Andre Grisell . Tom Ham . Darrell Francis Hamilton . Terry B. Hannaford . Kael D. Hanson . David Edward Hays . Marc Hellwig . Gary C. Hill . Michael Jayred . Arthur Lawrence Jones . Ronald Harland Jungenberg . Albrecht Karle . John L.

Kelley . James Michael Koehler . Mark Krasberg . Sven Lidstrom . Cynthia L. Mackenzie . Terry Dean Matt . Charles Patrick McParland . Simon Patton . Robert Paulos . Brian Pechan . Dave Pernic . John Robert Pretz . Gerald T. Przybylski . Charles Donald Rentmeesters . Steffen Richter . James A. Roth . Darryn Schneider . John Short . Edward F. Shultz . Thorsten Stezelberger . Karl-Heinz Sulanke . Greg Sullivan . Mark Thoma . Serap Tilav . Tony W. Wendricks . Christin Wiedemann . Kurt Woschnagg . James Yeck

Research Objectives: This project is an international collaboration to build a neutrino telescope over the next six austral summers. Neutrinos are subatomic particles produced by the decay of radioactive elements and elementary particles such as pions. The existence of neutrinos was first suspected in 1930 when scientists observed that energy and momentum were missing from the decay of radioactive nuclei. In 1955 neutrinos were finally observed and in 2001 experiments observing the sun revealed that neutrinos have tiny but definitely non-zero masses.

Neutrinos are difficult to observe since they rarely interact with matter. It is this feeble interaction that makes them uniquely valuable as astronomical messengers from outside the solar system. Unlike photons or charged particles, neutrinos can emerge from deep inside their sources and travel across the universe without interference. They are not deflected by interstellar magnetic fields and are not absorbed by intervening matter. However, this same trait makes cosmic neutrinos extremely difficult to detect; immense instruments are required to find them in sufficient numbers to trace their origin.

On the rare occasions when a neutrino does collide with a terrestrial atom, it produces a particle called a “muon.” The muon emits Cherenkov radiation that is detectable as blue light. The muon preserves the direction of the original neutrino, thus pointing back to its cosmic source. By detecting this light, scientists can reconstruct the muon’s, and hence the neutrino’s, path.

The IceCube observatory will be a cubic kilometer-sized array of 4,200 photomultiplier tubes deployed on 70 vertical strings and buried 1.4 to 2.4 kilometers deep in the ice. AMANDA (Antarctic Muon and Neutrino Detector Array, Bob Morse, A-130-S) has served as a prototype for the new, larger array. Antarctic polar ice is an ideal medium for detecting neutrinos because it is exceptionally pure, transparent, and free of radioactivity. The blue light of Cherenkov radiation travels a hundred meters or more through the ultra-transparent ice.

Looking through the earth for neutrinos from outside the solar system, IceCube will detect subatomic particles from the most violent astrophysical sources: Events like exploding stars, gamma ray bursts, and cataclysmic phenomena involving black holes and neutron stars. The IceCube telescope is a powerful tool to search for dark matter, and could reveal the new physical processes associated with the enigmatic origin of the highest energy particles in nature.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-314-M

NSF/DBI (Division of Biological Infrastructure) 01-19793

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Cape Crozier, Siple Station, Lake Bonney
Dates in Antarctica: Early October to early December

Solar / wind powered instrumentation module development for polar environmental research

Dr. Anthony D. Hansen
Magee Scientific Company
tonyhansen@mageesci.com
http://www.mageesci.com/Antarctic

PI Tony Hansen stands beside one of two autonomous instrumentation modules this group installed in the Dry Valleys in the 2002-03 field season. In addition to a payload of scientific instrumentation, each installation is solar-powered and sends live webcam

Deploying Team Members: Jeffrey R. Blair . Anthony D. Hansen . Joseph D. Mastroianni

Research Objectives: This project will develop and test a self-contained, transportable module that will provide a sheltered, temperature-controlled interior environment for remotely deployed scientific equipment. Electric power will be provided by solar panels and a wind generator, backed up by batteries with several days' capacity. The module will offer both alternating and direct current for internal and external use and will include data logging and communications capability for practical application in a polar environment.

This field season, two modules will be deployed to support other science groups. One module supporting a remote camera will be deployed to assist the scientific objectives of project Andrew

Fountain's B-425-M project at Taylor Glacier. Another will be configured to function as a stand-alone communications hub for remote field use. It will include a multiplexed Iridium link feeding a local 802.11 wireless 'cloud'. Functionally, it will provide an on-demand direct link to the Internet for wireless-equipped computers in a remote field camp without any other communications infrastructure required

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-058-M

NSF/OPP Award 99-80452

Station: McMurdo Station

RPSC POC: Melissa Rider

Research Site(s): South Pole Station, LaPaz Icefields, Transantarctic Mountains

Dates in Antarctica: Mid November to late January

The Antarctic Search for Meteorites (ANSMET)

Dr. Ralph P. Harvey
Case Western Reserve University
Department of Geological Sciences
rph@po.cwru.edu
http://geology.case.edu/~ansmet/

The Antarctic Search for Meteorites (ANSMET)

Deploying Team Members: Nancy Chabot . Yulia (Julia) Goreva . David Mittlefehldt . John W. Schutt . Joe Boyce . Catherine Corrigan . Vera Assis Fernandes . Ralph P. Harvey . James Karner . Stanley G. Love . Keiko Nakamura . Shaun Norman . Julie Smith

Research Objectives: Since 1976, ANSMET (the antarctic search for meteorites program) has recovered more than 14,000 meteorite specimens from locations along the Transantarctic Mountains. Antarctica is the world's premier meteorite hunting ground for two reasons:

+ First, although meteorites fall at random all over the globe, the likelihood of finding a meteorite is enhanced if the background material is plain and the accumulation rate of terrestrial sediment is low; this makes the East Antarctic Ice Sheet the perfect medium.

+ Second, along the margins of the sheet, iceflow is sometimes blocked by mountains, nunataks, and other obstructions; this exposes slow-moving or stagnant ice to the fierce katabatic winds, which can deflate the ice surface and expose a lag deposit of meteorites (a representative portion of those that were sprinkled throughout the volume of ice lost to the wind). When such a process continues for millennia, a spectacular concentration of meteorites can be unveiled.

The continued recovery of antarctic meteorites is of great value because they are the only currently available source of new, nonmicroscopic extraterrestrial material. As such, they provide essential "ground truth" about the composition of asteroids, planets, and other bodies of our solar system. ANSMET recovers samples from the asteroids, the Moon, and Mars for a tiny fraction of the cost of returning samples directly from these bodies.

During the 2004-2005 field season, ANSMET's main field party (eight people) will work at the LaPaz icefields, approximately 250 miles from Amundsen-Scott South Pole Station. A total of more than 1,000 meteorites have been recovered from the site during visits in 1991, 2002 and 2003. This year's field team will continue systematic searches of the icefields in an effort to recover a representative sample of the extraterrestrial material falling to Earth.

A second team consisting of four people will conduct high-level reconnaissance at a number of icefields throughout the mid-range of the Transantarctic Mountains, from the Zanefeldt Glacier in the south to Buckley Island in the north. This reconnaissance team will visit poorly known or previously unvisited icefields, recovering meteorites and identifying their potential for more detailed searches during future seasons.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-110-M/S

NSF/OPP Award 02-29251

Station: McMurdo Station, South Pole Station

RPSC POC: Charles Kaminski

Research Site(s): Arrival Heights, ARO, SkyLab

Dates in Antarctica: Calibration in January, observing in the austral winter

---

Austral high-latitude atmospheric dynamics

Dr. Gonzalo Hernandez
University of Washington
Earth and Space Sciences
hernandez@u.washington.edu
http://cedarweb.hao.ucar.edu/

Photo not available.

Deploying Team Members: Stephen T. Barlow . Gonzalo Hernandez . Michael P. McCarthy . Bryan Venema

Research Objectives: Observations of atmospheric dynamics in Antarctica help scientists better understand the global behavior of the atmosphere in high-latitude regions. Compared with lower latitude sites, the South Pole is a unique spot from which to observe the dynamic motion of the atmosphere. Its position on the Earth's axis of rotation strongly restricts the types of wave motions that can occur.

Project researchers will use high-resolution Fabry-Perot spectrometers at South Pole Station and Arrival Heights to make simultaneous azimuthal observations of the individual line spectra of several upper-atmospheric trace species, specifically the hydroxyl radical and atomic oxygen. The observed Doppler shift of the emission lines provides a direct measure of line-of-sight wind speed; wind field structure can also be derived from these measurements. Simultaneously observed line widths provide a direct measurement of kinetic temperature.

This project's goal is to observe, characterize, and understand high-latitude mesospheric and thermospheric motions, as well as the thermal structure of these regions. In particular, our present interests are the strong coupling between the lower and higher atmosphere and the existence of persistent upper thermospheric vertical winds. In both locations, observations are made during the austral winter, when the instruments operate in 24-hour data-acquisition mode. At this time, station technicians perform routine maintenance and monitor operations. During the austral summer, project team members deploy to both stations to perform calibration, maintenance and upgrades.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-239-L
Station: R/V Laurence M. Gould
RPSC POC: Alice Doyle
Research Site(s): LMG 05-04
Dates in Antarctica: Early to mid April

NSF/OPP Award 99-10007

Mysticete whale acoustic census in the GLOBEC west antarctic project area

Dr. John Hildebrand
Scripps Institution of Oceanography
jhildebrand@ucsd.edu
http://www.cetus.ucsd.edu

Photo not available.

Deploying Team Members: Catherine Falkenburg . Mark MacDonald

Research Objectives: The antarctic blue whale population is so low that it is virtually impossible to obtain statistically significant encounter rates for population estimation during visual surveys. Unlike the large call repertoires of most bird species, blue whales within a given geographic area appear to have only one fundamental call type that is retained over many decades. The acoustic character of these calls is likely to become an important parameter in the revision of estimates of blue whale stocks and subspecies. Passive acoustic surveys document this variablility while visual surveys obtain such subspecies and stock information only when a biopsy can be obtained—which is rarely the case. The low frequency calls of blue (B. musculus) and fin (B.physalus) whales can be readily recorded out to a 20 kilometer radius providing more contacts in one-year than would be possible from even an extensive visual survey. Passive detection of whale calls provides a non-invasive and cost-effective means to sample mysticete populations year around in the Antarctic.

Technological advances in seafloor acoustic recorders have resulted in highly reliable, relatively low-cost, off-the-shelf, practical instruments while advances in our understanding of mysticete whale calling behavior have made acoustic estimation of population densities possible. These and other researchers continue to study mysticete whale call behavior in more accessible areas such as California coastal waters but some of the most important questions in mysticete whale population estimates lie in the Antarctic where the populations were most affected by harvesting.

This project will determine minimum population estimates, distribution and seasonality for mysticete whales, especially blue whales within the West Antarctic Peninsula region. Whales will be censused and monitored by detecting their calls on eight passive acoustic recorders deployed on the seafloor for a period of 15 to 18 months.

The deployment of a large aperture autonomous hydrophone array in the Antarctic will promote incorporation of passive acoustics as a tool for mysticete whale detection and census. Added to the suite of tools available for marine mammal detection, this method promises to provide new insight to the role of these top predators in the short food chains common to polar ecosystems. Moreover, the recovery or potential loss of the antarctic blue whale population that once numbered greater than 200,000 animals is not only a question of species extinction, but is relevant to all Southern Ocean ecosystem studies.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager
NSF/NOAA agreement

O-257-S
Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Station technicians collect samples

South Pole monitoring for climatic change: US Department of Commerce NOAA climate monitoring and diagnostic laboratory

Dr. David Hofmann
National Oceanic and Atmospheric Administration
Climate Monitoring and Diagnostics Laboratory
david.j.hofmann@noaa.gov
http://www.cmdl.noaa.gov

National Oceanic and Atmospheric Administration/Climate Monitoring and Diagnostics Laboratory staff Loreen Lock (right) and Brian Vasel (left) launch a plastic balloon on September 22, 2002 carrying an ozonesonde to study the 2002 antarctic ozone hole.

Deploying Team Members: Tim Berkoff . Andrew D. Clarke . Geoff Dutton . Bob Evans . Tom Mefford . Steve A. Montzka . Russell Schnell . Daniel M. Simon . James Spinhirne

Research Objectives: The National Oceanic and Atmospheric Administration (NOAA) has been conducting studies to determine and assess the long-term buildup of trace atmospheric constituents that influence climate change and the ozone layer. Time-series analyses of long-term data provide insight into several phenomena of particular interest. These include:

+ Seasonal and temporal variations in greenhouse gases,

+ Stratospheric ozone depletion,

+ Transantarctic transport and deposition,

+ The interplay of the trace gases and aerosols with solar and terrestrial radiation fluxes that occur on the polar plateau, and

+ The development of polar stratospheric clouds over Antarctica.

Project scientists measure carbon dioxide, methane, carbon monoxide, stable isotopic ratios of carbon dioxide and methane, aerosols, halocarbons, and other trace constituents. Flask samples are collected and returned for analysis, while concurrent in situ measurements are made of carbon dioxide, nitrous oxide, selected halocarbons, aerosols, solar and terrestrial radiation, water vapor, surface and stratospheric ozone, wind, pressure, air and snow temperatures and atmospheric moisture. Air samples at Palmer Station are also collected.

These measurements allow researchers to determine the rates at which concentrations of these atmospheric constituents change. They also point to likely sources, sinks, and budgets. This group collaborates with climate modelers and diagnosticians to explore how the rates of change of these parameters affect climate.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager
NSF/NOAA agreement

O-264-P
Station: Palmer Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station
Dates in Antarctica: Station technicians collect samples

Collection of atmospheric air for the NOAA/CMDL worldwide flask sampling network

Dr. David Hofmann

National Oceanic and Atmospheric Administration
Climate Monitoring and Diagnostics Laboratory
david.j.hofmann@noaa.gov
http://www.cmdl.noaa.gov

Kristin Van Konyenburg, the Palmer Station physician in 2002, shown here operating the NOAA/Climate Monitoring and Diagnostic Laboratory, carbon cycle flask sampler. The sampler can be seen in the background with the sample inlet line extended.

Research Objectives: The National Oceanic and Atmospheric Administration (NOAA) has been conducting studies to determine and assess the long-term buildup of trace atmospheric constituents that influence climate change and the ozone layer. Time-series analyses of long-term data provide insight into several phenomena of particular interest. These include:

+ Seasonal and temporal variations in greenhouse gases,

+ Stratospheric ozone depletion,

+ Transantarctic transport and deposition,

+ The interplay of the trace gases and aerosols with solar and terrestrial radiation fluxes that occur on the polar plateau.

Personnel at Palmer Station will collect air samples to be analyzed for carbon dioxide, methane, carbon monoxide, stable isotopic ratios of carbon dioxide and methane. Flasks will also be collected for analysis of halocarbons, nitrous oxide, and other trace constituents.

These measurements allow researchers to determine the rates at which concentrations of these atmospheric constituents change. They also point to likely sources, sinks, and budgets. This group collaborate with climate modelers and diagnosticians to explore how the rates of change of these parameters affect climate.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-114-L/P

NSF/OPP Award 02-34249

Station: R/V Laurence M. Gould, Palmer Station

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): R/V Laurence M. Gould

Dates in Antarctica: Late December to early February

Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER study area

Dr. James T. Hollibaugh
University of Georgia
Department of Marine Sciences
aquadoc@uga.edu
http://www.marsci.uga.edu

Photo not available.

Deploying Team Members: Matthew Erickson . Gary LeCleir

Research Objectives: This project investigates the distribution, phylogenetic affinities and aspects of the ecology of ammonium-oxidizing bacteria (AOB) in the Palmer LTER (Long Term Ecological Research) study area. The goals of this project are to:

+ Obtain more conclusive information concerning composition of antarctic ammonia oxidizers;

+ Begin characterizing their ecophysiology and ecology; and

+ Obtain cultures of the organism for more detailed studies.

Researchers will characterize water column and sea ice AOB assemblages phylogenetically and quantify different kinds of AOB in various samples. They will measure nitrification rates across the LTER study area in water column, sea ice and sediment samples. They will determine grazing rates on AOB and evaluate their sensitivity to UV light. The investigators will assess the significance of urea nitrogen as a source of reduced nitrogen to AOB. Finally, the group will evaluate the temperature response of nitrification over temperature ranges appropriate to polar regions. This work is expected to provide insights into the ecology of AOB and the knowledge needed to model how water column nitrification will respond to changes in the polar ecosystems accompanying global climate change.

Project team members will collect water samples at regular intervals at six stations per day. They will take sediment samples which return an undisturbed surficial surface layer. In the lab, they will perform incubations and UV experiments in a temperature- and light-controlled environment, either a flowing sea-water bath or an incubator. The project includes fieldwork at Palmer Station and onboard the R/V Laurence M. Gould.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-141-M
NSF/OPP Award 02-30197

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Thwaites Camp, Pine Island Camp
Dates in Antarctica: Mid October to early February

Airborne Geophysical survey of the Amundsen Sea Embayment, Antarctica (AGASEA)

Dr. John W. Holt
University of Texas Austin
Institute for Geophysics
jack@utig.ig.utexas.edu
http://www.ig.utexas.edu/research/projects/agasea

Photo not available.

Deploying Team Members: Donald D. Blankenship . Hunter Anderson Danque . Theresa Diehl . Irina Filina . John Gerboc . John W. Holt . Scott D. Kempf . Erick Leuro . Anatoliy V. Mironov . David L. Morse . Matthew E. Peters . Thomas Richter

Research Objectives: This project is a collaboration of British Antarctic Survey (BAS) and the University of Texas (UTIG). Collectively, the project's primary objective is to determine boundary conditions for the major glacier drainages in the Amundsen Sea Embayment, including ice surface topography, subglacial topography, gravity and magnetic anomalies. Additional objectives of the BAS component will be to collect ground-based measurements of accumulation rate and ice velocity and to collect several short firn cores to complement the results of the US ITASE (International Transantarctic Scientific Expedition) ground traverse conducted during the 2001-2002 field season.

The major part of research operations will be a large-scale airborne geophysical survey of the Amundsen Sea Embayment flown with two instrumented Twin Otter aircraft (one USAP, one BAS). There will be two bases of operation: One near the Ross Embayment / Amundsen Embayment ice flow divide and the second on the divide between Pine Island Glacier Basin and "Drainage Basin A."

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-378-S

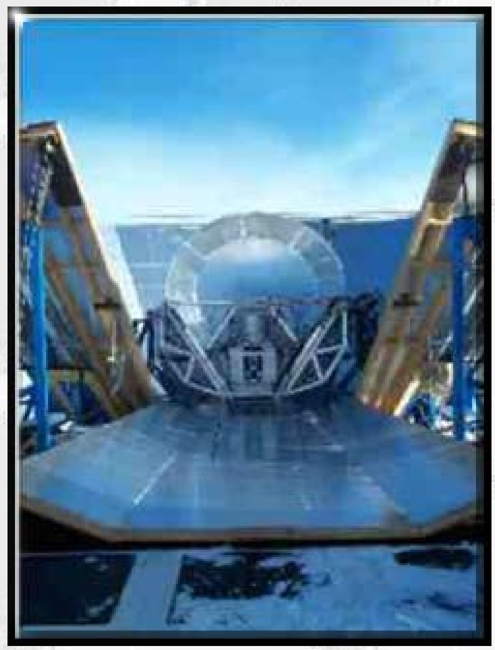
NSF/OPP Award 02-32009

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

High resolution observations of the CMB with ACBAR

Dr. William L. Holzapfel
University of California Berkeley
Physics Department
swlh@cosmology.berkeley.edu
http://cosmology.berkeley.edu/group/swlh/acbar/index.html



High-resolution observations of the cosmic microwave background (CMB) with ACBAR.

Deploying Team Members: Jessica Tui Dempsey . Jonathan Goldstein . William L. Holzapfel . Christian Reichardt . John Ruhl . Zachary Staniszewski

Research Objectives: The Arcminute Cosmology Bolometer Array Receiver (ACBAR) is a 16 element 240 mK bolometer array designed for observations of small angular scale fluctuations in the Cosmic Microwave Background (CMB). Mounted on the Viper telescope at the South Pole, ACBAR produces high signal to noise images of the CMB with angular resolution of about 4 minutes. Due to the high sensitivity and resolution of the experiment, ACBAR provides a unique compliment to the large-scale CMB anisotropy maps and helps to improve constraints on models describing our Universe. ACBAR is presently observing in three millimeter-wavelength bands.

In the 2004-2005 austral summer, ACBAR will be retrofitted with sixteen 2.1 millimeter detector channels. The upgraded instrument will observe through the winter season in order to produce improved observations of fine scale CMB anisotropy. These new observations will be used to improve constraints on the matter density in the Universe and spectral index of the primordial matter fluctuations. Observations on the smallest angular scales will search for the signature of evolving galaxy clusters and produce constraints on the normalization of matter density fluctuations.

ACBAR will be removed from the Viper telescope when the project team arrives at the Pole shortly after station opening. The instrument will be brought into the MAPO building where it will be opened and refurbished.

The unique capabilities of ACBAR, which was deployed to the South Pole in December 2000, allow it to address a broad range of science focused on measuring primary and secondary CMB anisotropies. Our observations and analysis will help realize the full potential of this powerful instrument for the study of cosmology. Four institutions will continue to collaborate in the maintenance and operation of ACBAR and Viper and participate in the data analysis.

The results will serve as a vital complement to the large-scale Microwave Anistropy Probe (MAP) spacecraft data set and provide an essential check of the fine-scale excess power reported by other single-frequency experiments. The novel instrumentation, observation techniques, and analysis developed for ACBAR are generally applicable to future ground-based millimeter astronomy experiments. In addition, this project has provided hands-on research experience to several undergraduate and graduate students.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-306-P

NSF/OPP Award 02-33955

Station: Palmer Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

Global thunderstorm activity and its effects on the radiation belts and the lower Ionosphere

Dr. Umran S. Inan

Stanford University
Department of Electrical Engineering
inan@nova.stanford.edu
http://www-star.stanford.edu/~palmer

Photo not available.

Deploying Team Members: Ryan Said

Research Objectives: The research program addresses scientific questions focused on the quantification of the global phenomenology and effects on the earth's ionosphere and the radiation belts of tropospheric lightning activity, consisting of about 2,000 thunderstorms active at any given time and maintaining a global average lightning flash rate of about 100 per second. The primary tool for studying these effects is the monitoring of the extremely low frequency and very low frequency bands of the electromagnetic spectrum in Palmer Station's unique electromagnetically quiet environment. Stanford University-built VLF receivers are also located in Upland, Indiana, and in the Negev desert of Israel. Data from Palmer Station will be used in conjunction with data from these other sites to study lightning activity in North and South America and Western Africa.

The experiment requires keeping the VLF antenna and receiver in good working condition. The antenna requires yearly maintenance and calibration and occasional inspections to insure it has not succumbed to the forces of nature. The electronics are maintained and looked after by the science technician in the "Clean Air/VLF" hut at Palmer Station. This year project team members plan to move the VLF antenna further up the glacier about 6,000 feet away from Palmer Station.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-108-S
NSF/OPP Award 00-93381
Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Maintenance in January, instruments operate continuously

---

A VLF beacon transmitter at South Pole (2001-2004)

Dr. Umran S. Inan
Stanford University
Department of Electrical Engineering
inan@nova.stanford.edu
http://www-star.stanford.edu/~vlf/south_pole/south%20pole.htm

Photo not available.

Deploying Team Members: Evans Paschal

Research Objectives: Relativistic electrons -- measured at geosynchronous orbit with energies of more than 300 kiloelectron volts -- appear to fluctuate in response to substorm and solar activity. During such events, these highly energetic electrons can penetrate as low as 30 to 40 kilometers above the Earth's surface. At that altitude, they can wreak havoc in the atmosphere, ionizing chemical species, creating X-rays, and perhaps influencing the chemistry that produces ozone.

This is a three-year project to establish and operate a very-low-frequency (VLF) beacon transmitter at South Pole to measure solar effects on the mesosphere and lower ionosphere. The extent of relativistic electron precipitation can be calculated from variations in amplitude and phase of the VLF signals at different antarctic stations. The transmitter will also produce other data as well, on solar proton events, relativistic electron precipitation from Earth's outer radiation belts, and on the Joule heating components of high-latitude/ polar-cap magnetosphere/ionosphere coupling processes.

VLF data from the South Pole beacon provides a valuable complement to two other efforts: The southern hemisphere coherent HF radar network, Super Dual Auroral Network (SUPERDARN), and the Solar Anomalous and Magnetospheric Particle Explorer (SAMPEX), ongoing satellite-based measurements of trapped and precipitating high-energy electrons at high and low altitudes.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

NSF/OPP Award 01-27022

B-200-N
Station: RV/IB Nathaniel B. Palmer
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): R/V Nathaniel B. Palmer
Dates in Antarctica: Mid December to late January

Interactive effects of UV and vertical mixing on phytoplankton and bacterial productivity of Ross Sea Phaeocystis bloom

Dr. Wade H. Jeffrey
University of West Florida
Center for Environ Diagnostics and Bioremediation
wjeffrey@uwf.edu
http://www.serc.si.edu/uvb/Ross_Sea_index.htm

Photo not available.

Deploying Team Members: Amy J. Baldwin . Wade H. Jeffrey . Deneb Karentz . Joseph D. Pakulski

Research Objectives: Ultraviolet (UV) radiation influences plankton in the near-surface waters of most ecosystems. In particular, the Southern Ocean is affected in the austral spring, when UV radiation is enhanced by ozone depletion. While progress has been made in estimating the impact of UV radiation on bacteria and phytoplankton in the Southern Ocean, important issues remain to be resolved. Little is known, for example, about responses in systems dominated by the colonial haptophyte Phaeocystis antarctica, which dominates spring blooms in the southern Ross Sea. The presence of open water at a far southerly location in the spring, well within the ozone hole, and continuous daylight, with implications for DNA repair, make the Ross Sea of intense interest.

A number of studies suggest that vertical mixing can significantly modify the impact of UV radiation. However, the limited measurements of turbulence intensity in the surface layer that have been done have not been integrated with parallel studies of the effects of UV radiation on phytoplankton and bacterioplankton. To address these issues, investigators will focus on vertical mixing and UV radiation in the Ross Sea and characterize phytoplankton and bacterioplankton responses in both laboratory and solar incubations. These studies will lead to biological weighting functions and response models capable of predicting the impact of UV radiation on photosynthesis, bacterial incorporation, and DNA damage in the surface layer.

Researchers will use measure depth-dependent profiles of DNA damage, bacterial incorporation, photosynthesis, and fluorescence parameters over a 24-hour cycle. They have optimized measurements for typical springtime conditions in the Ross Sea, where stabilizing influences like solar heating and/or surface freshwater from melting ice mean that not enough turbulence is present to thoroughly mix the upper layer.

Researchers will develop fine-scale vertical density profiles to directly estimate large eddy scales. Estimated turbulent diffusivities and eddy scales will be directly related to surface layer effects and used to generate models of UV radiation responses in the surface mixed layer.

This first in-depth study of UV radiation in the Ross Sea will enhance scientific understanding of vertical mixing processes, trophic interactions, and biogeochemical cycling in the Ross Sea and will provide a valuable comparison with previous work in the Weddell-Scotia Confluence and Palmer Station regions.

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-295-M
NSF/EAR (Division of Earth Sciences) 03-21760

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): McMurdo Station
Dates in Antarctica: Mid October to early February

UNAVCO Geodetic GPS Support

Mr. Bjorn Johns
UNAVCO
bjorn@unavco.org
http://www.unavco.org

GPS survey of a geodetic control point at Cape Hallett. Photo by Chuck Kurnik.

Deploying Team Members: Beth Ann Bartel . Jim Greenberg

Research Objectives: UNAVCO is a non-profit membership-governed consortium funded through NSF and NASA to support and promote high-precision measurement techniques for the advancement of Earth sciences. UNAVCO provides complete support for permanent stations, surveying, mapping, and other applications of the Global Positioning System (GPS) to U.S. Antarctic Program scientific investigators. UNAVCO maintains a "satellite" facility at McMurdo Station during the austral summer research season, providing a full range of geodetic GPS equipment and support services.

A large pool of high precision GPS receivers and associated equipment is provided for short term surveys through multi-year data collection in the Antarctic environment. Regular equipment upgrades assure a steady influx of modern equipment including:

+ State-of-the-art dual frequency GPS receivers

+ Power and communication systems for remote locations

+ GPS monument and antenna mount options

+ Accessories for kinematic and real-time kinematic (RTK) surveys

UNAVCO staff provides year-round support to help ensure field project success and assist with subsequent data management needs. The level of support provided is scalable to meet individual GPS project requirements. Technical support available includes:

+ Survey planning

+ Field survey and data processing training

+ Custom engineering solutions

+ System integration

+ Field assistance

+ GPS station maintenance

+ Data retrieval

+ Data flow monitoring

+ Data processing

+ Data archiving

UNAVCO also operates a community real-time kinematic (RTK) GPS base station that covers McMurdo Station and provides maintenance support to the NASA GPS Global Network (GGN) station MCM4 at Arrival Heights.

Top of Page

Oceans & Climate

Dr. Bernhard Lettau
Program Manager
NSF/ATM (Division of Atmospheric Sciences) 00-00923

O-204-P/S

Station: Palmer Station, South Pole Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station
Dates in Antarctica: Station technicians collect samples

A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems

Dr. Ralph F. Keeling
University of California San Diego
Scripps Institution of Oceanography
rkeeling@ucsd.edu
http://bluemoon.ucsd.edu

Photo not available.

Research Objectives: This project will analyze air samples from Palmer and South Pole stations to assess variations in the oxygen content in the atmosphere. At Palmer Station, researchers expect to see variations caused by exchanges of oxygen between the atmosphere and the Southern Ocean. The oceans tend to be a source of oxygen to the air in the spring and summer, and a sink for oxygen in the fall and winter. The spring emissions are mostly due to photosynthesis in the water while the winter uptake is due to mixing processes, which bring oxygen depleted waters from depth up to the surface. These exchanges lead to variations in the oxygen content of the air above the water and these changes are rapidly mixed around the latitude band by zonal winds.

Measurements of the seasonal variations in oxygen content at the South Pole, Palmer Station and other sites may be valuable for documenting changes in the biological productivity of the Southern Ocean over time. This project includes a subset of sample collections being made at a series of baseline sites around the world.

This research should help to improve estimates of the processes whereby oxygen is cycled throughout the global ecosystem, specifically, through photosynthesis and atmospheric mixing rates. It can improve predictions of the net exchange rates of carbon dioxide with biota, on land and in the oceans. An important part of the measurement program entails developing absolute standards for oxygen-in-air, to ensure stable long-term calibration. This group will also conduct surveys of the oxidative oxygen/carbon ratios of both terrestrial- and marine-based organic carbon, hoping to improve the quantitative basis for linking the oxygen and carbon dioxide geochemical cycles.

These results should help enhance understanding of the processes that regulate the buildup of carbon dioxide in the atmosphere and of the change processes -- especially climate change -- that regulate ecological functions on land and in the sea.

Top of Page

Geology & Geophysics

Dr. Thomas Wagner
Program Manager
NSF/DOD agreement

G-078-M
Station: McMurdo Station
RPSC POC: Doug Miller
Research Site(s): Bull Pass, Mt Newall
Dates in Antarctica: Late October to early December

Dry Valley seismic project

Dr. Robert C. Kemerait
United States Air Force
Air Force Technical Applications Center (AFTAC)
kemerait@tt.aftac.gov
[No website]

Clay Himmelsbach, Kevin Filiatrault and Will Burk installing a new seismic data digitizing system in a borehole close to Bull Pass in the Wright Valley. Photo by Jimmy Jackson.

Deploying Team Members: Nicholas Kappel . John Lauser . Mikel MacDonald . Robert J. Madgar II

Research Objectives: The Dry Valleys Seismic Project monitors regional and global seismicity. This station is an element in the Air Force Technical Applications Center (AFTAC) Southern Network (ASN). The network provides near real time data from nine locations within the southern hemisphere. The data is telemetered to the National Data Center in Florida and is available to the international scientific community.

Every year project team members perform seismic system preventive maintenance and scheduled maintenance of the power systems.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-518-M

SGER (Small Grant for Exploratory Research)

Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Cape Bird, Arrival Heights
Dates in Antarctica: Late November to mid December

Temporal variability in natural and anthropogenic disturbance of McMurdo Station

Dr. Mahlon Kennicutt
Texas A & M University
Geochemical and Environmental Research Group
mck2@gerg.tamu.edu
[No website]

With Scott Hut in the background, Chuck Kennicutt records data for monitoring spatial and temporal scales of human disturbance. Photo by Dianna Gielstra.

Deploying Team Members: Sally Applebaum . Andrew Klein . Terry Palmer . Stephen T. Sweet

Research Objectives: Antarctica represents perhaps one of the most carefully-tended and strictly-monitored habitats on Earth. Aside from the manifest desire to protect the flora, fauna and the atmosphere of a relatively pristine environment, there is the value the extreme southern latitudes provide as a virtual baseline barometer of global pollution. The Antarctic Treaty's Protocol on Environmental Protection, supplemented by the policies and practices of the nations who work and do science there, have combined to focus scrutiny on any anthropogenic impacts that can be foreseen or detected.

Project team members will collect and compile a system of observations that should enable scientists to be more aware of any such impacts on both marine and terrestrial habitats in and around McMurdo Station, locating them precisely and tracking them over time. Based on a three-year pilot program of sampling and data analysis, an environmental monitoring program is being initiated. The feasibility of this design will be evaluated in the current season. Point-data sampling grids at various spatial scales measuring a series of attributes indicative of change will be established. The project's objectives are to determine:

+ The spatial and temporal scales of change, and its origin;

+ How efficiently this observational system documents relevant changes in important habitat characteristics; and

+ The usefulness of various approaches to reference or control locations.

The field party will use GIS-techniques and geostatistical methods to organize these diverse data sets into a coherent, coordinated framework. The results should provide additional fundamental scientific information for developing a long-term strategy to document and minimize the impacts of future science (and support operations) on antarctic resources and values.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

NSF/OPP Award 02-30499

B-266-N
Station: RV/IB Nathaniel B. Palmer
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): NBP 04-09
Dates in Antarctica: Mid December to late January

Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea

Dr. David J. Kieber

State University of New York Syracuse
Chemistry Department
djkieber@syr.edu
http://www.esf.edu/chemistry/kieber/kieber.htm

Photo not available.

Deploying Team Members: Danielle Suzanne Benati . John Bisgrove . David J. Kieber . George Westby

Research Objectives: Areas of the Southern Ocean have spectacular blooms of phytoplankton during the austral spring and early summer. One of the dominant species, the haptophyte Phaeocystis antarctica, is a prolific producer of the organic sulfur compound dimethylsulfoniopropionate (DMSP). Phaeocystis blooms are associated with some of the world's highest concentrations of DMSP and its volatile degradation product, dimethylsulfide (DMS). Sulfur in the form of DMS, is transferred from the oceans to the atmosphere and can affect the chemistry of precipitation and influence cloud properties and possibly climate. DMSP and DMS are also quantitatively significant components of the carbon, sulfur, and energy flows in many marine food webs, although very little information is available on these processes in high-latitude systems.

This project will investigate the biogeochemical cycling of DMSP and its degradation product, DMS, in the southern Ross Sea during the height of the seasonal phytoplankton bloom (Dec-Jan). The primary goals will to be quantify how light and nutrients influence the production and loss terms for DMS and to examine the role of DMSP in the carbon and sulfur cycles of the Ross Sea. Investigators will focus on the effects of solar radiation (including UV) on phytoplankton and bacterioplankton processes related to the DMSP/DMS cycles, as well as purely photochemical processes such as DMS photooxidation. Team members will sample from two to six hydrographic stations, carrying out extensive multi-day experiments involving deck-board incubations and in situ incubations with a free floating drifter array. Data collection will include concentration measurements of dimethyl sulfoxide (DMSO), DMSP and DMS using gas chromatography, and cycling rates using 35S-labeled radiotracers.

Project team members will join the R/V Nathaniel B. Palmer cruise NBP04-departing Lyttelton New Zealand and arriving at McMurdo Station. They will sample waters with different bloom stages and different mixing regimes using a CTC (conductivity temperature depth) rosette. Water samples will be incubated on deck, in the laboratory and over the side with a free-floating drifter for about 8 to 12 hours. Water samples will be processed onboard the vessel.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-002-N

NSF/OPP Award 02-30497

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): NBP 04-09
Dates in Antarctica: Mid December to late January

Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea

Dr. Ronald P. Kiene
University of South Alabama
Department of Marine Sciences
rkiene@disl.org
http://www.southalabama.edu/marinesciences/fac_kiene.html

Principal investigator Ron Kiene secures quartz tubes for overside incubation.

Deploying Team Members: Daniela del Valle . Hyakubun Harada . Ronald P. Kiene . Dorothea Slezak

Research Objectives: Areas of the Southern Ocean have spectacular blooms of phytoplankton during the austral spring and early summer. One of the dominant species, the haptophyte Phaeocystis antarctica, is a prolific producer of the organic sulfur compound dimethylsulfoniopropionate (DMSP). Phaeocystis blooms are associated with some of the world's highest concentrations of DMSP and its volatile degradation product, dimethylsulfide (DMS). Sulfur in the form of DMS, is transferred from the oceans to the atmosphere and can affect the chemistry of precipitation and influence cloud properties and possibly climate. DMSP and DMS are also quantitatively significant components of the carbon, sulfur, and energy flows in many marine food webs, although very little information is available on these processes in high-latitude systems.

This project will investigate the biogeochemical cycling of DMSP and its degradation product, DMS, in the southern Ross Sea during the height of the seasonal phytoplankton bloom (Dec-Jan). The primary goals will to be quantify how light and nutrients influence the production and loss terms for DMS and to examine the role of DMSP in the carbon and sulfur cycles of the Ross Sea. Investigators will focus on the effects of solar radiation (including UV) on phytoplankton and bacterioplankton processes related to the DMSP/DMS cycles, as well as purely photochemical processes such as DMS photooxidation. Team members will sample from two to six hydrographic stations, carrying out extensive multi-day experiments involving deck-board incubations and in situ incubations with a free floating drifter array. Data collection will include concentration measurements of dimethyl sulfoxide (DMSO), DMSP and DMS using gas chromatography, and cycling rates using 35S-labeled radiotracers.

Project team members will join the R/V Nathaniel B. Palmer cruise NBP04-departing Lyttelton New Zealand and arriving at McMurdo Station. They will sample waters with different bloom stages and different mixing regimes using a CTC (conductivity temperature depth) rosette. Water samples will be incubated on deck, in the laboratory and over the side with a free-floating drifter for about 8 to 12 hours. Water samples will be processed onboard the vessel.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-010-M

NSF/OPP Award 01-26319

Station: McMurdo Station

RPSC POC: Rob Edwards

Research Site(s): Cape Evans, Cape Royds, Sea Ice Turtle Rock, Winter Quarters Bay, Cape Chocolate, Explorers Cove

Dates in Antarctica: Mid October to early December

Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic

Dr. Stacy L. Kim
San Jose State University
Moss Landing Marine Laboratories
skim@mlml.calstate.edu
http://benthic.mlml.calstate.edu/groups/benthic/aspire03/index.htm

While diving at the Dailey Islands, Andrew Thurber prepares to enter a tide crack. Photo Stacy Kim.

Deploying Team Members: Kathleen Conlan . Michael Donnellan . Jennifer L. Fisher . Stacy L. Kim . Andrew R. Thurber . Robert Bryce Zook

Research Objectives: The Antarctic is considered one of the most pristine habitats on the planet. Humans occupy only a tiny portion of the continent. Though the human footprint in Antarctica is small and generally highly localized, there are areas where anthropogenic contamination is severe. For example, past practices at McMurdo Station have resulted in a few highly contaminated marine areas such as the one near the old sewage outfall. High levels of organic enrichment have radically altered the local benthic community. The altered community and surrounding undisturbed communities have been well described over a ten-year period.

In January 2003, a sewage treatment plant was completed at McMurdo Station, and the organic input to the seafloor has dropped markedly. On the basis of existing information on community recovery dynamics in polar ecosystems from ice-mediated disturbances (icebergs and anchor ice) and in temperate ecosystems from organic-loading, researchers predict that recovery will begin immediately. However since growth and reproduction are often slow in antarctic species, complete recovery may extend over a much longer period than in temperate areas. In addition, slow microbial processes at low polar temperatures have allowed a large pile of organic material to build up at the outfall site, and some changes may be the result of burial rather than organic enrichment. Finally, the size of the disturbance is unusual; small organic inputs such as seal feces and dead fish are common, but large sewage outfalls are not. Thus, the outfall and new treatment plant provide a unique opportunity for a large-scale experiment on recovery.

In 2002, project team members collected data to describe the habitat and community while the outfall was still in operation. This will be added to the data collected from 1988 to 1998 to provide a baseline. Investigators initiated experiments with organic content, burial, and disturbance size as variables. During the next two seasons, they will track the recovery of the benthic community, compare the rates with those predicted from a meta-analysis of recovery from organic disturbance in a variety of habitats, and contrast the role of organic loading with burial and patch size. This integrated approach will further the understanding of anthropogenic impacts in polar environments.

This field season, the team is conducting subtidal experiments and observations on the response of the benthic community to organic enrichment as a disturbance factor. Smaller scale experiments on biodiversity, physical disturbance and patch dynamics are underway across the Sound (Explorers Cove, Cape Bernacchi), and north of McMurdo Station (Cinder Cones, Turtle Rock) and will be completed. Long term experiments and observations on community change, recruitment, and growth will continue at 14 sites from Cape Armitage to Cape Royds, and Cape Chocolate to Cape Bernacchi.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-307-L
NSF/OPP Award 03-38290

Station: R/V Laurence M. Gould
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): R/V Laurence M. Gould
Dates in Antarctica: Late November to late December

Salpa thompsoni in the Southern Ocean: Bioenergetics, population dynamics and biogeochemical impact.

Dr. Patricia Kremer
University of Connecticut
Department of Marine Science
pkremer@uconn.edu
[No website]

Photo not available.

Deploying Team Members: Jeffrey Godfrey . Erich Horgan . Patricia Kremer . Laurence P. Madin . Brennan Theodore Phillips . Kerri M. Scolardi

Research Objectives: Salps are holoplanktonic grazers that have a life history, feeding biology and population dynamic strikingly different from krill, copepods or other crustacean zooplankton. Salps sometimes occur in very dense populations that cover large areas, and these “blooms” have been shown to have major impacts from both grazing and production of fast-sinking fecal pellets. Nevertheless, the rates of feeding, metabolism, defecation, growth and reproduction for bloom-forming salps are still poorly understood, especially for Salpa thompsoni, the most abundant salp in the Southern Ocean. Although commonly acknowledged as a major component of the Southern Ocean zooplankton community, often comparable in biomass and distribution to krill, salps have received relatively little attention. This project will investigate S. thompsoni, which regularly occurs during the austral summer in high concentrations at various locations around Antarctica.

Project team members will conduct their study near the northern end of the Antarctic Peninsula, a region that often has high densities of salps, and has time series data sets from the antarctic LTER (Long Term Ecological Research) and the AMLR Program (Antarctic Marine Living Resources) research efforts. Although extensive sampling has documented the seasonal abundance of S. thompsoni in the Southern Ocean, there still is a paucity of data on important rates that determine population growth and this species' importance in grazing and vertical flux of particulates. In addition to the various rate measurements, investigators will make quantitative surveys of horizontal and vertical distribution of the salps. The length-frequency data will be examined for both the solitary (asexual) and aggregate (sexual) from these collections. The various rate measurements will be used to construct a model of salp population dynamics, the results of which will be compared with the cohort structure of the field data. Researchers will interpret both experimental and modeling results within the context of the physical and nutritional conditions to which the salps are exposed. This integrated approach will provide the best basis for understanding the growth dynamics of salp blooms in the Southern Ocean.

This study represents an intensive investigation of the target species, Salpa thompsoni. The results from this species (endemic to the Southern Ocean) can be compared with existing data for congeneric species S. aspera and S. fusiformis that also occur in high densities in many locations. The combined results should yield insights into the environmental factors, energetics and population dynamics associated with the formation of salp blooms. The results of this study should enable scientists to better evaluate the importance of salps in biogeochemical cycles and in structuring the pelagic environment of the Southern Ocean.

Top of Page

2004-2005 USAP Field Season

Glaciology

Dr. Julie Palais
Program Manager

I-191-M
NSF/OPP Award 02-28052

Station: McMurdo Station
RPSC POC: Melissa Rider
Research Site(s): Blue Glacier, Victoria Upper Glacier, Clark Glacier, Commonwealth Glacier
Dates in Antarctica: Mid October to mid December

Dry Valleys Late Holocene climate variability

Dr. Karl J. Kreutz
The University of Maine
IQCS/ Department of Geological Sciences
karl.kreutz@maine.edu
http://climatechange.umaine.edu/Research/Expeditions/DryValleys1.html

Eclipse ice core drill in operation. Photo by Karl Kreutz.

Deploying Team Members: Terrance L. Gacke . Karl J. Kreutz . Jon Tierney . Michael Waszkiewicz . Bruce Williamson

Research Objectives: The goals of this project are to collect and develop high-resolution ice core records from the Dry Valleys region of Antarctica, and provide interpretations of interannual to decadal-scale climate variability during the last 2000 years (late Holocene). In particular, researchers seek to test hypotheses related to ocean/atmosphere teleconnections (e.g., El Nino Southern Oscillation, Antarctic Oscillation) that may be responsible for major late Holocene climate events such as the Little Ice Age in the Southern Hemisphere. The primary research objectives for this austral summer season are to recover intermediate length (150-200 meter) ice cores from two sites the Taylor/Wright Valley region (Clark and Commonwealth Glaciers) and to conduct additional glaciological and meteorological data collection at each site.

Conceptual and quantitative models of these processes in the Dry Valleys during the late Holocene are critical for understanding recent climate changes. Broader impacts of the project include:

+ Contributions to several ongoing interdisciplinary antarctic research programs;

+ Graduate and undergraduate student involvement in field, laboratory, and data interpretation activities;

+ Use of project data and ideas in several University of Maine courses and outreach activities; and

+ Data dissemination through peer-reviewed publications, University of Maine and other paleoclimate data archive Web sites, and presentations at national and international meetings.

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-081-M

NSF/OPP Award 02-29305

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Mt Erebus
Dates in Antarctica: Late November to mid January

Mount Erebus Volcano Observatory and Laboratory (MEVOL)

Dr. Philip R. Kyle

New Mexico Institute of Mining and Technology
Department of Earth & Environmental Science
kyle@nmt.edu
http://www.ees.nmt.edu/Geop/Erebus/erebus.html

Werner Giggenbach descending into the crater of Mt. Erebus for gas samples. Just before reaching the lava lake, an eruption forced Werner to return to the rim with singed ropes and clothes. Photo by William McIntosh.

Deploying Team

Julie Ann Calkins . Nelia W. Dunbar . Richard Esser . Peter Kelly . Philip R. Kyle . Jayme Brooke Margolin . William C.

Members: McIntosh . Shauna Mikelich . Clive Matthew Martin Oppenheimer . Dawn Catherine Sweeney

Research Objectives: Mount Erebus, Ross Island is the most active volcano in Antarctica. It is unique in containing a persistent convecting lava lake of anorthoclase phonolite magma. Degassing of the lake and underlying magmatic system emits volcanic gases into the pristine antarctic atmosphere. Because of the excellent access and the nature of the small strombolian eruptions, Mt. Erebus has become a model volcano for volcanological studies.

This field season, project team members will continue the work over the last three field seasons when they installed five integrated geophysical/geodetic surveillance observatories and made measurements of gas emissions and continued GPS measurements to observe deformation of the volcano. Some of the objectives for this year include:

+ Maintain the six Integrated Surveillance Instrumentation (ISI) system containing a broadband seismometer, dual frequency GPS receiver, tiltmeter, a variety of environmental sensors and associated power systems (batteries, solar panels and wind generators) at a site named Ray on the crater rim of Erebus;

+ Upgrade and maintain the five existing short period seismic stations already in operation on the volcano;

+ Make campaign GPS measurements at sites on the flanks and summit of the volcano to supplement the eight existing continuous GPS units;

+ Collect volcanic rocks samples and gases and measure U-decay series isotopes in them to assemble a geochemical-isotopic-petrologic data set to evaluate the rate dependent parameters of magma genesis, evolution and degassing; and

+ Continue the annual surveillance of the volcanic activity as part of the Mt. Erebus Volcano Observatory studies.

The existing short period and broadband seismic networks will allow an understanding of the eruptive behavior and dynamics of Mt. Erebus. Inversion of the seismic data will allow topographic imaging of the magma chamber and plumbing inside the volcano.

During the austral summer months, field based observations will include measuring emission rates of carbon dioxide, sulfur dioxide, radionuclides, trace gases and metals. These data will be used to evaluate the potential impact of gas emission from Mt. Erebus on the snow chemistry on the East Antarctic Ice Sheet. Investigators will also examine short term variations in the emission rates of fluorine, chlorine, sulfur dioxide, and metals to examine volatile zoning in the magma chamber supplying the lava lake. A GPS network on the flanks and summit of the volcano will be re-occupied to examine any deformation that may have occurred. The GPS network will monitor deformation associated with the on-going eruptive activity.

Another part of this project will develop and deploy integrated low-power, low-cost, real-time-telemetered volcano monitoring stations at Mt. Erebus and other active volcanoes. Many volcanoes, particularly in the developing world, have little or no modern instrumentation. The project also includes the education of graduate and undergraduate students in volcanology and geophysics, the dissemination of information to high school audiences, and the provision of year-round monitoring information to the National Science Foundation and to McMurdo Station. Finally, to convey the excitement and societal relevance of volcanology and other aspects of earth science, we expect to continue public outreach through lectures, media interaction, and inquiry response.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-033-S NSF/OPP Award 02-30438

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): MAPO
Dates in Antarctica: Installation in the austral summer, observing in the winter

---

Background Imaging Of Cosmic Extragalactic Polarization (BICEP)

Dr. Andrew Lange

California Institute of Technology
Physics Department
ael@astro.caltech.edu
http://www.astro.caltech.edu/~lgg/bicep_front.htm

BICEP mount and environmental enclosure. The mount allows the receiver to continuously rotate about the optical axis and periodically toggle by 180 degrees in azimuth.

Deploying Team Members: Denis Barkats . Jamie Bock . H. Cynthia Chiang . Charles Darren Dowell . Gregory Griffin . Brian Keating . John Kovac . Chao-lin Kuo . Andrew Lange . Pete Mason . Hien Trong Nguyen . Yuki Takahashi . Lawrence Weintraub . Kiwon Yoon

Research Objectives: BICEP is an experiment designed to measure the polarization of the Cosmic Microwave Background (CMB) to unprecedented precision, and in turn answer crucial questions about the beginnings of the Universe. It will operate at 100 GHz and 150 GHz at angular resolutions of 1.0° and 0.7°, with an array of 96 polarization-sensitive bolometers (PSBs), mapping a large region of the sky around the South Celestial Pole. Its design is optimized to provide exquisite sensitivity to CMB polarization on medium to large angular scales, allowing it to directly probe for the gravitational wave signature of inflation.

Recent CMB observations have hinted strongly at an inflationary epoch in which the size of the universe undergoes rapid exponential expansion during the first 1e-38 seconds, producing the near isotropy of the horizon, the flat geometry of the universe, and the pattern of peaks and valleys in the CMB power spectrum that we observe today. Although these recent observations are consistent with the inflationary model, they are not sufficient to rule out other models of the early universe. The critical remaining test is to detect the gravity-wave background (GWB), which is only predicted by inflation, and the most promising means of accomplishing that is to look for the GWB's imprint on the polarization of the CMB. GWB's extremely faint imprint on the CMB polarization combined with various foreground and instrumental sources of confusion makes this a difficult task.

Detection will require only modest angular resolution (about 1 degree), but long integration (about a year) on a restricted and contiguous patch of sky. The 6-month night, the extremely dry and stable weather, and the precise rotation of the sky around the zenith make Amundsen-Scott South Pole Station the ideal terrestrial site for this ambitious project. The BICEP instrument will have a flexible and easily upgradeable design which will allow for optimization after the first season of observation, when these foreground sources will be better characterized. The many sources of confusion can be mitigated by carefully selecting the angular resolution, frequencies of operation, and scanning strategy. BICEP is well-situated to make the cleanest-possible detection of the GWB. Finally, BICEP will probe for the GWB due to inflation more deeply than other instruments.

By combining a new polarization-sensitive bolometric detector technology developed for the European Space Agency’s Planck satellite (to be launched in 2007) with four independent levels of signal differencing and a carefully optimized observing strategy, BICEP will reach the current limit on CMB polarization in the first hour of integration, reach the sensitivity of Planck over 1 percent of the sky in the first week, and precisely measure CMB polarization on the critical angular scales of one degree to ten degrees.

Observational cosmology is enjoying a renaissance that has captured the public imagination and serves as one of the most effective vehicles for stimulating interest in science in general. Detecting the signature of the GWB in the CMB would represent a triumph of fundamental physics and cosmology that would revolutionize our understanding of the origins of the Universe.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-256-P

NSF/OPP Award 03-37656

Station: Palmer Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station and vicinity
Dates in Antarctica: Early January to early February

Physiological and molecular mechanisms of stress tolerance in a polar insect

Dr. Richard Lee
Miami University
Department of Zoology
leere@muohio.edu
[No website]

Photo not available.

Deploying Team Members: David L. Denlinger . Scott A. Hayward . Richard Lee . Joseph P. Rinehart . Lucas Sandro

Research Objectives: During the austral summers of 1979 and 1980 Dr. Lee, a member of this research team, documented the ability of the antarctic midge Belgica antarctica to tolerate a wide variety of stresses. The project's long term objective is to further characterize this ability especially in an ecological context. During the three years of the project, researchers will first fully characterize the microclimatic conditions experienced by B. antarctica both seasonally and among different microhabitats. They will then work to characterize the molecular mechanisms involved in surviving the documented fluctuations and investigate how this midge may accumulate protective molecules from the macroalgae Prasiola crispa, a primary food plant of Belgica larvae.

The field team's deployment in January will allow them to collect winter acclimatized larvae of Belgica antartica that are still covered by winter ice as well as investigate larvae as they experience snowmelt, summer warming, and occasional drying. Midges will be collected at specific times throughout the field season to monitor changes in stress proteins and other chemicals that provide protection against the extreme temperature and water stresses that these insects confront. Fieldwork will be conducted using a Zodiac in the immediate vicinity of Palmer Station on peninsulas such as Bonaparte Point and Norsel Point, and on nearby islands including Torgerson Island and Humble Island which have substantial populations of B. antarctica.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-136-S

NSF/OPP Award 01-32576

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): SkyLab
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

A proposal for the measurement and analysis of extremely low frequency waves at South Pole Station

Dr. Marc R. Lessard

Dartmouth College
Thayer School of Engineering
marc.lessard@dartmouth.edu
[No website]

ELF magnetic sensor coil, receiver, and the data acquisition system. Inside the receiver (inset). Photo by Hyomin Kim.

Research Objectives: This project aims to detect and record magnetic field fluctuations in the extremely-low-frequency (ELF) range at South Pole Station, specifically auroral ion cyclotron waves, which have been well correlated with flickering aurora. Theory predicts that these waves modulate precipitating electron fluxes, thereby causing the flickering in luminosity emissions. Substantial evidence now supports this theory, although the excitation mechanism responsible for the ion cyclotron waves is somewhat uncertain. Perhaps the most well-developed theory suggests that the waves result from an electron-beam instability. In any case, the frequency of the flickering or, equivalently, the frequency of the ground-based observations of ion cyclotron waves can be used to infer the altitude of the excitation mechanism, since the wave frequency depends on the strength of the background magnetic field, which is a known quantity. The information that will be acquired can be used to test models of auroral acceleration mechanisms, as well as study dispersive ELF waves, a type of wave that has been reported in the literature only a few times, but one that may provide important information on substorm onset or, perhaps, the boundaries of open and closed magnetic fields.

The topic is closely associated with other existing projects in upper atmospheric physics. A first step is to identify the wave mode and to determine the location and geomagnetic conditions under which these waves can be observed. The equipment used to make these observations consists of an induction coil magnetometer and data acquisition system. The induction coil is a commercially available device, one that was originally designed for geophysical exploration. Data will be returned to Dartmouth College for analysis.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-362-S

NSF/OPP Award 02-16279

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: February

Development of an Autonomous Real-time Remote Observatory (ARRO)

Dr. Marc R. Lessard
Dartmouth College
Thayer School of Engineering
marc.lessard@dartmouth.edu
[No website]

Photo not available.

Deploying Team Members: Amanda Plagge . Marshall Swearingen

Research Objectives: This project is part of the larger development of the Autonomous Real-Time Remote Observatory (ARRO). In support of ARRO, this group will test a variety of small wind generators at the South Pole. The primary goal is to determine whether a small-scale wind generator might be suitable as a power source for ARROs, which could ultimately reduce the initial costs of these observatories and reduce resources required for transportation and maintenance. If any generator appears to be reliable enough, the group would then incorporate it into the ARRO testing, probably by placing it in parallel with the HR-3 generator from Northern Power the following winter (2006).

Project team members will ship six wind generators for installation and testing. The generators will be installed near the Skylab with cabling leading to the interior of Skylab. Data regarding their performance will be recorded via a Linux-based acquisition system.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-259-M

NSF/OPP Award 02-29836

Station: McMurdo Station
RPSC POC: Melissa Rider
Research Site(s): Cape Hallett
Dates in Antarctica: Late October to early February

Soil biodiversity and response to climate change: A regional comparison of Cape Hallett and Taylor Valley

Dr. W. Berry Lyons
Ohio State University
Byrd Polar Research Center
lyons.142@osu.edu
[No website]

Photo not available.

Deploying Team Members: Byron J. Adams . John E. Barrett . Timothy O. Fitzgibbon . Thomas Henry Nylen . Ross A. Virginia . Diana H. Wall

Research Objectives: Soil ecosystems along the Victoria Land coast from the McMurdo Dry Valleys in the south to Cape Hallett in the north occur across broad gradients of biodiversity, climate, and soil resource legacies from previous climates (organic matter, nutrients, and salts). The range of conditions can be used to test specific hypotheses derived from a soil biodiversity and habitat model developed from the McMurdo Dry Valleys Long-Term Ecological Research Program (LTER). This "habitat suitability" model describes the distribution, abundance, and diversity of soil biota based on a combination of legacy and contemporary soil and climate properties.

This project will extend the model to the greater Victoria Land region at Cape Hallett. Insights into the relationship between biodiversity (microbes and invertebrates) and ecosystem functioning (soil respiration and nutrient cycling) may be especially important in Victoria Land since it encompasses a range of ecosystems, from those with near minimum organic matter and no invertebrates to those with very high organic matter deposits and complex food webs. A three-year program of field and laboratory research will address how soil food webs and ecosystem processes are affected by climate, legacy, and contemporary soil processes.

Researchers will begin the regionalization of results and insights from the McMurdo LTER study and determine whether the changes in biodiversity along the range of soil habitats and landscape gradients in Taylor Valley occur similarly across gradients in a richer, more complex habitat (Cape Hallett). There is an immediate need to understand how soil biodiversity and ecosystem functioning are related and to determine the factors influencing the distribution of soil biodiversity across Antarctica.

The taxonomic complexity of soil food webs elsewhere limits investigators ability to draw inferences about the functional significance of biodiversity and the responses of soil communities to varying conditions and climate. The extension and testing of a conceptual model of soil biodiversity based on the simplest soil communities on Earth will contribute to the knowledge of complex temperate ecosystems. These linked studies of microbial and invertebrate diversity in relation to soil organic matter, moisture, and temperature change at Taylor Valley and Cape Hallett will provide one of the most complete quantitative assessments of soil diversity to date.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

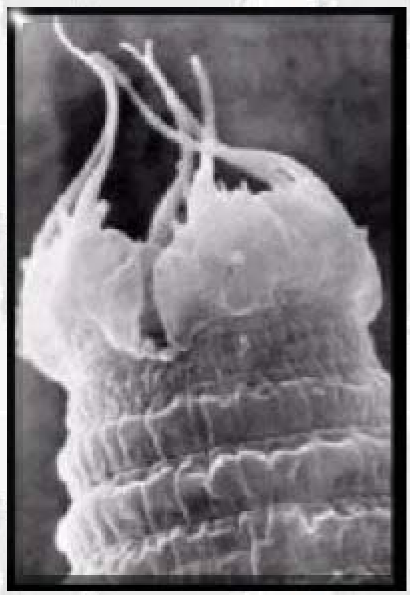
B-420-M

NSF/OPP Award 98-10219

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Lake Hoare, Lake Fryxell, Dry Valleys
Dates in Antarctica: Early October to mid February

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. W. Berry Lyons
Ohio State University
Byrd Polar Research Center
lyons.142@osu.edu
http://huey.colorado.edu



McMurdo Dry Valleys Long Term Ecological Research (LTER): The role of natural legacy on ecosystem structure and function in a polar desert

Deploying Team Members: Peter Cable . Kelly Foley . Katherine Jennifer Harris . Alfred Kaltenbach . W. Berry Lyons . Kathleen Ann Welch

Research Objectives: The McMurdo LTER lakes program is focused on understanding the environmental conditions and ecological processes of former and present lakes in the dry valleys. The main objective is to provide general background information on the physical, chemical, and biological activity in Lakes Bonney (east and west lobes), Hoare, and Fryxell. Studies are being done to monitor lakes and streams in order to detect changes through time, and relate these to changes in physical parameters, e.g., climate, hydrology. Monitoring of the lakes and streams is also being done to collect data for water, major solute, and nutrient budgets of the lakes.

This group is responsible for monitoring the inorganic geochemistry of waters collected from the glaciers, streams, ponds and lakes of the Dry Valleys. As part of the LTER project, team members will collect rock samples to study inorganic carbon dynamics in soils, specifically calcite formations. They will study the upland seeps and ponds for a better understanding of their hydrologic and geochemical controls. They will continue to work with co-PI's involved with the LTER lake and stream sampling programs in the Dry Valleys. One team member will continue a study of chemical weathering in the hyporheic zone of the streams using major ions, Silicon, Uranium decay series elements and trace elements.

Top of Page

2004-2005 USAP Field Season

Glaciology

Dr. Julie Palais
Program Manager

I-190-M

NSF/OPP Award 02-29546

Station: McMurdo Station

RPSC POC: Doug Miller

Research Site(s): Icebergs B15-J, B15-K, C16, Drygalski Ice Tongue, Nascent Iceberg (Ross Ice Shelf), Saddle between Mt. Bird and Mt. Erebus

Dates in Antarctica: Early October to late November

Collaborative research of Earth's largest icebergs

Dr. Douglas R. MacAyeal
University of Chicago
Department of Geophysical Sciences
drm7@midway.uchicago.edu
http://amrc.ssec.wisc.edu/iceberg.html

RV Polar Sea "facing off" against iceberg B15A for the first time in January of 2001. This project flew off the deck of the Polar Sea and placed sensors and GPS receivers on the iceberg, allowing them to monitor it's position and weather conditions. Photo by Josh Landis.

Deploying Team Members: Kelly Brunt . Young-Jin Kim . Douglas R. MacAyeal . Emile Okal . Marianne H. Okal . Ronald Ross . Olga V. Sergienko . Jonathan E. Thom

Research Objectives: This project represents a multi-institutional and multi-disciplinary effort to investigate the physical processes governing the behavior of giant tabular icebergs calved from Antarctica's ice shelves. Last year the main focus of the field program was the fleet of icebergs that are currently aground or adrift near Ross Island. This season, this focus will be expanded to include two ice-shelf or ice-tongue sites (one on the Ross Ice Shelf and the other known as the Drygalski Ice Tongue) that are expected to become new icebergs in the next several years.

The scientific rationale of the research is threefold: the first is the fact that the opportunity to investigate the basic principles governing the drift, melting, break-up and environmental impact (including generation of seismic signals) of large icebergs presents itself only rarely, and the calving of icebergs presently underway in the Ross Sea presents a once-in-a-lifetime opportunity. The second is the fact that the northward drift of large tabular icebergs represents a natural “climate change” experiment on an accelerated time-scale: the melting of the icebergs being studied over the next decade will foretell events that may occur in parts of Antarctica (e.g., the ice shelves) as global warming kicks in over the coming century. A third motivation is that large tabular icebergs from Antarctica represent a significant mass of fresh water -- an important natural resource of concern to humans. Understanding the natural drift patterns, and regions where icebergs accumulate near inhabited parts of the globe may someday prove useful for supplying fresh water to populations in need.

Project team members will deploy autonomous drift-tracking stations that report iceberg weather conditions, collect GPS data that tracks iceberg movements, and publish occasional webcam photographs through satellite connections to the internet. Seismometers are deployed on the icebergs to determine the source of T-phase seismic tremor. T-phase stands for “tertiary arrival” and is the name tentatively given by seismologists to the enigmatic acoustic signals generated by icebergs and picked up thousands of kilometers away in remote island outposts. Radar measurements, using both portable radar sounders and permanent in situ radar stations are conducted to determine the basal melting rate of the icebergs in response to the warmer ocean temperatures they will encounter as they drift north.

Data collected so far has helped to illuminate the causes and effects of the enigmatic drift pattern of B15A in the vicinity of Ross Island. Over the course of the next decade, instruments deployed on B15A and other icebergs will monitor their behavior as they drift far from the Ross Sea.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-006-M
NSF/OPP Award 01-30398

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Granite Harbor, New Harbor, Sea Ice
Dates in Antarctica: Late August to mid February

Energetics of protein metabolism during development of antarctic echinoderms

Dr. Donal T. Manahan
University of Southern California
Department of Biological Sciences
manahan@usc.edu
[No website]

Photo not available.

Deploying Team Members: David W. Ginsburg . Allison J. Green . Donal T. Manahan . Robert E. Maxson . Michael Moore . Douglas A. Pace

Research Objectives: Understanding metabolic efficiency in polar organisms is required to help resolve long-standing questions regarding temperature compensation and adaptations to food limitation in polar regions. This project will emphasize the subcellular levels of biological analysis to understand the relationship between development, growth, metabolic rate, and rates and costs of protein synthesis in the antarctic organisms it studies. The group will test the hypothesis that there is a “new” biochemistry for protein synthesis in these antarctic organisms.

The field team will combine their expertise in antarctic larval physiology and the biochemistry and molecular biology of sea urchin development to address an experimental plan that is based on three major objectives.

+ Test the generality of the groups' recent finding of the low cost of protein synthesis in antarctic sea urchin larvae by measuring metabolism and protein synthesis during development of other antarctic echinoderm species.

+ The prediction of a high rate of protein synthesis with low metabolic cost is that growth efficiencies will be high in such organisms. Researchers will directly test that hypothesis by measuring the physiology of protein growth efficiencies in larvae.

+ Explain in specific molecular terms the unique high efficiency of protein synthesis in antarctic sea urchin embryos by studying each of the component processes of protein synthesis (i.e. fraction of ribosomes engaged in protein synthesis, the fraction of mRNA molecules engaged in protein synthesis, average polysome size, and polypeptide elongation rates).

The group will also supplement these measurements on whole population protein synthesis with measurements based on selected individual proteins. At the subcellular level, rates of ATP (Adenosine triphosphate, the energy currency of cells) consumption during protein synthesis will be measured in cell-free translation systems of antarctic sea urchin embryos. The combination of these quantitative analyses will allow scientists to pinpoint those aspects of protein metabolism that result in such extremely high energy-efficiencies.

Top of Page

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-054-M

NSF/OPP Award 03-38291

Station: McMurdo Station

RPSC POC: Melissa Rider

Research Site(s): Western Olympus Range, Asgard Range, upper Beacon Valley and adjacent valleys in the Quartermain Mountains, Kennar Valley

Dates in Antarctica: Mid October to early January

Age, origin, and climatic significance of buried ice in the western Dry Valleys

Dr. David R. Marchant
Boston University
Department of Earth Sciences
marchant@bu.edu
[No website]

Photo not available.

Deploying Team Members: James W. Head . Douglas Kowalewski . Joseph Levy . Adam R. Lewis . David R. Marchant . Rebecca Parsons . Joerg Schafer . David Shean . Kate Swanger

Research Objectives: Buried ice deposits represent an exciting and potentially far-reaching archive of atmosphere and climate on Earth extending back for many millions of years. These deposits are terrestrial analogs to widespread and young buried ice on the Martian surface as identified by recent data from Mars Odyssey.

This project will evaluate the age, origin, and climatic significance of buried ice in the western Dry Valleys region. These and other researchers have published evidence that the ice to be examined is over a million years in age, making it by far the oldest ice yet known on this planet.

An alternative view is that the buried ice is more recent segregation ice produced from the in-situ freezing of groundwater. Distinguishing between these hypotheses is key to understanding Neogene climate change of Antarctica. First steps toward addressing this question have shown that glacier ice, far older than in the Vostok ice core (420,000 yrs), exists in Mullins Valley, southern Victoria Land, and that it contains the typical "saw-tooth" pattern for downcore changes in dD and d18O that so characterize climate records in late Quaternary ice cores.

The project team comprises a diverse research group with expertise in antarctic geomorphology, numerical modeling, cosmogenic dating, 40Ar/39Ar analyses, ice-core analyses, and ice-core drilling technology. The interdisciplinary research program proposes to:

+ Understand better the surface processes that permit ice preservation,

+ Test the efficacy of cosmogenic and 40Ar/39Ar analyses in dating tills above buried ice,

+ Further assess the use of cosmogenic-nuclide analyses and 40Ar/39Ar analyses of ashfall deposits to date buried ice, and

+ Use these data to help resolve the debate between "young" and "old" ice scenarios.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-029-M
NSF/OPP Award 02-38281

Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Sea Ice, Granite Harbor, New Harbor
Dates in Antarctica: Early October to mid January

CAREER: Genomic networks for cold-adaptation in embryos of polar marine invertebrates

Dr. Adam G. Marsh
University of Delaware
College of Marine Studies
amarsh@udel.edu
http://marsh.cms.udel.edu/~amarsh

Photo not available.

Deploying Team Members: Ogugua Anene-Maidoh . Jeremiah Dann . Lindsay Kendall . Adam G. Marsh . Richard Strathmann . Paul Ulrich

Research Objectives: Although the cold ocean ecosystems comprise 72 percent of Earth's biosphere by volume, they remain sparsely inhabited and relatively unexploited, particularly the metazoan phyla. The few animals that do exist at this border of intracellular freezing are ideal for exploring genomic-level processes of environmental adaptation. Understanding life at the margin will convey significant insights into the processes essential for survival under intense selection pressures.

This project's study of adaptive mechanisms in genomic networks focuses on a system that faces a formidable challenge at cold temperatures: Embryonic development of two antarctic echinoderms, the seastar Odontaster validus and the sea urchin Sterechinus neumayeri, at sea water temperatures of –1.8º C. Project team members will quantify temperature effects on gene expression and protein turnover networks during early development by using a Bayesian network analysis to identify clusters of genes and proteins whose levels of expression are associated in fixed, synergistic interactions.

Researchers will address the question of whether it is more or less difficult (complex) for an embryo to develop in an extreme environment. To answer it, team members will decipher network topologies and subnet structuring to uncover gene connectivity patterns associated with embryonic development in this polar environment.

This project also has outreach components designed for both undergraduate students and the public bringing the experience of working in Antarctica to a larger audience by:

+ Incorporating environmental genomics into a new bioinformatics curriculum being developed at the University of Delaware,

+ Implementing an intern program to involve minority undergraduates in summer research in the United States and then to bring them to Antarctica to participate in research, and

+ Creating a K–12 education program that will bring the excitement of working in Antarctica to the classrooms of thousands of children (in the United States and around the world) through a program produced in conjunction with the Marine Science Public Education Office at the University of Delaware.

Top of Page

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-056-M

NSF/OPP Award 02-29306

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Bull Pass, Dry Valleys, Victoria Valley
Dates in Antarctica: Early December to late January

Magmatism in the Dry Valleys: A workshop

Dr. Bruce D. Marsh
Johns Hopkins University
Morton K. Blaustein Department of Earth and Planetary Sciences
bmarsh@jhu.edu
[No website]

Photo not available.

Deploying Team Members:

Jean Henri Joseph Bedard . George Bergantz . Alan Boudreau . Amanda D. Charrier . Jennifer Rebecca Cooper . Scotty Cornelius . Jon Davidson . Justin Durel . David H. Elliot . Ron Victor Fodor . Michael Garcia . Dennis Geist . Karen Harpp . Taber G. Hersum . Dougal Jerram . Simon Allen Kattenhorn . Michael Manga . Bruce D. Marsh . Ed Mathez . Ian Stewart McCallum . Samuel B. Mukasa . Howard Richard Naslund . Scott Paterson . Nick Petford . Adam Simon . Jill VanTongeren . Michael Zieg

Research Objectives: This project is a three-week field and laboratory event involving 20 to 25 researchers who will investigate the fundamental mechanics and development of magmatic systems in the most general sense. The event is a working conference with sessions split between discussions, laboratory work in the Crary Laboratory, and field-work in the Dry Valleys. Four major magmatic processes will be considered:

1. Magma transport and differentiation in a mush column (East Bull Pass)

2. Crystal transport and sorting in ponding magma (East Dais)

3. Solidification front instability in sills (Pandora’s Spire/Solitary Rocks)

4. Mechanics of sill emplacement (Victoria Valley and East Wright Valley)

The McMurdo sessions will involve discussion, map work, modeling (both analytical and simple experimental), calculations (with a cadre of versatile software), rock cutting, and making thin sections so that the bulk of the discussion can center on essentially real time field observations. To provide the broadest possible impact, both in real-time and in the long-term, the ideal mix of participants will include those who have experience, expertise, and a passionate interest:

+ Researchers working on other parts of the Ferrar system;

+ Senior researchers of layered intrusions and basaltic sills;

+ Researchers of ocean ridge magma chambers and melt sheets;

+ Young researchers studying magmatic processes;

+ Graduate students in igneous petrology

The chief aim of this meeting is to identify the fundamental features and processes common to all magmatic systems, to understand the regional dynamics of the Ferrar-TAM (Trans-Antarctic Mountains) magmatic province, and to expose strong scientists to the unique and world-class field area that Antarctica provides.

Twenty participants and an additional five scientific team members will be split into two groups. At all times one group will be camping in Bull Pass while the other remains in McMurdo. At various times the two groups will switch locations. Activities include day trips to Victoria Valley, the Dais intrusion in the Dry Valleys, and aerial field trips for each group.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-021-L
NSF/OPP Award 02-17282

Station: R/V Laurence M. Gould
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): Standard LTER sample stations
Dates in Antarctica: Late December to early February

Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

Dr. Douglas G. Martinson
Columbia University
Lamont-Doherty Earth Observatory
dgm@ldeo.columbia.edu
[No website]

Photo not available.

Research Objectives: This project is the modeling component of Palmer Station Long Term Ecological Research (LTER). It focuses on temperature and salinity profiles of the water column at each standard station in the study areas. The models will include weather and navigational data such as wind speed and direction, air temperature and humidity at east station site, as well as latitude and longitude data. Data from shipboard ADCP (Acoustic Doppler Current Profileer) is also used for interpretation and checking of geostrophic calculations.

Shipboard technicians sample the temperature and salinity of the water column at each standard LTER station, and in any other location during the cruise relevant to other LTER group needs or in response to interesting scientific insights arising during normal sampling.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-421-M

NSF/OPP Award 98-10219

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Dry Valleys
Dates in Antarctica: Late October to late January

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. Diane M. McKnight

University of Colorado Boulder
Institute of Arctic and Alpine Research (INSTAAR)
mcknight@snobear.colorado.edu
http://huey.colorado.edu

The Role of Natural Legacy on Ecosystem Structure and Function in a Polar Desert: The McMurdo Dry Valley Long Term Ecological Research Program

Deploying Team Members:

Justin Joslin . Diane M. McKnight . Chi Yang

Research Objectives: This project is the flow, sediment transport, and productivity of streams component of McMurdo LTER. The researchers will continue to operate a network of 15 stream flow gauges, collect water quality samples from 30 streams, and make hydrologic measurements. Most of the work will take place in the Taylor and Wright Valleys and project team members will also visit the Garwood, Marshall, and Miers Valleys. Investigators will work with Tony Hansen and his group (O-314) to install a Transportable Autonomous Instrumentation Support Unit (TAISU) at the Onyx River gage near Lake Vanda. This unit provides remote monitoring of stream flow, temperature, and conductivity data. Remote monitoring enables researchers to more effectively schedule site visits when gauge equipment is malfunctioning so as to minimize data loss. Similarly, scheduling site visits during times of high flow enables the field team to obtain more independent flow measurements.

Team members will also attempt to repair and operate an existing stream gauge at Santa Fe Stream in the Lake Bonney basin. The gauge at Santa Fe will be updated to a sonic sensor and a stilling well to record stage height. They will also continue hyporheic zone thermal budget modeling investigations.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-104-S

NSF/OPP Award 02-30428

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Maintenance in January, observations in the austral winter

---

Dayside auroral imaging at South Pole

Dr. Stephen B. Mende
University of California Berkeley
Space Sciences Laboratory
mende@ssl.berkeley.edu
[No website]

Dayside auroral imaging at South Pole. Photo by Charles Kaminski.

Research Objectives: The South Pole has advantages for auroral imaging because the continuous darkness over the winter months allows 24 hours optical observations and the ideal magnetic latitude permits the observation of dayside aurora. This group operates two ground-based imagers at Amundsen-Scott South Pole Station and combines their observations with simultaneous global auroral observations by the IMAGE spacecraft to investigate the temporal and spatial details and ionospheric effects of reconnection processes at the magnetopause.

The reconnection (merging) region of the magnetosphere provides the most significant entry point for solar wind plasma. It is now widely accepted that the dayside region contains the foot point of field lines that participate in reconnection processes with the interplanetary field. Although there is quite a body of literature about the auroral footprints of the dayside reconnection region from ground based observations it has not been possible to relate those results to simultaneous global auroral images.

Global observations of proton auroras from the IMAGE spacecraft provided direct images of the foot print of the reconnection region showing that reconnection occurs continuously and that the spatial distribution of the precipitation follows the theoretically predicted behavior as a function of the interplanetary field (IMF). The apogee of the IMAGE spacecraft orbit is slowly drifting south and in the time frame of this grant, IMAGE apogee will be over the southern hemisphere. Thus it will be possible to obtain simultaneous global images of the aurora by IMAGE and of the high latitude dayside region by two ground-based imagers (electron and protons auroras) at South Pole Station.

This project will capitalize on this unique opportunity and use the IMAGE satellite as the “telescope” and the ground-based imagers as the “microscope” for these observations. Understanding the earth's electromagnetic environment is key to predicting space weather and to determining how geoactive magnetic storms are.

Top of Page

2004-2005 USAP Field Season

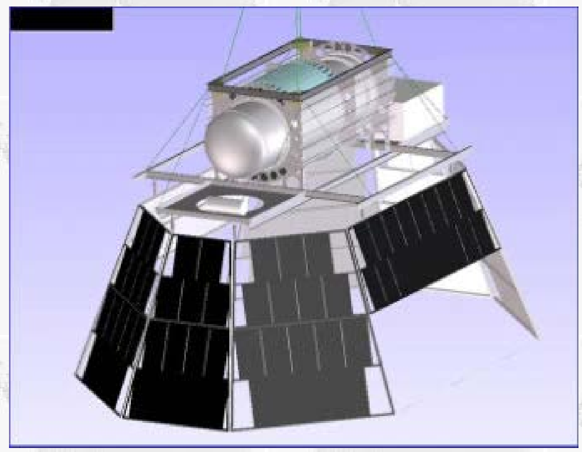
Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager
NSF/NASA agreement

A-140-M
Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Williams Field
Dates in Antarctica: Late October to late January

Balloon-borne Experiment with a Superconducting Spectrometer (BESS)

Dr. John W. Mitchell
National Aeronautics and Space Administration
Goddard Space Flight Center
john.w.mitchell.1@gsfc.nasa.gov
http://lheawww.gsfc.nasa.gov/docs/gamcosray/hecr/BESS/BESS.html



ATIC-1 after landing on January 13, 2001. Photo courtesy of LSU.

Deploying Team Members: Hideyuki Fuke . Sadakazu Haino . Teruyuki Kumazawa . Yasuhiro Makida . Shinya Matsuda . John W. Mitchell . Frank San Sebastian . Makoto Sasaki . Kazuma Takeuchi . Akira Yamamoto . Tetsuya Yoshida

Research Objectives: BESS-Polar is a joint project of Japanese and US scientists to search for antimatter in the cosmic radiation and measure energy and intensity of less exotic components of the cosmic radiation. The antimatter search is of great interest in that it may provide answers to questions of cosmological significance dating from the creation of the Universe:

1. Is the Universe "baryon symmetric"? That is, does it contain equal amounts of matter and antimatter? Might there exist antimatter galaxies? Discovery of a single antihelium would answer this question.

2. Is there an excess of low energy antiprotons beyond that expected from "standard" processes? If so, BESS measurements may provide evidence for the existence of primordial black holes or dark matter.

The BESS-Polar instrument is a large superconducting magnet augmented with a variety of detectors for tracking charged particles and determining their momentum, velocity and identity. The payload has the largest geometry factor of any balloon-borne magnet spectrometer currently flying and is ideally suited for identifying antiprotons and the nuclei of antihelium.

The long-duration flight of BESS-Polar is expected to provide data of unprecedented sensitivity in searching for antihelium and low energy antiprotons. It will also measure proton and helium spectra and separate light isotopes in galactic cosmic rays.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-130-S
NSF/OPP Award 03-37726

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

AMANDA 2004 (Antarctic Muon and Neutrino Detector Array)

Dr. Robert M. Morse

University of Wisconsin Madison
morse@amanda.physics.wisc.edu
http://amanda.berkeley.edu

Antarctic Muon And Neutrino Detector Array (AMANDA).

Deploying Team Members:

Markus Ackermann . Patrick Simon Peter Berghaus . Elisa Bernardini . Dave Besson . Jim Braun . Thomas T. Burgess . Thierry Pierre Alexandre Castermans . Steve T. Churchwell . Kenneth Evans . Kirsten Sabine Goldmann . Marc Hellwig . Daan Hubert . Per Olof Hulth . Klas Goeran Hultqvist . Stephan Hundertmark . Ilya V. Kravchenko . Johan Lundberg . Alf Timo Messarius . Rudy Alan Moore . Jiwoo Nam . Philip Olbrechts . Stefen Schlenstedt . Andrea Silvestri . Wolfgang Wagner . Michael Walter

Research Objectives: Neutrinos are elementary particles with no electrical charge and believed to have very little or no mass. Coursing through the universe they interact only rarely with other particles. The sources of neutrino origins could be diffuse, made up of contributions from many active galactic nuclei (ANGI), or they could be point sources of neutrinos coming from supernova remnants (SNRs), rapidly rotating pulsars, neutron stars, individual blazars, or other extragalactic point sources. Recently, new sources of high energy gamma rays have been discovered such as the source Mrk 421, discovered by NASA's Compton Gamma Ray Observatory (CGRO) and Mt. Hopkins Observatory. To date, neutrino astronomy has been limited to the detection of solar neutrinos, plus one brief spectacular burst from the supernova that appeared in the Large Magellanic Cloud in February of 1987 (SN 1987a).

Only now is it becoming technically feasible to build large neutrino telescopes. As one of the first generation detectors, AMANDA promises to make seminal contributions to this branch of neutrino astronomy. AMANDA's primary objective is to discover the sources both within our galaxy, and beyond, of the shower of very high energy neutrinos descending on and usually passing through the earth. AMANDA uses an array of photo multiplier tubes imbedded in the ice near the South Pole, between one and two kilometers deep, to create a Cherenkov detector out of the natural ice. Cherenkov radiation is emitted by collisions of high-energy neutrinos with atoms in the ice.

Over the last six seasons, the project has drilled an array of holes in the ice and suspended over 600 photomultiplier tubes on "strings" inside. The ultratransparent ice at South Pole allows detection of the blue light of Cherenkov radiation from several hundred meters away. There are currently 26 strings, each hard-wired to computers in the Martin A. Pomerantz Observatory (MAPO) facility. The computers analyze the gigabytes of collected data to determine true neutrino events.

This season AMANDA plans a number of electronic upgrades to the existing experiment, VLF noise investigations (VLF Beacon Operations), calibration of the entire instrument, improvements in the supernova Detection System Support of the RICE (Radio detection of Neutrinos). Upgrades to the ICECUBE prototype string of detectors will complete the work on new Transient Waveform (TWR) system experiment.

Top of Page

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-052-M/P/S

NSF/OPP Award 02-33246

Station: McMurdo Station, Palmer Station

RPSC POC: Jessie Crain/Rob Edwards

Research Site(s): Arrival Heights, Cape Roberts, Dry Valleys, Fishtail Point, Mt Fleming, Beacon Valley, Palmer Station, South Pole Station

Dates in Antarctica: Early November to mid January

Geodesy and geospatial data program

Mr. Jerry L. Mullins
United States Geological Survey
jmullins@usgs.gov
http://usarc.usgs.gov/antarctic_atlas/

Photo not available.

Deploying Team Members: Cheryl A. Hallam . Larry Dalton Hothem . Jerry L. Mullins . Jeremy Palmer . Daniel Sechrist

Research Objectives: Geodetic surveying, aerial photography, remote sensing (principally using several varieties of satellite imagery), and mapping are all activities necessary for the successful operation of a multifaceted scientific and exploration effort in Antarctica. The U.S. Geological Survey provides these support activities to the U.S. Antarctic Research Program. Specifically four areas of support will be provided:

Project team members will service and retrieve GPS data from the Antarctica Remote Global Navigation Satellite Systems (GNSS) Observatories (ARGO) established during the 2001-2 and 2002-3 field seasons. They will perform hardware and firmware upgrades at three autonomous ARGO sites: Cape Roberts, Mt. Fleming, and Fishtail Point. Data collected with the continuous operating low power systems contribute to the SCAR Geodetic Infrastructure for Antarctica (GIANT) and SCAR ANTEC program research objectives. This support includes investigation of atmospheric refraction effects on GPS observation data, serving as GPS base reference station for ground and airborne georeferencing requirements; and contributions to a database in support of long term investigations to measure crustal deformation in the Transantarctic Mountains, Ross Island and vicinity.

In cooperation with Land Information New Zealand (LINZ), team members will perform annual maintenance and calibration of the tide gauge observatories at Cape Roberts and Scott Base. Tide gauge data are incorporated in database with other tide measurements obtained from continent-wide network of stations. Data supports the global sea level studies, establishing sea level datum for hydrographic surveys, and the SCAR GIANT program objectives. Calibration surveys are performed over a two or three day period at time of peak tide variation.

USGS personnel will continue to support the daily operations of the International GPS Service (IGS) system for station MCM4 located at the RADARSAT facility on Arrival Heights, and for the GPS/GLONASS (Russian system) integrated receiver observatory system for station CRAR, located at Crary Laboratory. These observations contribute to high accuracy orbital computations and research into integration of observations from different systems of the GNSS.

As may be required by scientists and researchers, USGS personnel will perform special geodetic surveys at selected sites in the region of the Dry Valleys, Beacon Valley, and on Ross Island. The purpose of special geodetic surveys include supporting image ground control requirements, enhancing accuracy and densification of the regional geodetic control network, and testing accuracy of geospatial (height) data obtain by application of airborne remote sensing instrumentation such as from IceSat, LIDAR, RADARSAT, high resolution airborne digital cameras.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-255-M/S

NSF/OPP Award 02-30370

Station: McMurdo Station, South Pole Station

RPSC POC: Charles Kaminski

Research Site(s): Arrival Heights, ARO Building

Dates in Antarctica: Instruments operate continuously

Infrared measurements of atmospheric composition over Antarctica

Dr. Frank J. Murcray
University of Denver
Department of Physics & Astronomy
fmurcray@du.edu
[No website]

Photo not available.

Deploying Team Members: Pierre F. Fogal . Toufic M. Hawat . Frank J. Murcray

Research Objectives: Using passive infrared instruments, this project measures year-round atmospheric chemistry to acquire better data for the photochemical transport models used to predict ozone depletion and climate change. The ozone hole has shown how sensitive the southern polar stratosphere is to chlorine, and although gradual healing of the hole is expected, model predictions indicate a possible delay in recovery because of the impact of global warming on the catalytic ozone destruction process.

Since most satellite instruments do not sample the polar regions in the winter, ground-based instruments can make important contributions. The data from these instruments also provide validation for new satellite sensors. In the first year of the project, team members installed two spectrometers, one at Amundsen-Scott South Pole Station and another at McMurdo Station for year-round operation, and a solar spectrometer at South Pole Station for summer operation. Project researchers collaborate with and receive data from the New Zealand National Institute for Water and Air Research, which operates a similar solar spectrometer at Arrival Heights. During the polar night, two instruments will provide important information on nitric acid and denitrification, as well as dehydration, and high-resolution spectra from which are derived vertical profiles, vertical column amounts of many molecules important in the ozone destruction process, and atmospheric tracers. Specifically, project team members will derive year-round column abundance measurements of nitric acid, methane, ozone, water, nitrous oxide, the chlorofluorocarbons (CFCs), and nitrogen dioxide.

The solar instruments will provide some altitude profile information about those molecules and others. The data will be used to:

+ Determine the current state of nitrogen oxide partitioning,

+ Measure denitrification, vapor profiles in the stratosphere, and dehydration,

+ Determine current CFC and stratospheric chlorine levels, and

+ Gain more insight into vortex-related chemical and dynamic effects.

The data will also allow photochemical transport modelers to compare outputs with actual measurements, especially at intermediate stages. As the recovery from ozone destruction begins, it is important to have a data set that comprehensively covers the major constituents of both the catalytic ozone destruction sequence and global warming, in order to place the relative influence of the two mechanisms in perspective.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-086-E
NSF/OPP Award 02-30069

Station: Special Project
RPSC POC: John Evans
Research Site(s): Palmer Station
Dates in Antarctica: Early November to early February

Long-term data collection at select Antarctic Peninsula visitor sites

Mr. Ron Naveen
Oceanites, Inc.
oceanites.mail@verizon.net
[No website]

Gentoo penguins at Petermann Island. Photo ©2004 by Ron Naveen/Oceanites, Inc.

Deploying Team Members: Stacey Buckelew . Ian Drummond Bullock . Rosemary Dagit . Steven Forrest . Ron Naveen

Research Objectives: The Antarctic Site Inventory Project has collected biological data and site-descriptive information in the Antarctic Peninsula since 1994. This research has provided data on sites visited by tourists on shipboard expeditions in the region. The project's goal aim is to obtain data on the population of several key species of Antarctic seabirds that might be impacted, directly or cumulatively, by visits to these sites.

Investigators will focus particularly on Petermann Island, a heavily visited Antarctic Peninsula site south of Anvers Island and the Lemaire Channel. Petermann Island was selected because it ranks among the ten most visited sites in Antarctica each year in terms of numbers of visitors and zodiac landings, is diverse in species composition, and is sensitive to potential environmental disruptions from visitors.

Project team members will collect data over five years on two important biological parameters for Adelie and gentoo penguins, and blue-eyed shags:

+ Breeding population size (number of occupied nests) and

+ Breeding success (number of chicks per occupied nest).

The close proximity of Petermann Island to Palmer Station will allow comparison of data with the Palmer Long-Term Ecological Research Program (LTER).

Team members will collect demographic data in accordance with the standard methods established by the Convention for the Conservation of Antarctic Marine Living Resources Ecosystem Monitoring Program, and the information gathered will thus be comparable with similar data sets being compiled by the research programs of other Antarctic Treaty nations. While separating human-induced change from change resulting from a combination of environmental factors will be difficult, this work will provide a first step toward identifying potential impacts. The long-term data sets will contribute to a better understanding of biological processes in the entire region and will also contribute valuable information to be used by Antarctic Treaty nations as they address environmental stewardship issues in Antarctica.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-203-N
NSF/OPP Award 01-27037

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Stephanie Suhr-Sliester
Research Site(s): R/V Nathaniel B. Palmer
Dates in Antarctica: Mid December to late January

Interactive effects of UV and vertical mixing on phytoplankton and bacterioplankton in the Ross Sea

Dr. Patrick J. Neale
Smithsonian Institution
Smithsonian Environmental Research Center
neale@serc.si.edu
http://www.serc.si.edu/uvb/Ross_Sea_index.htm

Photo not available.

Deploying Team Members: Linda Franklin . Teresa Garner . Patrick J. Neale . Jesse Diego Phillips-Kress . Cristina Sobrino

Research Objectives: Ultraviolet (UV) radiation influences plankton in the near-surface waters of most ecosystems. In particular, the Southern Ocean is affected in the austral spring, when UV radiation is enhanced by ozone depletion. While progress has been made in estimating the impact of UV radiation on bacteria and phytoplankton in the Southern Ocean, important issues remain to be resolved. Little is known, for example, about responses in systems dominated by the colonial haptophyte Phaeocystis antarctica, which dominates spring blooms in the southern Ross Sea. The presence of open water at a far southerly location in the spring, well within the ozone hole, and continuous daylight, with implications for DNA repair, make the Ross Sea of intense interest.

A number of studies suggest that vertical mixing can significantly modify the impact of UV radiation. However, the limited measurements of turbulence intensity in the surface layer that have been done have not been integrated with parallel studies of the effects of UV radiation on phytoplankton and bacterioplankton. This project addresses these issues by focusing on vertical mixing and UV radiation in the Ross Sea and characterize phytoplankton and bacterioplankton responses in both laboratory and solar incubations. These studies will lead to biological weighting functions and response models capable of predicting the impact of UV radiation on photosynthesis, bacterial incorporation, and DNA damage in the surface layer.

Project team members will measure depth-dependent profiles of DNA damage, bacterial incorporation, photosynthesis, and fluorescence parameters over a 24-hour cycle. They have optimized measurements for typical springtime conditions in the Ross Sea, where stabilizing influences like solar heating and/or surface freshwater from melting ice mean that not enough turbulence is present to thoroughly mix the upper layer. Researchers will develop fine-scale vertical density profiles to directly estimate large eddy scales. Estimated turbulent diffusivities and eddy scales will be directly related to surface layer effects and used to generate models of UV radiation responses in the surface mixed layer.

This first in-depth study of UV radiation in the Ross Sea will enhance scientific understanding of vertical mixing processes, trophic interactions, and biogeochemical cycling in the Ross Sea and will provide a valuable comparison with previous work in the Weddell-Scotia Confluence and Palmer Station regions.

Top of Page

2004-2005 USAP Field Season

Artists & Writers

Mr. Guy Guthridge
Program Manager
Artist/Writer Program

W-220-P
Station: Palmer Station
RPSC POC: Elaine Hood
Research Site(s): Palmer Station
Dates in Antarctica: Mid November to late December

Time, place, and imagination: Images and poems from Antarctica

Ms. Judith E. Nutter
anubis120@juno.com
[No website]

Jude Nutter

Deploying Team Members: Judith E. Nutter

Research Objectives: Jude Nutter will be gathering material for a collection of poems and pastels called *Time, Place, and Imagination*. This will not be a collection of “illustrated” poems: The pastels will not be portraits of landscape, but visions of landscape, which, in turn, means that they will reflect something of the artist’s emotional and spiritual orientation. Ms. Nutter anticipates producing a series of poems written in response to the antarctic landscape as well as to the history of Antarctica and the internal landscapes of those who are drawn to such an environment. As the writer Francis Spufford points out, there is an “uncharted” polar history; an “intangible history of assumptions, responses to landscape, cultural fascinations, aesthetic attraction to cold regions.” This interplay between the physical landscape and the internal landscape will be the focus of the collection.

A native of North Yorkshire, England, Jude Nutter came to the U.S. in the late 1980s and spent ten years homesteading on Wrangell Island in Southeast Alaska. Her poems have been widely published and received several national and international awards, grants, and honors. *Pictures of the Afterlife*, her first collection, was published by Salmon Poetry, Ireland, in 2002. Her second collection, *The Curator of Silence*, is forthcoming from the University of Notre Dame Press as part of its Ernest Sandeen Prize Series. She is currently at work on a collection of poems about World War I and World War II entitled *I Wish I Had a Heart Like Yours*, Walt Whitman.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-321-M/S

NSF/OPP Award 00-90343

Station: McMurdo Station, South Pole Station

RPSC POC: Charles Kaminski

Research Site(s): McMurdo Station, South Pole Station

Dates in Antarctica: Late October to early November

Prevention of environment-induced decrements in mood and cognitive performance

Dr. Lawrence A. Palinkas

University of California San Diego
Department of Family and Preventive Medicine
lpalinkas@ucsd.edu
http://www.polart3.ucsd.edu

Photo not available.

Deploying Team Members: Marc Shepanek

Research Objectives: Cognitive performance degrades with residence in Antarctica, and mood alteration fits a seasonal pattern during extended residence. Although these changes suggest psychological responses to physiological adaptations to cold and dim light, the exact mechanisms are poorly understood. The first objective is to determine whether long-term exposure to cold temperatures and/or to dim light is associated with significant changes in cognitive performance and emotional well-being:

+ Is physiological adaptation to cold and/or adaptation to dim light independently or synergistically associated with decrements in cognitive performance and emotional well-being?

+ Do personnel at South Pole Station experience greater physiological adaptation and decrements than personnel at McMurdo Station?

This group will also determine whether these decrements can be prevented or minimized by pharmacologic interventions and/or phototherapy:

+ What are the effects of combining liothyronine sodium with levothyroxine sodium versus supplementation with tyrosine (a precursor to both thyroid hormone and catecholamines) and daily phototherapy?

+ Is phototherapy used in combination with a pharmacologic agent more effective than either intervention used alone?

In phase I, project team members will establish computer-testing protocols, develop an effective placebo capsule, package the necessary drugs, and test the validity and reliability of computer-administered cognition and mood protocols with 30 hypothyroid outpatients on constant thyroid hormone replacement and 30 age- and sex-matched healthy controls in New Zealand.

In phase II, 50 members of the 2002 winter (v) crews, 35 at McMurdo Station and 15 at South Pole Station, will be randomized in a double-blind crossover design into one of two treatment groups (20 subjects in each group) and one control group (10 subjects). Baseline measurements will be conducted, and treatment groups will be switched after a one-month washout period. Mood and memory testing will comprise five assessments over 12 months. Treatments consist of 50 micrograms (mcg) of levothyroxine sodium plus 12.5 mcg of liothyronine per day, 150 milligrams per kilogram of tyrosine per day, and a placebo.

In phase III, a similar design will be used to evaluate the effectiveness of phototherapy, alone and in combination with the more effective of the two pharmacologic interventions.

This research will lead to an improved understanding of the specific environmental conditions and physiological mechanisms that affect behavior and performance in the Antarctic, help develop countermeasures for circannual oscillations of mood and cognitive performance, and contribute to a reduction in accidental injuries at high latitudes.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

NSF/ATM (Division of Atmospheric Sciences) 03-36946

A-284-S

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): RF Sector
Dates in Antarctica: Instruments operate continuously

Dynamics of the antarctic MLT region using ground-based radar and TIMED instrumentation

Dr. Scott Edward Palo
University of Colorado Boulder
Department of Aerospace Engineering Sciences
scott.palo@colorado.edu
http://grison.colorado.edu

Photo not available.

Deploying Team Members: James Paul Avery . Susan Kathryn Avery . Santiago de la Pena . Hiroyuki Iimura . Diego Janches . Elias Moises Lau . Scott Edward Palo . William Pisano

Research Objectives: This is a propitious time to study a number of atmospheric phenomena, because of the recently-peaked 11-year solar cycle, and NASA's TIMED (Thermosphere-Ionosphere-Mesosphere-Energetics and Dynamics) satellite mission. In addition to measurements derived from instruments on TIMED, this project will install a meteor radar at Amundsen-Scott South Pole Station. Concentrating on the dynamics of the mesosphere and lower thermosphere, this group looks at:

+ The space-time decomposition of wave motions

+ Delineation of the spatial climatology over Antarctica with emphasis on the structure of the polar vortex

+ Dynamical response to energetic events

+ Inter-annual variability

The meteor radar is a VHF system capable of measuring the spatial structure and temporal evolution of the horizontal wind field over the South Pole. Spatial climatology data will also come from existing ground-based radars at Davis Station, Syowa Station, Rothera Station, and the Amundsen-Scott base.

As NASA's TIMED satellite orbits over the South Pole, wind and temperature data will provide counterpoint and corroborative information. Experiments based both in space and on the ground may be mounted, and data that was previously reliant on a single source can be better validated.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-144-E

NSF/OPP Award 02-30441

Station: Special Project

RPSC POC: Melissa Rider

Research Site(s): SANAE, South African base

Dates in Antarctica: Early December to late February

Balloon observations of MeV electron precipitation

Dr. George Parks

University of California Berkeley
Space Sciences Laboratory
parks@ssl.berkeley.edu
http://sprg.ssl.berkeley.edu/~jsample/

Photo not available.

Deploying Team Members: MIchael Kokorowski . John Sample

Research Objectives: This project's goal is to understand the loss of very energetic electrons (0.5 to 10MeV) from the Earth's radiation belts into the atmosphere. From previous balloon flights, it is believed that most of this loss happens in short-lived events very different from better-known kinds of electron loss.

Researchers will launch four small balloon payloads with X-ray, electric field and magnetic field instrumentation in an effort to observe some of these loss events from several positions around the Earth at once. By launching below the South Atlantic, the experiment takes advantage of the weakness in the Earth's magnetic field at that point to observe "drifted" echoes of precipitation (loss) events happening all over the Earth. From these data, investigators hope to deduce the physical mechanism that causes the precipitation, and see whether it may also be related to the acceleration of radiation-belt electrons to high energies.

Project team members will fly to Cape Town, South Africa where they will board a South African research ship for transport to SANAE station (South African National Antarctic Expedition).

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-375-S
NSF/OPP Award 03-42448

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Installation in the austral summer, observing in the winter

---

PAST: The Primeval Structure Telescope

Dr. Jeffrey B. Peterson
Carnegie-Mellon University
Physics Department
jbp@fire.phys.cmu.edu
[No website]

Photo not available.

Deploying Team Members: Bennett Andrew Maruca . Jeffrey B. Peterson

Research Objectives: For decades the study of the first collapsed objects has largely been a theoretical exercise since almost no data from redshift higher than five were available. The high redshift universe, where the first ionizing objects resided, was inaccessable to observation. That changed suddenly in February 2003. Using the WMAP (Wilkinson Microwave Anisotropy Probe) satellite, investigators reported evidence that the universe was ionized bery early, before age 200 million years. To ionize the universe at the then-prevailing hydrogen density would have required a very strong UV (ultraviolet) flux and that means it is likely that the first UV-effusive objects were formed much earlier than many cosmologists had thought. The early ionization means the universe was more violent, structured and interesting in its youth than many had considered.

This project will build and test the PrimevAl Structure Telescope (PAST) and use it to locate and study the era of formation of the earliest luminous objects. The primeval structures researchers expect to find contained the first stars, supernova explosions, and/or black holes. All these objects were strong sources of UV radiation so they ionized the material surrounding them. It is this ionization the PAST instrument will detect and study. The structure of this ionization reflects the overall density structure at the redshift of luminous-object formation.

The PAST will be a sparse array of 1,000 antennae spanning several square kilometers of ice surface adjacent to the station. The instrument will be build almost entirely of inexpensive commercially available components. The design will closely follow that of the proven South Pole Riometer, a VHF interferometer array which has been operating efficiently for a decade (Rosenberg, now Weatherwax, A-111-M/S).

The PAST array will image and spectrally resolve hyperfine emission of neutral hydrogen at redshifts from 6 to 35. As the primeval energy release developed, bubbles of ionization temporarily eliminated this emission. These bubbles were essentially the aggregate Stromgren spheres of protogalaxy groups and clusters. The PAST instrument will image these bubbles in three dimensions, allowing researchers to study their evolution and their merging. Scientists hope to understand the timing of formation of the first bright objects.

In addition to enabling study of the ancient history of the universe, the PAST array will provide polarized images of the galaxy with unprecedented resolution. PAST will also continuously image ionospheric absorption in finer detail than ever before.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-289-M
NSF/OPP Award 03-38428

Station: McMurdo Station
RPSC POC: Karl Newyear
Research Site(s): McMurdo Station, USCG Icebreaker
Dates in Antarctica: Early December to early February

Genetic and photogrammetric investigations of three ecotypes of Killer whales in the southern Ross Sea

Dr. Robert L. Pitman
National Oceanic and Atmospheric Administration
Protected Resources Division
Robert.Pitman@noaa.gov
[No website]

Mother-calf pair of "Type C" killer whales in the Ross Sea. Type C killer whales are smaller and occur in larger groups than killer whales found throughout the rest of the world. They prefer fast ice, are known to eat fish, including Antarctic toothfish, and may be a separate species. Photo by Robert Pitman.

Deploying Team Members: Don LeRoi . Wayne Lloyd Perryman . Robert L. Pitman

Research Objectives: Commercial whalers were the first to realize there may be more than one species of killer whales in Antarctica. Large killer whales live outside the pack ice and feed on Minke whales. Smaller ones are lesser known because they live in the pack ice, where they eat mawsoni and other fish. They are about 20 to 23 feet (6-7 m) long, which is 3 to 5 feet (1-1.5 m) shorter than the regular killer whale. And there may be yet a third species; a distinctive eye patch and differing school size may further distinguish the smaller killer whales into two groups, which don't intermingle. This project's goal is to determine if the types of whale are indeed distinct species.

Three observers aboard the USCG icebreaker will stand watches on the bridge during the transit from Hobart to McMurdo Station. When a killer whale group is sighted, and depending upon the circumstances (killer whale type, weather, time of day, operational conditions, ship's schedule) a request may be made to deploy a launch, a helicopter, or both. The data will be particularly valuable if both launch and helicopter operations can be used on the same group of killer whales.

Team members will collect biopsy samples using small boat operations and a projectile biopsy system developed and used successfully over the last 15 years. The fired dart has a hollow tip that extracts a tissue sample, bounces off the animal and is retrieved with a scoop net. The samples will be sequenced and analyzed at the Genetics Laboratory of Southwest Fisheries Science Center in La Jolla, California to compare genetic divergence among the three forms of killer whales.

Researchers will also obtain aerial photographs of individual whales using a helicopter-mounted 35-mm camera system. When the camera is fired, an altitude is automatically recorded from the radar altimeter and a position recorded from the GPS. These photographs will be used to accurately determine lengths and body proportions for morphological comparisons among the three forms. Previously published information indicates that the form that is most common in the southern Ross Sea may be significantly smaller than "regular" killer whales. Body length and body proportion data from aerial photographs can provide crucial morphological evidence for phenotypic divergence and speciation within this group.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-197-M

NSF/OPP Award 02-29638

Station: McMurdo Station
RPSC POC: Charles Kaminski
Research Site(s): Cape Crozier
Dates in Antarctica: Early October to mid December

Diving physiology and behavior of Emperor penguins

Dr. Paul John Ponganis
Scripps Institution of Oceanography
pponganis@ucsd.edu
http://antarctic.ucsd.edu

Emperor penguin exiting the experimental dive hole at the penguin ranch in the 1999 field season. Photo by Paul Ponganis.

Deploying Team Members: Andrea Torrence Knower Stockard . Jessica Ulrika Meir . Edward P. Ponganis . Katherine Victoria Ponganis . Paul John Ponganis . Katsufumi Sato . Judy St. Leger . Edward Raymond Stockard . Tania Zenteno-Savin

Research Objectives: The Emperor penguin, Aptenodytes forsteri, is the premier avian diver and a top predator in the antarctic ecosystem. The routine occurrence of 500-meter dives during foraging trips is a physiological and behavioral enigma. Project researchers will attempt to determine how and why Emperor penguins dive as deeply and long as they do by examining four major topics: pressure tolerance, management of oxygen stores, end-organ tolerance of diving hypoxemia/ischemia, and deep-dive foraging behavior. These subjects are relevant to the role of the Emperor as a top predator in the antarctic ecosystem and to critical concepts in diving physiology, including decompression sickness, nitrogen narcosis, shallow water blackout, hypoxemic tolerance, and extension of aerobic dive time.

The core of this season's project will be the Penguin Ranch, a sea ice camp for the study Emperor penguins' diving. Other work will include the censuses of the Emperor colonies by aerial photography over Beaufort Island, Franklin Island, and Cape Washington. Day trips will be conducted to the Cape Crozier colony, and (sea-ice permitting) the Beaufort Island colony. Project team members will deploy a long-term camera at Cape Crozier.

Microprocessor based instruments and cameras will be attached to birds, enabling researchers to determine feeding behavior, stroke frequency, diving air volume, oxygen depletion rates, and nitrogen profiles during diving. Biochemical investigations of biopsied tissue samples will also allow study of molecular adaptations to tissue hypoxia. In addition to investigation of mechanisms of hypoxemic and pressure tolerance, these studies will refine techniques for examination of diving behavior of Emperors at sea during the final year of the grant.

The final objective of the project is to continue annual censuses at Emperor colonies in the Ross Sea, and in particular, to follow the effects of the B-15 iceberg on the Cape Crozier colony. This is especially important because of recent declines in the last year: 6,000 fewer chicks at Cape Washington, only 300 chicks at Beaufort Island, and less than 200 chicks at Cape Crozier. Long-term monitoring of the Cape Crozier colony will also be evaluated with the deployment of a remote, programmable camera in this season.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

NSF/MCB (Division of Molecular and Cellular Biosciences) 02-37335

B-195-M

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Dry Valleys
Dates in Antarctica: Mid October to early January

Microbial diversity and function in the permanently ice-covered lakes of the Dry Valleys

Dr. John C. Priscu
Montana State University Bozeman
Land Resources and Environmental Sciences
jpriscu@montana.edu
http://www.mcm-dvlakesmo.montana.edu

Photo not available.

Deploying Team Members: Wilson Foo . Brian D. Lanoil . Johanna E. Laybourn-Parry . Joel L. Moore

Research Objectives: The antarctic Dry Valleys forms the driest and coldest ecosystem known and has, until relatively recently, been thought to harbor little life. This ecosystem is composed of a mosaic of glaciers, glacial streambeds, exposed soils, and the only permanently ice-covered lakes on Earth. The permanent ice eliminates wind-driven mixing resulting in vertical transport at the level of molecular diffusion, gas exchange between liquid water and the atmosphere, and reduces light penetration. The lakes present the only habitat in this ecosystem that contains permanent liquid water and supports year-round metabolic activity in an environment that would normally appear to be inhospitable to life. The food web of the lakes is dominated by prokaryotes and protists; few metazoans have been observed. Biogeochemical studies on these lakes have revealed many biogenic chemical gradients (e.g., N_2O, CH_4, DMS, DMSO) that lack simple biochemical and thermodynamic explanations.

These data beg one to ask if the microorganisms present in the water columns today are responsible for the geochemical gradients we now observe. A primary reason for establishing a MO for the dry valley lakes is to understand not just how the environment controls the diversity of organisms, but also how diversity itself controls the functioning of ecosystems. This is one of the hottest topics in modern ecological research and the lake systems lend themselves to answering these questions in a unique way. Given the lack of metazoans, and the evolutionary history and resultant geochemistry of these lakes, they offer a unique experimental arena to search for novel microorganisms and study the interplay of microbial diversity and ecosystem function.

This project will use molecular tools in concert with conventional and high throughput culturing techniques to define representative prokaryotic groups responsible for the contemporary redox couples and geochemical gradients that now exist in Lakes Fryxell and Bonney. These data will be integrated with prokaryotic based exoenzyme signatures and physiological traits to link prokaryotic diversity with ecosystem function. By working closely with the McMurdo LTER (Long Term Ecological Research), project team members will form a very diverse group representing fields that have not often worked together in the past (glaciologists, geochemists, hydrologists, meteorologists, microbial ecologists, molecular biologists, traditional microbiologists, modelers).

Given the sensitive and relatively simple systems in the dry valleys, this integrated approach will point the way towards a broader integration of the biogeosciences. The results will be significant to the growing bodies of literature in organismal diversity, biotechnology, geobiology, polar ecology, and astrobiology. The group will work with existing and proposed new programs to archive its phylogenetic and physiological data so that all interested can access it easily through the Internet. By linking this research with highly visible education, outreach and human diversity programs supported by NSF-OPP and the McMurdo LTER, this project will have a broad impact on society.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager
NSF/OPP Award 98-10219

B-422-M
Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Dry Valleys
Dates in Antarctica: Mid October to late January

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. John C. Priscu
Montana State University Bozeman
Land Resources and Environmental Sciences
jpriscu@montana.edu
http://www.homepage.montana.edu/~lkbonney/

Helicopter putting in the field team at Lake Vida when the temperature was -48 C.

Deploying Team Members: Brianna Rhae Arnold . Amy Chiuchiolo . Christine M. Foreman . Jill Mikucki . John C. Priscu . Delisa Rogers

Research Objectives: Much of what is known about such extreme polar deserts has been discovered by work conducted in Antarctica because few comparable systems exist elsewhere. Much of our knowledge about the structure and function of these polar desert ecosystems has been discovered only recently resulting, in large part, from the first phase of the McMurdo Long-Term Ecological Research program (MCM-I) from 1993 to 99. In MCM-I, researchers explored the physical constraints controlling the structure and function of this polar desert. They discovered that subtle changes in temperature, precipitation, and albedo have profound effects on the hydrologic cycle, biogeochemistry, productivity and biodiversity within the valleys. Moreover, local effects are modified by landscape position and topography.

The Dry Valleys ecosystem is sensitive to very small variations in climate because the change between solid and liquid phase of water is delicately poised in this environment. Thus, small changes in temperature and radiant energy regimes are amplified by large, non-linear changes in hydrologic budgets that can ramify throughout the system. The presence of liquid water remains the primary limiting condition for life in Antarctica, so the relationship of energy balance to liquid water availability, ecological function and biological diversity will continue to be a major emphasis of the McMurdo Dry Valley LTER program.

This project is the lake pelagic and benthic productivity and microbial food webs component of McMurdo LTER. The group will continue measurements of biological, chemical, and physical limnological properties of Dry Valley lakes, with special emphasis on LTER core research areas. They will also measure other parameters relevant to modeling the Taylor Valley Lake Ecosystems.

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-076-M

NSF/OPP Award 03-38224

Station: McMurdo Station
RPSC POC: Rob Edwards
Research Site(s): Arena Valley, Kukri Hills, Taylor Valley
Dates in Antarctica: Late November to late January

Stability of landscapes and ice sheets in Dry Valleys: A systematic study of exposure ages of soils and surface deposits

Dr. Jaakko Putkonen
University of Washington
Earth and Space Sciences
putkonen@u.washington.edu
[No website]

Photo not available.

Deploying Team Members: Daniel Morgan . Jaakko Putkonen . John O. Stone

Research Objectives: Hyperarid cold conditions have prevailed in the Dry Valleys for over ten million years (Myr) based on suggested in situ preservation of ancient volcanic ash, overlying till and colluvium. This extreme stability of the sediments also argues against any influx of warm based ice into the valley system and attests to the relatively dry climate and minimal ice sheet expansion. However, other evidences suggest that Dry Valleys may have experienced much more sediment erosion than generally believed: 1) The cosmogenic exposure ages of inner valley boulders and bedrock all show generally younger ages than volcanic ash deposits that are suggested to give the minimum age to moraines and drifts, 2) There is an apparent discrepancy between the suggested extreme preservation of slope deposits (>10 Myr) adjacent to bedrock that has in the same time period eroded 2.6 to 6 meters.

The fact that the till and moraine exposure ages generally post date the overlying volcanic ash deposits (a clear contradiction) can be explained by documented expansion of continental ice sheet in the Dry Valleys sector to inundate the valleys with cold based ice, thus preserving the landscape and shielding the surfaces from cosmic radiation. Another probable explanation for the young cosmogenic exposure ages is erosion of the sediments and gradual exhumation of young boulders to the surface.

The cosmogenic isotope systematics are especially well suited to address questions of temporal shielding and sediment stability.

This project will measure the accumulation of cosmogenic isotopes in the rocks at or near soil surface to determine the minimum sediment exposure ages, soil stability or mixing, and shielding history of surfaces by cold based ice. Additional benefits include directly verifying the extreme preservation of soils and assigning absolute minimum ages to key deposits.

Top of Page

Artists & Writers

Mr. Guy Guthridge
Program Manager
Artist/Writer Program

W-218-M/S
Station: McMurdo Station
RPSC POC: Elaine Hood
Research Site(s): McMurdo Station area
Dates in Antarctica: Mid December to late January

Antarctic Anthology

Ms. Susan Fox Rogers
Bard College
rogers@bard.edu
[No website]

Susan Fox Rogers.

Deploying Team Members: Susan Fox Rogers

Research Objectives: It is often the extremes and natural drama of Antarctica that draws the attention of a visitor or outsider. Artists and writers have rightly celebrated the striking beauty of Antarctica, but for those who have spent time on the Ice it is often the details of the day to day--how and what to eat, where you sleep, how to stay warm--that provide the most insight into what it really means to live in such a place. The texture and richness of daily life generates interesting and complicated memories—and often the best stories. This is what Susan Fox Rogers discovered when in 1996 she edited *Alaska Passages: Twenty Voices from Above the 54th Parallel* (Sasquatch Books) in which she gathered stories from Alaskans that offered vivid details of what it is like to live in such a "big place." Her goal is to assemble a similar collection of personal essays from "Antarcticans," those who have spent time on the ice and have a keen literary eye for describing this life.

Susan Fox Rogers has edited ten book anthologies, four of which focus on women and outdoor sports (*Solo: On Her Own Adventure*, *Two in the Wild: Tales of Adventure from Friends, Mothers, and Daughters*, *Another Wilderness: New Outdoor Writing*, and *Going Alone: Women's Adventures in the Wild*). Each of her collections combines the work of new as well as veteran writers and though each book began with an initial vision, they all took shape through the words and experiences of the contributors. As with these previous books, Ms. Rogers hopes to be surprised by the tales from a range of writers-- and from those who never thought of themselves as writers--whether support staff, principal investigators, or team members.

Formerly an editor at Penguin U.S.A., Ms. Rogers is currently a visiting professor of writing and first year seminar at Bard College. Ms. Rogers has taught courses on antarctic narratives and, based on her work on the ice, plans to develop a new course for fall 2005. She has also taught writing at the University of Arizona, where she received her M.F.A. in creative nonfiction.

Ms. Rogers will work out of McMurdo. There, she intends to solicit stories, to experience the "daily life" of certain teams and to explore possible subjects that would be essential to such a collection.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager
NSF/OPP Award 02-17282

B-028-L/P

Station: R/V Laurence M. Gould, Palmer Station

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): Palmer Station, R/V Laurence M. Gould

Dates in Antarctica: Late October to mid March

Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

Dr. Robin Macurda Ross-Quetin

University of California Santa Barbara
Marine Science Institute
Robin@icess.ucsb.edu
http://pal.lternet.edu

Palmer Long Term Ecological Research Project: Climate, ecological migration, and teleconnections in an ice-dominated environment (prey component)

Deploying Team Members: Diane Chakos . Katie Davis . Cliff Hoffmann . Stephen Holloway . Gregory Quetin . Langdon Buckner Quetin . Robin Macurda Ross-Quetin . Joshua Sprague . Lyndon Valicenti

Research Objectives: The overall objectives of the Long Term Ecological Research (LTER) program at Palmer Station are to document and understand the seasonal cycles of primary production, krill recruitment, Adélie penguin breeding and microbial biogeochemical processes in the nearshore regime of the coastal Antarctic ecosystem.

This project is the 'prey' component of the Palmer LTER. The research focuses on the effects of physical processes, particularly interannual differences in the extent of pack ice, on macrozooplankton. The emphasis is on processes such as recruitment and production in antarctic krill, and interactions among krill, its food sources and its predators. Fieldwork is conducted at Palmer Station and onboard the R/V Laurence M. Gould.

Objectives for the research program sited at Palmer Station are to survey with bioacoustics on a twice-weekly basis and collect krill on a weekly basis to establish a time series of seasonal progression in availability, demography, physiological condition and production (growth) of antarctic krill. Work includes acoustic surveys using a Zodiac, sampling zooplankton and krill with nets, conducting experiments in the lab, diving in early spring to collect young-of-the-year krill associated with pack ice, conducting underwater/ice surveys with the CCD underwater video camera, and sampling the under-ice surface.

Onboard the Gould, the overall objective is to continue the now 13-year long LTER time series on the regional scale grid of hydrographic stations. Specific activities include:

+ Occupying the full LTER grid of stations including the inshore and offshore stations,

+ Recovering and redeploying a long-term sediment trap array,

+ Conducting surveys of oceanographic properties and bird observations within the Adélie penguin foraging area near Palmer Station,

+ Sampling deep water properties at on-grid and far-field (off-grid) stations in the Antarctic Circumpolar Current

+ Visiting Rothera Station of the British Antarctic Survey on Adelaide Island, allowing British colleagues to use LMG for one day of local hydrographic sampling,

+ Conducting censuses and obtaining data on seabird foraging ecology from a field camp on Avian Island,

+ Occupying Arthur Harbor stations to maintain Palmer Station seasonal sampling and cross-calibrate shore- and LMG-based sampling activities.

+ Deploying a suite of surface ARGOS floats to diagnose the current velocity field in the sampling gradient, and

+ Monitoring penguin breeding colonies near Anvers, Renaud and Adelaide Islands.

Top of Page

Artists & Writers

Mr. Guy Guthridge
Program Manager
Artist/Writer Program

W-221-S
Station: South Pole Station
RPSC POC: Elaine Hood
Research Site(s): South Pole Station
Dates in Antarctica: November

Vast active living intelligence system: Photographing the South Pole

Ms. Connie Samaras
University of California Irvine
Department of Studio Art
samaras@uci.edu
[No website]

Photo not available.

Deploying Team Members: Connie Samaras

Research Objectives: Connie Samaras is a Professor in the Department of Studio Art and an Affiliated Faculty Member in Women’s Studies at the University of California Irvine. Her NSF proposal is to photograph the new station being built at Amundsen-Scott South Pole Station, as well as other structures there, in such a way as to emphasize the liminal space between life support architecture and extreme climate. Her project title, "Vast active living intelligence system" (borrowed from sci-fi writer Philip K. Dick), reflects her interest in depicting Antarctica as a place of multiple and often contradictory intersections of technology, culture, nature, space and time. As in all her work, she’s interested in picturing the multiplicity of realities that exist in any given moment or place but which often go unseen, not because of a failure of optics but because of a (sometimes necessary) lack of perception.

In addition to being a participant in the Artists and Writers program, other recent awards include Anonymous Was A Woman Fellowship (2003), Durfee Foundation ARC Grant (2002), Los Angeles Cultural Affairs Visual Arts Fellowship C.O.L.A (2002), and the Adaline Kent Award, San Francisco Art Institute (2002).

Top of Page

Oceans & Climate

Dr. Bernhard Lettau
Program Manager
NSF/DOE agreement

O-275-P/S
Station: Palmer Station, South Pole Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station, South Pole Station
Dates in Antarctica: Instruments operate year-round

Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab

Dr. Colin Sanderson
United States Department of Energy
Environmental Measurements Lab
colin.sanderson@eml.doe.gov
http://www.eml.doe.gov/

Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab

Research Objectives: Radionuclides, some of which occur naturally in the surface air, are atoms emitting radioactive energy. It is these, as well as nuclear fallout and any accidental releases of radioactivity, that the Environmental Measurements Laboratory's (EML's) Remote Atmospheric Measurements Program (RAMP) is designed to detect and monitor. Since 1963, EML, as part of the U.S. Department of Energy, has run the Global Sampling Network to monitor surface air. The RAMP system provides on-site analysis in 13 different locations around the world including Palmer and South Pole stations.

At Amundsen-Scott South Pole Station, National Oceanic and Atmospheric Administration (NOAA) staff maintain the equipment and collect samples. At Palmer Station, the science technician maintains the equipment, collects samples and sends data to the PI's home institutions. Tasking includes checking the system (high-volume aerosol sampler and a gamma ray spectrometer), initiating gamma ray counts, calibrating sensors, changing filters and data disks, and sending filters and data to the ELM lab in New York City. So far, antarctic monitoring has seen only naturally-occurring radionuclides, Be-7 (an isotope of beryllium) and Pb-210 (an isotope of lead).

Top of Page

2004-2005 USAP Field Season

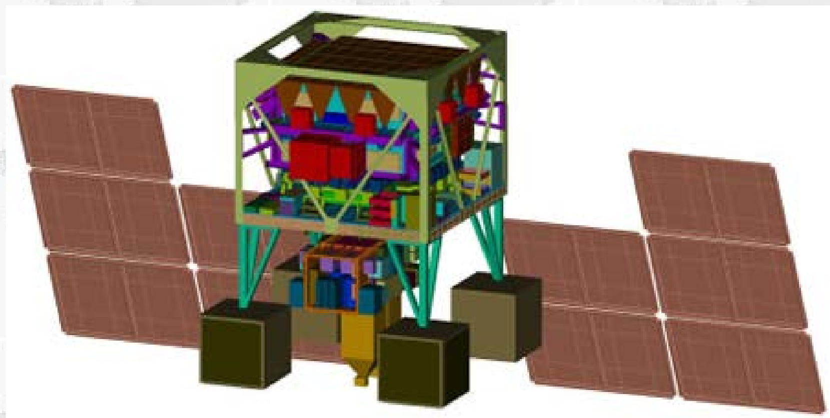
Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

NSF/NASA agreement

A-137-M
Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Williams Field
Dates in Antarctica: Mid October to early February

Cosmic Ray Energetics And Mass (CREAM)



3D Schematic of CREAM Flight Configuration. Photo courtesy of NASA.

Dr. Eun-Suk Seo
University of Maryland
Institute for Physical Science and Technology
seo@umd.edu
http://cosmicray.umd.edu/cream/cream.html

Deploying Team Members: Brian Scott Abresch . Patrick (Jojo) Boyle . John Taylor Childers III . Alexander M. Coleman . Nicholas Bryan Conklin . Stephane Coutu . Ted T. Daisey . Michael Duvernois . Opher Ganel . Henry C. Hart . Thomas Hyun Kim . Moo Hyun Lee . Larry Lutz . Alexandre Malinine . Na Hee Park . Jeffrey Reddish . Ralph L. Selby . Eun-Suk Seo . Casey James Smith . Michael E. Smolinski . Frederick Charles Stapf . Simon Swordy . Ronald Kevin Taylor . Arturo A. Vigil . Peter Hawley Walpole . John William Waterfield . Shun Yong Zinn

Research Objectives: This is a NASA-funded experiment that studies the origins of cosmic rays. The instrument is configured with state-of-the art particle detectors to measure cosmic ray composition from protons to iron nuclei over the energy range 1-10^3 TeV in a series of balloon flights. The goal is to observe cosmic ray spectral features and/or abundance changes that might signify a limit to supernova acceleration. Particle charge (Z) measurements will be made with a timing-based detector and a pixelated silicon matrix to minimize the effect of backscatter from the calorimeter. Particle energy measurements will be made with a transition radiation detector for Z > 3 and a sampling tungsten/scintillator calorimeter for Z > 1. In-flight cross calibration of the two detectors allows better determination of the particle energy. Measurements of relative abundances of secondary comic rays (e.g., B/C) as well as primary spectra will allow determination of cosmic ray source spectra at this high energy, where measurements are currently not available. The instrument has been tested and calibrated with a series of beam tests at CERN.

The science instrument will be integrated with a flight command data module (CDM) support system developed for by the NASA Wallops Flight Facility. The CDM is attached to the bottom of the payload and will provide the CREAM instrument with power and communications. The power system consists of ten solar panels and four batteries that will provide 28V power to the instrument. The power system will also provide support system instrumentation with 5, 12, and 28V (regulated and unregulated) power. The communication interface between the science instrument and the CDM is through flight computers with an Ethernet connection. All commands are received by the CDM flight computer and are forwarded to the instrument flight computer or to the CDM components. The Tracking and Data Relay Satellite System (TDRSS) antenna is the prime over-the-horizon communications system with a 100 Kb/s down-link capability. Real-time science and housekeeping data will be down-linked continuously. All data will also be recorded on two hard drives onboard the CDM. If data is not down-linked during real time during a TDRSS zone of exclusion, that data can be retrieved from the hard drive and down-linked at 50 Kb/s. Other communication platforms that serve as backups to TDRSS include line-of-site, Iridium, and Argo µGPSI.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-036-L/P

NSF/OPP Award 01-25890

Station: Palmer Station, R/V Laurence M. Gould

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): Dallmann Bay

Dates in Antarctica: Mid April to early June

Cold body temperature as an evolutionary shaping force in the physiology of antarctic fishes.

Dr. Bruce D. Sidell
The University of Maine
School of Marine Sciences
BSidell@maine.edu
http://www.marine.maine.edu/faculty/faculty_indiv.php?faculty_id=39

Photo not available.

Deploying Team Members: Kimberley Anne Borley . Bruce D. Sidell . Jody Wujcik . Jody M. Wujcik

Research Objectives: This project seeks to understand the characteristics of physiology and protein structure of antarctic fishes that are compatible with life at body temperatures of approximately 0 degrees C. Project team members will capture specimens of antarctic channichthyid icefish and red-blooded nototheniid species using otter trawls and buoyed and anchored fish traps from the R/V Laurence M. Gould. They also plan to use sets of buoyed and anchored baited fish pots (traps) and possibly buoyed and anchored longlines. The advantage of both traps and/or longlines is that fishing operations need not be restricted to the limited number of identified sites where bottom trawls can be deployed successfully.

Using Zodiacs from Palmer Station, the group will also capture fishes by hook-and-line or fish traps in the local area. In the lab, researchers will conduct experiments with live antarctic fishes and with material prepared from their tissues.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-129-S

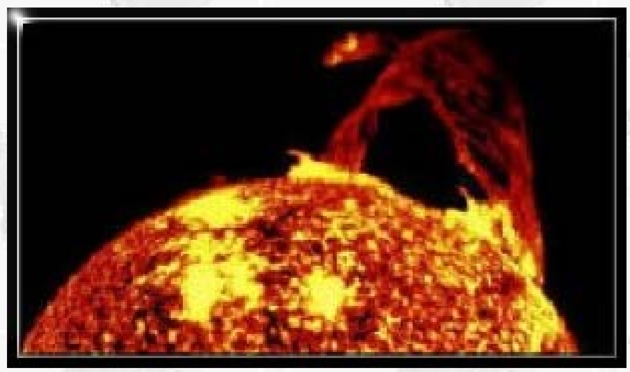
NSF/OPP Award 03-37618

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): Aurora Laboratory
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

The antarctic investigations of upper atmospheric disturbances over the South Pole Station

Dr. Gulamabas G. Sivjee
Embry Riddle Aeronautical University
Space Physics Research Laboratory
sivjee@sprl.db.erau.edu
http://www.sprl.db.erau.edu/



Effects of enhanced solar disturbances during the 2000-2002 solar-max period on the antarctic Mesosphere-Lower-Thermosphere (MLT) and F regions composition, thermodynamics and dynamics

Deploying Team Members: S. Irfan Azeem . Donald McEwen . Gulamabas G. Sivjee

Research Objectives: Variations in the sun's energy affect people in obvious ways, for example, driving the weather and the seasons. However, there are many cycles and variations on scales from seconds to centuries to eons that are of deeper interest to science. One of the most basic is the 11-year cycle when the sun's magnetic poles reverse direction. The 23rd cycle since reliable observations began has just recently peaked. Coincident with this cycle, sunspots and other solar activity are waxing to peak levels. NASA is using this opportunity to conduct its TIMED (Thermosphere-Ionosphere-Mesosphere-Energetics and Dynamics) satellite study, focusing on the region between 60 and 180 kilometers above the earth's surface.

This project takes advantage of the timing of both of these events, using observations in the visible and near-infrared ranges of upper-atmospheric emissions above South Pole Station to study the heating effects of auroral electrical currents in the ionosphere, as well as planetary waves and atmospheric tides.

TIMED will provide data on the temperature, winds, and tides of earth's upper atmosphere, especially above the poles as it passes overhead. But tracking satellites often have difficulty differentiating between variations in location or time. The South Pole ground-based observations conducted by this group will be valuable in sorting out the time-location question. The core scientific questions that will be addressed are:

+ Source(s) and propagation of Antarctic F-region patches,

+ Variations in the Antarctic E-region O/N2 ratio,

+ Antarctic middle atmosphere disturbances generated by Stratospheric Warming Events (SWE),

+ Antarctic thermospheric response to Solar Magnetic Cloud/Coronal Mass Ejection (SMC/CME) events, and

+ Effects of Joule heating on the thermodynamics of the Antarctic F-region.

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager
NSF/OPP Award 02-17282

B-032-L/P

Station: R/V Laurence M. Gould, Palmer Station

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): Palmer Station, R/V Laurence M. Gould

Dates in Antarctica: Late December to early February

Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

Dr. Raymond C. Smith

University of California Santa Barbara
Institute for Computational Earth System Science(ICESS)
ray@icess.ucsb.edu
http://pal.lternet.edu

Photo not available.

Deploying Team Members: Gregory Quetin . Katherine Schwager . Austen Thomas . Lyndon Valicenti

Research Objectives: The overall objectives of PAL-LTER research at Palmer Station are to document and understand the seasonal cycles of primary production, krill recruitment, Adelie penguin breeding and microbial biogeochemical processes in the nearshore regime of the coastal Antarctic ecosystem. This project is the bio-optical component of the Long Term Ecological Research (LTER) project, focusing on the processes controlling the space/time variability of phytoplankton biomass and production including atmospheric and oceanographic forcings. They also investigate the linkage between shipboard surface observations and satellite observations relevant to these various processes including sea ice coverage and phytoplankton biomass and production.

Project team members will make sea ice observations in accordance with international protocols and measure bio-optical properties using a free-fall profiling system. They use models and selected satellite imagery including sea-ice, sea surface temperature, ocean color (SEAWIFS and/or MODIS), ozone concentration, and cloud cover data.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-047-M

NSF/OPP Award 00-87401

Station: McMurdo Station
RPSC POC: Karl Newyear
Research Site(s): McMurdo Station, USCG Icebreaker
Dates in Antarctica: Mid December to mid February

Interannual Variability in the Antarctic-Ross Sea (IVARS): Nutrients and seasonal production

Dr. Walker O. Smith
Virginia Institute of Marine Sciences
Department of Biological Sciences
wos@vims.edu
http://www.vims.edu/bio/ivars/

Photo not available.

Deploying Team Members: Britt Anderson . Vernon L. Asper . Robert Carroll . Liza DeLizo . Jennifer Dreyer . Paul Field . Grace Henderson . Tina Johnson . David Malmquist . Kevin Martin . Jacques Oliver . Leah Oliver . Scott Michael Polk . Gillian Potter . Jeremy Potter . Marta Sanderson . Amy R. Shields . Walker O. Smith . Sasha Tozzi

Research Objectives: The oceanography of the Ross Sea is relatively well known, including the physical oceanography and hydrography, nutrient concentrations (nitrate and silicic acid), and phytoplankton biomass and species composition. However, marked variations in these variables occur spatially and temporally. Indeed, the variations with time are the greatest factor in the Ross Sea habitat. For example, throughout much of the winter the Ross Sea is ice covered, and no incident radiation is available to drive photosynthesis. In contrast, during the summer months the Ross Sea is ice-free, and large accumulations of phytoplankton biomass occur.

In addition to these seasonal changes, variations among years occur in all oceanographic variables, whether they be current velocities and directions, ice concentration, winds, or phytoplankton productivity. The causes and consequences of these interannual variations, however, are poorly known. They likely have both local and remote drivers; that is, ice concentrations are likely controlled by the antarctic circumpolar wave and by basin-wide changes induced by El Niño. Regardless of the causes, the degree of variation among years in biological variables is unknown, and this is what IVARS seeks to explore. Ultimately researchers hope to understand not only the causes, but also the consequences to the food web of the region.

This project's objectives are to quantify the variations in seasonal community production in the southern Ross Sea and to assess the variations among years. This is done by two means: a) collecting nutrient profiles at a set grid/number of stations during two cruises, and b) deploying moorings with a variety of chemical and biological sensors that define the temporal pattern of nutrient uptake (and its oceanographic controls) at two locations. Together, an understanding of the spatial and temporal variations of community production can be obtained, and thus an idea of the interannual variations of the entire region. Ultimately researchers will link these with both large-scale processes of the Pacific Basin and food web effects.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-260-L

NSF/OPP Award 00-03618

Station: R/V Laurence M. Gould
RPSC POC: Randy Sliester
Research Site(s): Science of opportunity on all cruises
Dates in Antarctica: Vessel technicians collect data

The Drake Passage high density XBT / XCTD program

Dr. Janet Sprintall
Scripps Institution of Oceanography
Physical Oceanography Research Division
jsprintall@ucsd.edu
http://www-hrx.ucsd.edu

Photo not available.

Deploying Team Members: Janet Sprintall

Research Objectives: The distance between Antarctica and South America is relatively narrow at the Drake Passage. Here the Antarctic Circumpolar Current which drives the waters in the Southern Ocean is extremely strong. This project measures the seasonal to interannual variability of upper ocean temperature and geostrophic transport through Drake Passage. The project has been ongoing since 1996 during which researchers have observed substantial variability in circulation, transport and water properties on time scales from seasonal to interannual, and spatial scales from mesoscale eddies to the Antarctic Circumpolar Current cores.

Closely spaced measurements are collected underway on six to eight crossings per year. Measurements are taken by two kinds of probes that are deployed and send data back to the vessel via radiotelemetry: XBT (eXpendable BathyThermographs recording temperature) and

XCTD (eXpendable Conductivity Temperature Depth sensors recording salinity). The XBTs are loaded and launched using an automatic launcher and associated software that automates the collection of the XBT profiles. The system drops an XBT probe at pre-specified locations and prompted by the GPS location. Approximately 70 XBTs are dropped per crossing.

On sampling cruises XCTDs are dropped every half degree of latitude between 55 and 60 degrees south. Salinity bottle samples are also collected at each XCTD deployment. This bottle data will be used to calibrate the XCTD and underway thermosalinograph (TSG) data. Offsets between the bottle salt data and the TSG can be significant, and this is one way of determining the offset. Onboard technicians support the project by setting up and loading the automatic XBT launcher, conducting the XCTD deployments, collecting the salinity bottle samples, and logging all project activities. Project data and logs as well as standard shipboard underway data (TSG, meteorological and navigation data) are sent to the principal investigator at the end of every cruise.

The information gathered is stored and in a high-quality database accessible on the Internet. These and other researchers study the magnitude and depth of penetration of the seasonal signals, the connections to atmospheric forcing, and the effects of interannual variations such as those associated with the Antarctic Circumpolar Wave. Data analysis is carried out in cooperation with the Argentine Antarctic Institute in Buenos Aires.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

NSF/OPP Award 00-94605

A-377-S
Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): AST/RO
Dates in Antarctica: Late October to mid January

Wide-field imaging spectroscopy in the submillimeter: Deploying SPIFI on AST/RO

Dr. Gordon J. Stacey
Cornell University
Department of Astronomy
stacey@astrosun.tn.cornell.edu
http://astro.cornell.edu/research/projects/SPIFI

Photo not available.

Deploying Team Members: Thomas Nikola . Thomas E. Oberst . Steven C. Parsley . Gordon J. Stacey

Research Objectives: SPIFI (South Pole Imaging Fabry-Perot Interferometer) is the first direct detection imaging spectrometer for use in the submillimeter band and was designed for use on the 1.7-meter Antarctic Submillimeter Telescope and Remote Observatory (AST/RO) at the South Pole in the far-infrared and submillimeter windows. After having developed and extensively field-tested SPIFI, the primary scientific goals of this project are to:

+ Image the inner regions of the galaxy, in particular submillimeter lines that characterize excitation conditions in the Central Molecular Zone (CMZ), and trace the dynamics of the gas. Questions to be answered are, among others, Can neutral gas flowing through the CMZ be traced? Are there shocks from cloud-cloud collisions in this flow? What is the connection between the CMZ molecular clouds and the circumnuclear ring?

+ Map the Large Magellanic Cloud and Small Magellanic Cloud in these lines. The low metalicity environment in these dwarf galaxies may mimic that of protogalaxies, so that investigating the interaction between star formation and the interstellar matter in these galaxies is key to understanding the star formation process in the early Universe.

+ Characterize and map the physical conditions of the interstellar matter in nearby galaxies. These data are unique and will be key to understanding the relationships between density waves, bar potentials, and galaxy-wide star formation.

These projects can be undertaken only with the high sensitivity and mapping capabilities of the SPIFI AST/RO combination. SPIFI is much more sensitive than the best heterodyne receivers, which do not have the sensitivity, or (often) the bandwidth, to detect the broad, weak lines from galaxies, or the spatial multiplexing capability necessary for wide-field mapping projects.

This field season, project team members will refurbish and upgrade the SPIFI after its winter operations.

Top of Page

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager

A-371-S

NSF/OPP Award 01-26090

Station: South Pole Station
RPSC POC: Charles Kaminski
Research Site(s): South Pole Station
Dates in Antarctica: Maintenance in the austral summer, observing in the winter

---

Continued operation of the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO)

Dr. Antony A. Stark
Smithsonian Institution
Smithsonian Astrophysical Observatory
aas@cfa.harvard.edu
http://cfa-www.harvard.edu/ASTRO

Antarctic Submillimeter Telescope and Remote Observatory (AST/RO).

Deploying Team Members:

Elizabeth Ehasz . William Gorveatt . Christopher C. Groppi . Natalie Hinkel . Jacob Kooi . Craig Kulesa . Andrea Loehr . Christopher L. Martin . Antony A. Stark . Gregory Wright . Sigfrid Yngvesson

Research Objectives: Astronomy is undergoing a revolutionary transformation, where for the first time researchers can observe the full range of electromagnetic radiation emitted by astronomical sources. One of the newly developed and least explored bands is the submillimeter, at frequencies from about 300 giga-Hertz up into the tera-Hertz range. Submillimeter-wave radiation is emitted by dense gas and dust between the stars, and submillimeter-wave observations allow scientists to study in unprecedented detail the galactic forces acting on that gas and the star formation processes within it.

The Antarctic Submillimeter Telescope and Remote Observatory (AST/RO) is a 1.7-meter, single-dish instrument that has been operating since 1995 in several submillimeter bands. It has made position-position-velocity maps of submillimeter-wave spectral lines with arcminute resolution over regions of sky that are several square degrees in size. AST/RO is a valuable complement to the planned arrays, which are inefficient when observing large areas because of their small field of view. AST/RO can observe molecular clouds throughout the fourth quadrant of the Milky Way and the Magellanic Clouds to locate star-forming cores and study in detail the dynamics of dense gas in our own galaxy. AST/RO studies are showing how molecular clouds are structured, how the newly formed stars react back on the cloud, and how galactic forces affect cloud structure. They have also shown that the structure of molecular clouds is affected by their heavy element content and by their proximity to spiral arms.

The project has produced extensive high sensitivity maps of several atomic and molecular transitions toward the Galactic Center and an unbiased survey of molecular and atomic gas in the fourth quadrant of the Galaxy. The telescope operates continuously through the Austral winter. Observations at terahertz frequencies are available with the TREND receiver, a 1.4 THz hot electron bolometer detector system, and with SPIFI, the South Pole Imaging Fabry-Perot Interferometer.

Essential to AST/RO's capabilities is its location at Amundsen–Scott South Pole Station. Most submillimeter radiation is absorbed by irregular concentrations of atmospheric water vapor before it reaches the earth's surface. The dry air over South Pole Station allows an accurate intercomparison of submillimeter-wave power levels from locations on the sky separated by several degrees. This is essential to the study of submillimeter-wave radiation on the scale of the Milky Way and its companion galaxies.

Project researchers will use recently installed receivers in the Terahertz frequency band (SPIFI, TREND) to map highly-excited lines of carbon monoxide and other molecules toward star-forming regions in the Milky Way and nearby galaxies and to map emission from ionized nitrogen the second strongest line emitted from the interstellar medium) toward the Galactic Center. They will begin a survey of atomic and molecular lines from the Lupus and Chameleon clouds which are being intensively studied at infrared wavelengths with the Spitzer Space Telescope. The data will be made freely available.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-202-M/P/S
NSF/OPP Award 01-26262

Station: McMurdo Station, Palmer Station

RPSC POC: Patricia Jackson

Research Site(s): McMurdo Station, Palmer Station, South Pole Station

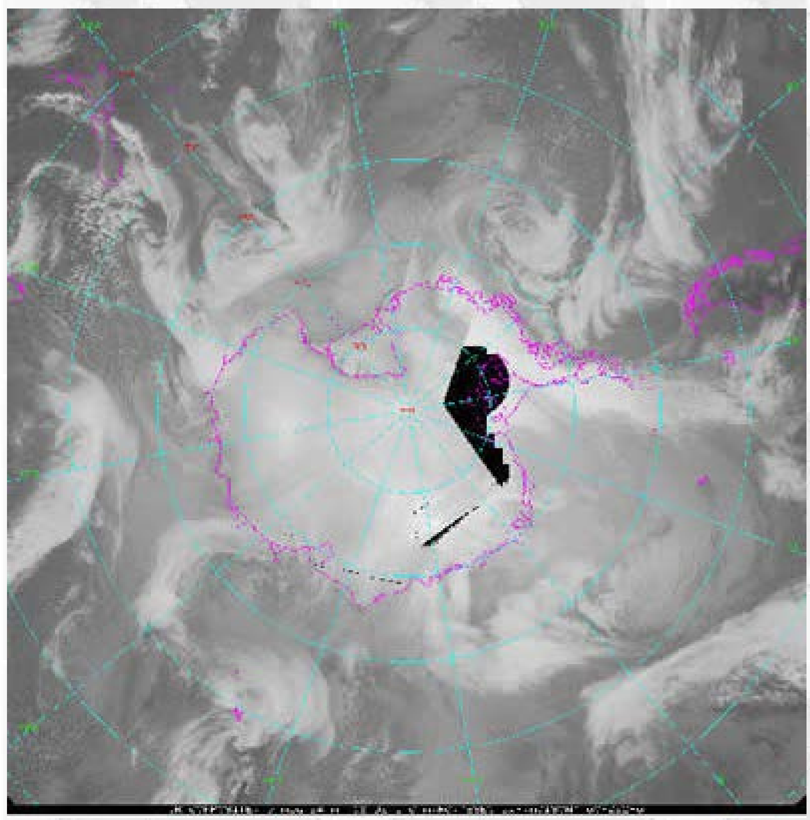
Dates in Antarctica: Project team deploys late October to mid November, data collected continuously

---

Antarctic Meteorological Research Center 2002-2005 (AMRC)

Dr. Charles R. Stearns

University of Wisconsin Madison
Space Science and Engineering Center/AMRC
chucks@ssec.wisc.edu
http://amrc.ssec.wisc.edu



Infrared composite image from several satellites including GOES, Meteosat, NOAA and DMSP. The image is black where no satellite coverage was available when the composite was made. Photo courtesy of the Antarctic Meteorological Research Center, Space Science and Engineering Center, University of Wisconsin-Madison.

Deploying Team Members: Jeff Key . Matthew A. Lazzara

Research Objectives: The Antarctic Meteorological Research Center (AMRC) was created in 1992 to improve access to meteorological data from the Antarctic. The AMRC's mission is to conduct research in observational meteorology and the stewardship of meteorological data, along with providing data and expert assistance to the antarctic community to support research and operations. The AMRC continues to fulfill its mission this season by:

+ Maintain and expanding the long-term record of all meteorological data on Antarctica and the Southern Ocean, and make these data available to the scientific community for multidisciplinary use. Special attention is given to obtaining data not normally or readily available by other means.

+ Generating satellite products, including but not limited to antarctic composite imagery, and expand and improve on them as much as possible

+ Conducting research in observational meteorology especially with regard to climatological analyses and case studies

Conducting and expanding educational and public outreach activities associated with antarctic meteorology and related fields.

Using available meteorological interactive processing software and other standard computing tools, the research team will collect data from all available sources for processing, archiving, and distribution.

The mission of the AMRC not only includes the opportunity to advance the knowledge of antarctic meteorology, but with the free availability of its data holdings, the AMRC gives others the opportunity to advance the frontiers of all antarctic science. Continuing educational outreach activities on meteorology and the Antarctic, an important component of this work, have the potential to raise the science literacy of the general public, as well as the level of K-12 science education.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-283-M/P/S NSF/OPP Award 03-38147

Station: McMurdo Station, Palmer Station

RPSC POC: Patricia Jackson

Research Site(s): Byrd Camp

Dates in Antarctica: Project team deploys late October to early February, data collected continuously

---

Antarctic Automatic Weather Station (AWS) program 2004-2006

Dr. Charles R. Stearns
University of Wisconsin Madison
Space Science and Engineering
Center/AMRC
chucks@ssec.wisc.edu
http://amrc.ssec.wisc.edu/aws.html

Two US Coast Guard technicians approach the Sutton AWS at 67.08 degrees South 141.37 degrees East at an elevation of 871 meters near the Adelie Coast of East Antarctica. Photo courtesy of AWS Project/Gerd Wendler/Steve Blake/USCG.

Deploying Team Members: Matthew A. Lazzara . Thomas Parish . Mark Seefeldt . Jonathan E. Thom . George A. Weidner

Research Objectives: A network of automatic weather stations (AWS) has been established on the antarctic continent and several surrounding islands. These facilities were built to measure surface wind, pressure, temperature, and humidity. Some of them also track other atmospheric variables, such as snow accumulation and incident solar radiation.

The data are transmitted via satellite to a number of ground stations and put to several uses, including operational weather forecasting, accumulation of climatological records, general research purposes, and specific support of the U.S. Antarctic Program, especially the LTER (Long Term Ecological Research) program at McMurdo and Palmer stations. The AWS network has grown from a small-scale program in 1980 into a significant data retrieval system that is now extremely reliable, and has proven indispensable for both forecasting and research purposes. Project team members deploy, maintain, and augment the automatic weather stations as necessary.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvili
Program Manager
NSF/NASA agreement

A-145-M
Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Williams Field
Dates in Antarctica: Mid October to early February

Long Duration Balloon (LDB) program

Mr. Bill W. Stepp
National Scientific Balloon Facility (NSBF)
David.Sullivan@nsbf.nasa.gov
http://www.nsbf.nasa.gov

Long Duration Balloon Program.

Deploying Team Members: Paul Brasfield . Joseph Buettner . Reid Chambers . Mark Cobble . Robbert Crabill . Andrew Denney . Scott C. Hadley . John Hobbie . Jim Humphrey . Jill Juneau . Michael David Matus . Nathan McCabe . Donald Roberts . Craig Alexander Smith . William Stepp . David W. Sullivan . Mark Wefel

Research Objectives: NASA's National Scientific Balloon Facility (NSBF), based in Palestine Texas, operates the Long Duration Balloon (LDB) program at Williams Field near McMurdo Station. NSBF staff work with researchers to launch, track, and recover high-altitude balloons carrying scientific payloads into the stratosphere.

Each year the air in the stratosphere over Antarctica forms a stable vortex--a high altitude jetstream with a circular pattern. A balloon launched in these conditions will circumnavigate the continent between 77 and 80 degrees south latitude and often land near where it was launched. If it stays aloft for one revolution, the scientific instruments aboard operate for 10 to 15 days. If all is well with the balloon and its science payload, a second revolution may be attempted. The vortex is stable from mid-December to mid-January providing a month-long launch window.

Every austral summer the NSBF launches two long duration balloons, each with a volume of 28.42 million cubic feet and capable of ascending to a float altitude of up to 42 kilometers (137,000 feet or 26 miles). Standard NASA scientific balloons are made of polyethylene film, the same material in plastic bags. It is only 0.002 centimeters (0.0008 inches) thick, about the same as an ordinary sandwich wrap. The helium-filled balloons can carry a payload weighing as much as 3,600 kilograms (8,000 pounds).

Balloon-borne science payloads in Antarctica offer advantages as a means of high-altitude exploration: They remain at altitude much longer than long duration balloons launched in other locations. They cost far less and can be configured and launched much faster than satellites. The instruments in the payload can be recovered and flown again.

During flight, the balloon is controlled by satellite-relayed commands from NASA's Wallops Flight Facility in Virginia. The sensors in the science payload collect data and sends it to the researchers' home institutions and to McMurdo Station where the instruments are monitored by project team members. To terminate the flight, an aircraft flies within line-of-sight of the balloon and sends a command to the payload. When “cut down,” the payload descends with a parachute and recovery operations begin.

This year the science payloads are BESS-Polar (Balloon-borne Experiment with a Superconducting Spectrometer) event number A-140-M, and CREAM (Cosmic Ray Energetics and Mass) event number A-137-M.

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-071-N

NSF/OPP Award 03-38317

Station: RV/IB Nathaniel B. Palmer

RPSC POC: Ashley Lowe

Research Site(s): Transit between McMurdo Base and Punta Arenas, Transit between South Africa and New Zealand

Dates in Antarctica: Late July to mid February

Collection of marine geophysical data on transits of the R/V Nathaniel B. Palmer

Dr. Joann M. Stock
California Institute of Technology
Geological and Planetary Sciences
jstock@gps.caltech.edu
http://www.gps.caltech.edu/~jstock/Palmerres.html

Photo not available.

Deploying Team Members: Adam Washburn Bongarzone . Heather Marie Brundage . Steven C. Cande . Marcel Bernard Croon . Rachel Muthoni Deco . Nathan J. Downey . Janessa M. Link . Elisabeth Sofia Nadin . Stuart Schmitt

Research Objectives: Well-constrained plate reconstructions of the circum-antarctic region are critical for examining a number of problems of global geophysical importance. This project seeks to improve reconstructions of the antarctic and surrounding plates by surveying gravity, magnetics, and swath bathymetry on transit cruises of geological importance covering areas where data are lacking.

On cruise NBP 04-06 in the Indian Ocean and the Tasman Sea, project team members will survey several major features of the Africa and Australia plates that relate to their history of spreading away from the Antarctic plate. These include fracture zones, part of the Broken Ridge and Diamantina fracture zone southeast of Australia, and Cenozoic magnetic anomalies formed by the spreading of the Capricorn and Australia plates away from Antarctica.

On NBP 05-01 during the transit from McMurdo Station to Punta Arenas at the southern tip of South America, project team members will survey several major features of the Antarctic plate. These include fracture zones, the fossil spreading system in the Adare Basin, and Cenozoic magnetic anomalies formed by the spreading of the Australia plate away from west Antarctica.

Top of Page

Glaciology

Dr. Julie Palais
Program Manager

I-175-M/S

NSF/OPP Award 02-21394

Station: McMurdo Station

RPSC POC: Melissa Rider

Research Site(s): Cohen Nunatak, Karo Hills, Quartz Hills, Hatcher Bluffs, Caloplaca Hills, Polygon Spur, Strickland Nunatak

Dates in Antarctica: Late November to late January

Late Quaternary history of Reedy Glacier

Dr. John O. Stone
University of Washington
Department of Earth and Space Sciences
stone@geology.washington.edu
http://www.ume.maine.edu/iceage/Research/projects/reedy.html

Sampling glacial deposits in the Quartz Hills for cosmogenic nuclide dating. Reedy Glacier in background. Photo courtesy of John Stone.

Deploying Team Members: Gordon Bromley . Howard B. Conway . Maurice Conway . Brenda L. Hall . John O. Stone . Claire Todd

Research Objectives: The stability of the marine West Antarctic Ice Sheet (WAIS) remains a significant unresolved problem in predicting future sea-level change. Some recent observations of the ice sheet support a negative mass balance whereas others argue the opposite (see website for citations). Differences between these short-term results may stem, in part, from short-term fluctuations in ice-sheet flow. In comparison, geologic observations provide evidence of behavior over a much longer timescale than glaciological monitoring and remote sensing, and therefore can help to constrain the evolutionary trajectory of the WAIS. Recent geologic mapping, dating and ice-penetrating radar surveys have shown that deglaciation of both the Ross Sea Embayment and coastal Marie Byrd Land continued into the late Holocene, and hint at the possibility that deglaciation and grounding-line retreat are continuing at present. However, previous studies in the Ross Sea Embayment have been confined to only three locations - the southern Scott Coast, Hatherton Glacier, and Roosevelt Island - all of which lie far to the north of the present grounding line position.

This project extends the coverage of glacial-geologic mapping and dating to Reedy Glacier in the southernmost Ross Sea Embayment. The thickness and longitudinal profile of Reedy Glacier are directly linked to the thickness of ice in the Ross Sea. Thus, the history of grounding-line retreat can be investigated by reconstructing the glacier profile through time. During the 2004-05 field season, glacial deposits on nunataks and ice-free areas at the foot and head of Reedy Glacier will be mapped and sampled, sites visited in the 2003-04 season will be re-visited to measure flow velocities, and ice-penetrating radar surveys will be carried out across the glacier.

This work directly addresses key goals of the West Antarctic Ice Sheet Initiative, which are to understand the dynamics, recent history and possible future behavior of the West Antarctic Ice Sheet.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager
NSF/OPP Award 03-38248

O-214-L
Station: R/V Laurence M. Gould
RPSC POC: Bob Kluckhon
Research Site(s): Science of opportunity on all cruises
Dates in Antarctica: Instruments operate continuously

Processes driving spatial and temporal variability of surface PCO2 in the Drake Passage

Dr. Taro Takahashi
Columbia University
Lamont-Doherty Earth Observatory
taka@ldeo.columbia.edu
http://www.ldeo.columbia.edu/CO2

Photo not available.

Research Objectives: The Southern Ocean provides an important component of the global carbon budget. Cold surface temperatures, with consequent low vertical stability, ice formation, and high winds, produce a very active environment where the atmospheric and oceanic reservoirs readily exchange gaseous carbon. The Drake Passage is the narrowest point through which the Antarctic Circumpolar Current and its associated fronts must pass. This so-called chokepoint provides the most efficient site to measure the latitudinal gradients of gas exchange.

Working from the R/V Laurence M. Gould, researchers will use equipment designed to measure both dissolved carbon dioxide and occasional total carbon dioxide in the surface waters during transects of the Drake Passage. This work extends similar measurements made aboard R/V Nathaniel B. Palmer and complements other data collected on surface temperatures and currents. These data sets supplemented by satellite imagery will enable scientists to estimate the net production and carbon export by the biological community. The data will also provide a quantitative description of the sources of dissolved carbon dioxide variability and a calculation of carbon dioxide fluxes between the ocean and the atmosphere.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-280-N

International Whaling Commission

Station: RV/IB Nathaniel B. Palmer
RPSC POC: Karl Newyear
Research Site(s): NBP 04-02
Dates in Antarctica: March

International Whaling Commission Southern Ocean Collaboration Program: Cetacean ecology, acoustic detection and sea ice habitat

Dr. Deborah Thiele
Deakin University
School of Ecology and Environment
deborah.thiele@deakin.edu.au
http://www.cetus.ucsd.edu

Photo not available.

Deploying Team Members: Kelly Asmus . Sarah Dolman

Research Objectives: The International Whaling Commission Southern Ocean Collaboration Program (IWCSOC) has been developed to provide a circum-Antarctic and multinational approach to investigating connections between cetacean ecology and the variability and dynamics of Antarctic ecosystems. The long term objective of the IWCSOC and the related ARP's around the Antarctic (AAA) program is to investigate connections between cetaceans and variability in ecosystem processes at local, regional and circum-Antarctic scales by conducting fine scale ecological studies and developing a circum-Antarctic continuous acoustic monitoring system for cetaceans using traditional (visual survey, biopsy, individual photo identification) and novel (passive acoustics, sea ice habitat classification) research techniques.

Our This project's initial approach involves participation in multidisciplinary and multinational research cruises using a combination of these techniques to compile basic seasonal distribution and acoustic presence data for each of the five antarctic oceanic regions. To this end team members have participated in US, German, Australian and UK Southern Ocean Global Ecosystems Dynamics Programs (SO GLOBEC) and in the Commission for the Convention on Antarctic Marine Living Resources (CCAMLR) programs in the Western Antarctic Peninsula, Weddell Sea, East Antarctica and the Scotia Sea, and with the U.S. Antarctic Slope Front (ANSLOPE) program in the Ross Sea.

While continuing the collaborative participation in multidisciplinary research, the investigators' intent is to expand the research to areas where arrays of passive acoustic instruments can be deployed long-term, and where vessel time is available to carry out fine scale ecological experiments measuring cetacean distribution and movements, sea ice habitat, prey and oceanographic dynamics seasonally and interannually. This work will be focused in areas where long-term ecosystem data have been collected by other research programs, in order to build on, complement and expand existing work (i.e. East Antarctica Prydz Bay, Scotia Sea/Elephant Island and the Western Antarctic Peninsula.

The IWC SOC/AAA program has been structured to include a variety of novel and historical cetacean research methods whilst simultaneously developing the potential of the new year-round acoustic recording packages (ARP's). While methodologically powerful, passive acoustic technology can currently provide data on call frequency, but cannot, when used remotely in the Antarctic, provide a reliable measure of relative abundance on any temporal or spatial scale, and does not allow an assessment of the number of individual whales calling at any one time, both critical elements in determining seasonal abundance. In order that this tool reaches its potential for application to cetacean conservation and management issues it is essential that means be developed to overcome this limitation as far as possible. Additionally, acoustic research needs to be partnered by studies to develop an ecological context for the analysis of acoustic data. For example, calling rates or spectra may vary with behaviour in response to changes in habitat characteristics. This can only be determined by ship-based research simultaneous with acoustic recordings.

Initially project team members will deploy a series of instruments and arrays in each of the six oceanic provinces of the Antarctic: the Indian Ocean, Pacific Ocean, Ross Sea, Amundsen-Bellingshausen Seas, Weddell Sea, and in the northern Antarctic Peninsula. The design of the arrays will result in data that can be used to: accurately position animals at time of call; track individual callers over short periods within a 100km radius from the center of the array; locate areas of seasonal high concentrations of a suite of species; and determine likely longitudinal movements. The project currently has single ARP's deployed in the northern Western Antarctic Peninsula (WAP), off the coast of East Antarctica near Casey and Mawson bases, and in the Ross Sea. The group has collaborative agreements for long-term deployments with visual and acoustic survey on cruises in these and other areas.

They will also conduct concurrent ecological studies around passive acoustic instruments using visual survey, biopsy, video, acoustic tagging and expendable sonobouys. The key objective of this work is to develop a broad set of categories of association between whale behaviour, environmental conditions and calling rates for each species. These will be continuously refined until researchers have a tool that will allow the interpretation of ARP data with remotely sensed environmental data to predict, link and extrapolate whale distribution, and causes at local, regional and circum-Antarctic scales. Broad categories of association will be developed that reflect the ecological significance of calling rates. To do this, researchers will locate concentrations of cetaceans, deploy acoustic tags, follow individuals, video group and individual behaviour while monitoring acoustically, biopsy calling animals and photo identify individuals to relate behaviour, genetic identity and ecological conditions to the passive acoustic data. Participation in large scale multidisciplinary surveys is an important component of the ecological work, for assessing potential array locations and providing the opportunity for integrated analysis of acoustic spectra and visual survey results with simultaneously collected data series for prey and ecosystem dynamics at regional scales.

The IWC SOCAAA is a core component of the Southern Ocean ICCED initiative, a joint venture in the Southern Ocean between GLOBEC and the global Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) long term research program, due to commence in 2007.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-040-E
NSF/OPP Award 01-25985

Station: Special Project
RPSC POC: John Evans
Research Site(s): Copacabana Field Station
Dates in Antarctica: Mid October to mid March

Foraging behavior and demography of Pygoscelis penguins

Dr. Wayne Trivelpiece
AMLR - Antarctic Ecosystem Research Division
Southwest Fisheries Science Center
wayne.trivelpiece@noaa.gov
[No website]

Foraging behavior and demography of Pygoscelis penguins.

Deploying Team Members: Stephen M. Agius . Candice Y. Lin . Michael James Polito . Susan G. Trivelpiece . Wayne Trivelpiece

Research Objectives: Seabird research conducted at Admiralty Bay, King George Island, in the Antarctic Peninsula region has documented annual variability in the life history parameters of the population biology of three related penguin species: the Adélie, the gentoo, and the chinstrap (Pygoscelis adeliae, P. papua, and P. antarctica, respectively). This long-term study has collected 25 years of data on these three related species, including survival and recruitment, population size and breeding success, and diets and foraging ecology.

Project team members will extend the research linking penguin demography and foraging ecology to variability in the antarctic marine ecosystem. A major focus will be on the population biology data for the Adélie and gentoo penguins and the distribution and trophic interactions among the three species during the breeding season and the nonbreeding, winter period.

Recent studies using satellite tags and time-depth recorders to examine postfledging foraging have provided the first detailed data on the wintering distributions of Adélie and chinstrap penguins in the Antarctic Peninsula.

Specific topics include an examination of the size and sex of krill captured by penguins feeding chicks and krill collected concurrently by net hauls in the adjacent marine environment and the length-frequency distribution of krill collected from penguin diet samples. The winter survival of breeding adults and the recruitment of young (2- to 4-year-old) prebreeding penguins to their natal colony will be compared to the extent of sea ice in the winter before the breeding season. These variables are expected to be positively correlated for the Adélie but negatively correlated for the chinstrap penguin. Detailed studies of adult gentoo penguins, which do not disperse widely from their natal colony, will be conducted using satellite tags.

These data on the impact of environmental variation on the structure of upper-trophic-level predators such as the Pygoscelis penguins will improve our understanding of the structure and function of the Antarctic.

Top of Page

2004-2005 USAP Field Season

Glaciology

Dr. Julie Palais
Program Manager

I-345-M
NSF/OPP Award 03-38295

Station: McMurdo Station
RPSC POC: Patricia Jackson
Research Site(s): Kamb Ice Stream Camp
Dates in Antarctica: Late October to mid December

Is Kamb Ice Stream restarting? Glaciological investigations of the bulge-trunk transition on Kamb Ice Stream, West Antarctica

Dr. Slawek M. Tulaczyk
University of California Santa Cruz
Earth Sciences
tulaczyk@es.ucsc.edu
[No website]

Photo not available.

Deploying Team Members: Ginny Catania . Maurice Conway . Ian Howat . Robert W. Jacobel . Rickard Pettersson . Slawek M. Tulaczyk

Research Objectives: The West Antarctic Ice Sheet (WAIS) contains enough ice to raise the global sea level by several meters and concerns have been voiced about its possible near-future retreat or collapse. However, recent measurements have shown that the Ross Sea sector of this ice sheet is in a positive mass balance. This result is surprising because geologic and glaciologic data indicate that the ice sheet was retreating for approximately the last 10,000 years. It is possible that the observed positive mass balance is a result of a short-term (decadal- or century-scale) oscillation in ice discharge, rather than an indication of a long-term shift in ice-sheet behavior. In particular, the Ross Sea sector of the West Antarctic ice sheet could return to neutral or negative mass balance if the stopped Kamb Ice Stream (formerly Ice Stream C) would restart and start flowing at ice-stream-like velocities. Because the tributaries of this ice stream are still active, a massive ice bulge is building up where they are running into the locked-up trunk of the ice stream. On mountain glaciers, build up of ice bulges is often associated with a sharp increase in ice velocity within a relatively short time.

This project is designed to test whether Kamb Ice Stream may be in the process of restarting. If it is, this research it will help establish what is the rate of ice stream reactivation and what mechanisms are controlling this rate. If there is no evidence for ongoing surge, the physical controls that are preventing surging will be examined and alternative scenarios for near-future evolution of Kamb Ice Stream will be explored. One such scenario is an increase in ice diversion toward the neighboring Whillans Ice Stream. Such diversion may help prevent a complete stoppage of this ice stream, which has been slowing down for at least the last 24 years.

The field component of the project consists of observations of bed properties and ice internal layers from ground penetrating radar together with measurements of surface topography and strain rates using differential GPS. The fieldwork will focus on the transition between the lower trunk of Kamb Ice Stream where ice motion has ceased and the bulge that has been forming just upstream, very near the former "Upstream C Camp." The modeling component of the project is a numerical modeling study of near future (~100 to 1,000 years) evolution of Kamb Ice Stream that will be used to generate predictions regarding the near-future behavior of the ice stream.

This project is a collaboration of scientists from three different types of US institutions -- a liberal arts college, a public research university, and a NASA research laboratory. Project results will be made available to the general public and educators through downloadable graphics and animations posted on the research website. Field data resulting from the project will be posted in the Antarctic Glaciological Data Center for use by other investigators.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-011-M

NSF/OPP Award 02-30237

Station: McMurdo Station
RPSC POC: Melissa Rider
Research Site(s): Hjorth Hill, Garwood Valley
Dates in Antarctica: Early December to early February

Biogeochemistry of Victoria Land coastal ponds: Role in terrestrial ecosystem organic carbon dynamics and structure

Dr. Maria Uhle

University of Tennessee
Department of Geological Sciences
muhle@utk.edu
[No website]

Photo not available.

Deploying Team Members: Phil Allen . Kaycie Ann Billmark . Melissa Hage . Maria Uhle

Research Objectives: One of the central themes of the LTER (Long-Term Ecological Research) is to understand the transport of organic carbon throughout the ecosystem and one potentially large source of labile organic carbon that has not been investigated is the abundant small ponds found in most areas of the Dry Valleys, especially near the coast. The ponds have a relatively large surface area, and seem to generate a large amount of stranded microbial mat as they shift position on the landscape. The transient nature of these ponds renders the organic matter vulnerable to transport, which may be a significant source of modern, labile carbon to the other components in the Dry Valleys ecosystem. This project's objectives are to

+ Determine the extent of the coastal pond reservoir,

+ Assess how productive the reservoir is as a whole and

+ Determine if coastal pond reservoir is a source of sink within the organic carbon dynamics and overall structure of the terrestrial ecosystem in the Dry Valleys region.

Much of this work will focus on understanding the biogeochemistry of these ponds in terms of the factors affecting organic carbon production and nutrient cycling. Selected ponds will be instrumented to monitor surface evolution and annual temperature changes to determine the annual heat budget of the ponds and to determine if the ponds completely freeze to the bottom during the winter months. Pond sediments will be dated to place these features in a temporal context. The size of the coastal pond reservoir will be determined by enumerating the number of ponds in the region and by measuring the amount of organic carbon sequestered in selected ponds along with the productivity and biomass accumulation rates. The labile organic carbon content of the coastal ponds will be measured and incubation experiments will be conducted to investigate organic matter turnover rate within the ponds and surrounding soil environments.

This information will yield estimates of the residence time of this material in modern and relict ponds. The coastal pond organic matter will also be chemically and isotopically fingerprinted so that it can be identified within other ecosystem components to determine its significance to the overall ecosystem.

Project team members will establish camps along the Hjorth Hill coast and in the Garwood Valley. They will hike to the surrounding ponds and collect samples during the day and process the samples in the evening.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-016-L/P

NSF/OPP Award 02-17282

Station: R/V Laurence M. Gould, Palmer Station

RPSC POC: Rob Edwards/Stephanie Suhr-Sliester

Research Site(s): Palmer Station, R/V Laurence M. Gould

Dates in Antarctica: Mid October to mid April

Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.

Dr. Maria Vernet
Scripps Institution of Oceanography
Marine Research Division
mvernet@ucsd.edu
http://pal.lternet.edu

Photo not available.

Deploying Team Members: Eli Loomis . Karie A. Sines . Jessica Spence . Austen Thomas . Lyndon Valicenti . Maria Vernet

Research Objectives: This component of the Palmer Long Term Ecological Research (LTER) program focuses on rates of primary production, phytoplankton community structure and absorption properties, and their relationship to physical forcing. Team members will collect water samples to estimate biochemical properties of phytoplankton and carry out experiments to estimate rate processes in the Palmer Basin vicinity while on station. They will do the same thing on a larger scale area in the middle and southern peninsula area onboard the R/V Laurence M. Gould.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-423-M
NSF/OPP Award 98-10219
Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Lake Hoare, Beacon Valley, F6, Taylor Valley, Dry Valleys
Dates in Antarctica: Early December to early February

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. Ross A. Virginia

Dartmouth College
Environmental Studies Program
ross.a.virginia@dartmouth.edu
http://huey.colorado.edu

The Role of Natural Legacy on Ecosystem Structure and Function in a Polar Desert: The McMurdo Dry Valley Long Term Ecological Research Program

Deploying Team Members: Anna Sophia Fleder . Margaret Simpson Graham . Michael Poage . Rebekka M. Stucker

Research Objectives: This project is one of two soil productivity components of McMurdo LTER (Ross Virginia, B-423-M, and Diana Wall, B-424-M). This season the group will focus on:

+ The influence of climate and edaphic factors on carbon and nitrogen cycling in terrestrial ecosystems of the Antarctic Dry Valleys.

+ The influence of climate and soil chemistry on the distribution and abundance of soil biodiversity in the antarctic Dry Valleys.

+ Understanding the linkages between soil biological communities and underlying ecosystem functioning.

+ Evaluating the influence of changes in climate on terrestrial ecosystems and invertebrate communities.

Activities include

+ Sampling and maintaining core LTER soil experiments in cooperation with Diana Wall's research group,

+ Investigating response of soil biota to climate change and substrate additions.

+ Studying relationships between soil biodiversity and ecosystem function by measuring in situ carbon dioxide, nitrogen and phosphorus flux through a combination of gas flux, buried bag and resin exchange membrane techniques.

Project team members will make brief trips to the Dry Valleys for monitoring, maintenance and sampling of long term experiments, and sampling of soil to support developing work on the nitrogen and phosphorus cycles and turnover of organic matter in the field. They will return to the Crary Laboratory at McMurdo Station for sample processing and initial analysis, as well as to perform incubation assays on selected soils.

Top of Page

2004-2005 USAP Field Season

Artists & Writers

Mr. Guy Guthridge
Program Manager
Artist/Writer Program

W-223-M
Station: McMurdo Station
RPSC POC: Elaine Hood
Research Site(s): McMurdo Station, South Pole Station
Dates in Antarctica: November to mid January

Antarctica: The biography of a continent

Dr. Gabrielle Walker
Gabrielle.walker@rbi.co.uk
[No website]

Gabrielle Walker.

Deploying Team Members: Gabrielle Walker

Research Objectives: Gabrielle Walker will write a popular science book, titled *Antarctica: A Biography of a Continent*. The book will be narrative non-fiction, written for an intelligent non-scientist audience, and will weave together descriptions of science, places and people working in Antarctica. The idea is to get at the "personality" of the continent through the eyes of researchers, through vivid descriptions of the different environments that they are working in, and through what Antarctic science reveals about the continent and its place in the world.

Dr. Walker is a freelance science writer specializing in earth and environmental sciences. She has a Ph.D. in natural science from Cambridge University, and is a former editor at *Nature* and features editor at *New Scientist*. Dr Walker has taught in the science writing program at Princeton University. She has also written for *Natural History*, *Science*, *The Economist* and many newspapers, and presented features, series and magazine programs for BBC radio. Her previous book is *Snowball Earth*, published by Crown.

Dr. Walker will spend two and a half months in Antarctica, mainly working out of McMurdo, but also visiting the South Pole and a variety of field sites. As well as researching for her book, she will also be obtaining material for magazine articles and radio programs.

Top of Page

Biology & Medicine

Dr. Polly Penhale
Program Manager

B-424-M

NSF/OPP Award 98-10219

Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Dry Valleys
Dates in Antarctica: Early December to early February

McMurdo Dry Valleys LTER (Long Term Ecological Research)

Dr. Diana H. Wall
Colorado State University
Natural Resource Ecology Laboratory
diana@nrel.colostate.edu
http://www.nrel.colostate.edu/projects/soil/MCM/index.html

McMurdo Dry Valleys Long Term Ecological Research (LTER): The role of natural legacy on ecosystem structure and function in a polar desert

Deploying Team Members: Byron J. Adams . Emma J. Broos . John Chaston . Claire Ojima . Holley Zadeh

Research Objectives: This project is one of two soil productivity components of McMurdo LTER (Ross Virginia, B-423-M, and Diana Wall, B-424-M). They have been studying soil biodiversity and ecosystem functioning in the Dry Valleys since 1989. Antarctic soils are the oldest, coldest, and driest on Earth and share similarities with the arid soils of the Jornada and Sevilleta LTER sites. The soils found in the McMurdo Dry Valleys are poorly developed, coarse-textured, and often have high salinities. They also have the lowest organic carbon and biological activity of any soils on this planet. The physical and chemical environment of Antarctic soils varies along gradients of temperature, moisture, organic matter content created in part by legacies of past climates.

No other soil systems are known to exist in which nematodes represent the top of the food chain and where food webs are as simple in structure. The nematode community in the Dry Valley soils consists of an endemic species Scottnema lindsayae , a microbial feeder (bacteria and yeast), Plectus antarcticus, a bacterial feeder, and Eudorylaimus antarcticus, an omnivore-predator.

Because nematodes are aquatic animals, moisture is a more important factor for survival in Antarctica than low temperature. Moisture from melting snow and streams is available to soils only intermittently, so organisms must be capable of prolonged survival with limited moisture and temperatures below freezing. Nevertheless, nematodes are ideally suited for survival in this extreme environment. They can enter a survival state, anhydrobiosis, for extended periods. This effectively decouples them from the nutrient cycle, which may contribute to the extremely slow rate of nutrient and carbon exchange in the MCM.

The group will continue to maintain (through application of water and nutrients), monitor (soil moisture and temperature) and sample (soils) in our various long-term experimental plots near Lakes Fryxell, Hoare and Bonney. The overall goal is to determine the impacts of natural factors and those associated with potential climate change on the abundance, distribution, and diversity of soil biota. Project team members will collect samples and conduct experiments in the Dry Valleys when biological activity in soil is at a peak in December/January. In Crary Lab, they will process and analyze soils and sediments samples.

Top of Page

2004-2005 USAP Field Season

Biology & Medicine

Dr. Polly Penhale
Program Manager

NSF/OPP Award 02-30276

B-310-M
Station: McMurdo Station
RPSC POC: Jessie Crain
Research Site(s): Lake Bonney, Lake Vanda
Dates in Antarctica: Early November to mid December

What limits denitrification and bacterial growth in Lake Bonney, Taylor Valley?

Dr. Bess B. Ward
Princeton University
Department of Geosciences
bbw@princeton.edu
[No website]

Photo not available.

Deploying Team Members: Jenny Baeseman . Gregory D. O'Mullan . Charles G. Trick . Caroline L. Tuit . Bess B. Ward . Mark L. Wells

Research Objectives: Denitrification is the main loss term for fixed nitrogen from ecosystems, and thus its rate and regulation may directly affect primary production and carbon cycling over short and long time scales. This group's previous investigation of the role of bioactive metals in regulating denitrification in cultured bacteria and permanently ice-covered Lake Bonney in the Taylor Valley of East Antarctica suggested that specific metals might be important in limiting bacterial growth in the lake and specifically in inhibiting denitrification.

This year they will undertake new experiments to assess the viability and metabolic capabilities of the bacteria in Lake Bonney. Ag toxicity, general metal toxicity and oxygen concentration will be investigated for their effect on denitrification in Lake Bonney by using a suite of "sentinel" strains of denitrifying bacteria (isolated from the lake) incubated in Lake Bonney water and subjected to various treatments. The physiological responses of these strains to changes in metal and oxygen concentration will be quantified by flow cytometric detection of single cell probes whose sensitivity and interpretation has been optimized for the sentinel strains.

Top of Page

2004-2005 USAP Field Season

Oceans & Climate

Dr. Bernhard Lettau
Program Manager

O-201-M
NSF/OPP Award 00-03826

Station: McMurdo Station
RPSC POC: Karen Pavich
Research Site(s): Dome Concordia
Dates in Antarctica: Early December to early February

Solar radiation on the East Antarctic Plateau

Dr. Stephen G. Warren

University of Washington
Atmospheric Sciences Department
sgw@atmos.washington.edu
[No website]

The 33 meter tower, a platform for instruments that measure snow surface reflectance. Photo by Richard Brandt.

Deploying Team Members: Richard E. Brandt . Thomas C. Grenfell . Stephen Hudson

Research Objectives: This project is an experimental study of solar radiation processes near the surface at Dome Concordia (Dome C), the French-Italian station in East Antarctica. It will be carried out in cooperation with the Laboratoire de Glaciologie et Geophysique de l'Environment in Grenoble, France. The emphasis is on the reflection of sunlight by snow and the transmission of sunlight through clouds. The observations researchers gather will be relevant to climate, remote sensing, and the physics of ice and snow.

Observations of the angular pattern of solar radiation reflected from the snow surface will allow the researchers to validate information derived from satellite-derived radiances. Using radiative transfer modeling through the atmosphere, the project's research team will reconcile measured surface reflection functions with the empirical functions obtained from the Advanced Very High Resolution Radiometer on the polar orbiting NOAA satellites.

Since Dome C is at 75 degrees latitude, the optical properties of the snow surface can be observed at higher solar elevation than is possible at the south pole. Researchers are also exploring the possibility that the Dome C region is the optimum antarctic surface for use as a calibration target for earth-observing satellites.

The research team will measure transmission of solar radiation through clouds, and these measurements will be used to obtain effective cloud optical depths to estimate cloud radiative forcing, with applications in climate models. They will develop a method to obtain this information from pyranometers alone so that the historical record of solar radiation observations in the antarctic interior can be analyzed for climatological information on clouds. Finally, the spectral peak of snow albedo will be accurately located in order to resolve a discrepancy over the spectral absorption of pure ice in the visible to near-ultraviolet range.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Bernhard Lettau
Program Manager
NSF/OPP Award 03-38105

A-111-M/S
Station: McMurdo Station, South Pole Station
RPSC POC: Doug Miller
Research Site(s): McMurdo Station, Skylab
Dates in Antarctica: Instruments operate continuously

Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions

Dr. Allan T. Weatherwax
Siena College
Physics Department
aweatherwax@siena.edu
http://www.antarcticdata.net

The University of Maryland's Imaging Riometer antenna at Arrival Heights in McMurdo, January 1998. Photo by [unknown].

Research Objectives: The University of Maryland will continue studies of the polar ionosphere and magnetosphere from Antarctica and nominally conjugate regions in the Arctic. High frequency (HF) cosmic noise absorption measurements (riometry) and auroral luminosity measurements (photometry) form the basis of these investigations. However, research efforts also involve extensive collaboration with other investigators using complementary data sets.

Riometers measure the relative opacity of the ionosphere. Working at both McMurdo and South Pole, this group maintains and uses an imaging riometer system called IRIS (imaging riometer for ionospheric studies), broad-beam riometers, an auroral photometers. This group has helped to extend antarctic coverage by providing imaging riometers for the British Halley Bay and the Australian Davis stations. The instruments work synergistically with a number of other instruments that are operated at all of these sites by other investigators. They also provide the data acquisition systems at South Pole and McMurdo stations for the common recording of other geophysical data and the provision of these data to collaborating investigators. To enhance the usefulness and timeliness of these data to the general scientific community, the data is made available in near real time on the Internet. Imaging riometer measurements will also be continued at Iqaluit in the Northwest Territories of Canada, the nominal magnetic conjugate point of South Pole station.

Continuation of these activities will enable this group to participate in, and contribute to, several major science initiatives, including the GEM, CEDAR, ISTP/GGS, and National Space Weather programs. A primary focus of the analysis activities over the next year will include coordinated ground- and satellite-based studies of Sun-Earth connection events.

These disparate activities have the common goal of enhancing understanding of the relevant physical processes and forces that drive the observed phenomena, both internal (e.g. magnetospheric/ionospheric instabilities) and external (e.g. solar wind/IMF variations). From such knowledge may emerge an enhanced forecasting capability. Many atmospheric events can have negative technological or societal impact, and accurate forecasting could ameliorate these impacts.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Bernhard Lettau
Program Manager

A-112-M

NSF/OPP Award 03-41470

Station: McMurdo Station

RPSC POC: Doug Miller

Research Site(s): AGO2, AGO1, AGO5

Dates in Antarctica: Maintenance in the austral summer, instruments operate continuously

---

Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIN): A new vision for global studies

Dr. Allan T. Weatherwax
Siena College
Physics Department
aweatherwax@siena.edu
http://www.antarcticdata.net

AGO P1 (Automatic Geophysical Observatory site P1) in December 2003. Photo by Rick Sterling.

Deploying Team Members: Jeff Chang . William Rachelson . Rick Sterling

Research Objectives: Continued progress in understanding the sun's influence on the structure and dynamics of the earth's upper atmosphere depends upon increasing knowledge of the electrodynamics of the polar cap region and the key role that this region plays in coupling the solar wind with the earth's magnetosphere, ionosphere and thermosphere. Measurements that are central to understanding include the electric field convection pattern across the polar cap and knowledge of the response of the atmosphere to the many forms of high-latitude wave and particle energy inputs during both geomagnetically quiet and disturbed situations.

The U.S. Automatic Geophysical Observatory (AGO) network is a suite of nearly identical instruments (optical and radio wave auroral imagers, magnetometers, and narrow and wide band radio receivers) at locations on the polar plateau. AGOs enable researchers to study the coupling of the solar wind to ionospheric and magnetospheric processes, emphasizing polar cap dynamics, substorm phenomena, and space weather. Among these projects are:

+ An investigation that uses extreme-low -frequency and very-low-frequency waves as an observing tools to understand the electrodynamic coupling between upper-atmospheric regions and the interaction of the magnetosphere and ionosphere.

+ An investigation that employs autonomous, compact, and low-power atmospheric LIDAR instruments to detect polar stratospheric clouds and profile the overlying atmosphere.

+ An investigation that uses magnetometers at conjugate sites in Antarctica and the Northern Hemisphere to measure variations in hydromagnetic waves with the optical emissions caused by charged particles that precipitate from the trapped radiation of the Earth into the upper atmosphere.

When combined with measurements made at staffed stations, AGO network data facilitate both large- and small-scale studies of the energetics and dynamics of the high-latitude magnetosphere. The research will be carried out with in situ observations of the geospace environment by spacecraft, in close cooperation with other nations working in Antarctica and in conjunction with studies performed in the Northern Hemisphere.

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-135-E

NSF/OPP Award 02-30094

Station: Special Project

RPSC POC: John Evans

Research Site(s): Deception Island onboard the Spanish Vessels, R/V Hesperides and R/V Las Palmas

Dates in Antarctica: Mid November to late January

High-resolution seismic tomography and earthquake monitoring at Deception Island volcano

Dr. William Sam Douglas Wilcock
University of Washington
School of Oceanography
wilcock@ocean.washington.edu
[No website]

Photo not available.

Deploying Team Members: Andrew Barclay . Patrick John Jonke . Bernard Kevin Mckiernan . Eric Shaun Phillips . Spahr Chapman Webb . William Sam Douglas Wilcock

Research Objectives: This is a collaborative experiment at Deception Island with a Spanish group led by Jesus Ibanez at the University of Granada. The objectives are to deploy ocean bottom seismometers provided by the US Ocean Bottom Seismometer Instrument Pool and land seismometers provided by the Spanish on and around Deception Island. These will record the natural seismicity of the volcano and airgun shots that will be generated by the Spanish from the ship the R/V Hesperides. The science objective is to obtain a P-wave tomographic image of the volcano and understand the relationships between the seismic structure, the distribution and nature of earthquakes and volcanic processes at Deception Island volcano.

The first cruise will be onboard the R/V Las Palmas using the Argentine port of Ushuaia. During this cruise project team members will deploy 14 ocean bottom seismometers (OBSs) from the US Ocean Bottom Seismometer Instrument Pool (OBSIP) in the vicinity of Deception Island. The second cruise will be onboard the R/V Hesperides sailing from King George Island and returning to Ushuaia. During this cruise project team members will recover, redeploy and recover again the 14 OBSIP OBSs.

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner
Program Manager

G-079-M

NSF/OPP Award 02-30285

Station: McMurdo Station

RPSC POC: Patricia Jackson

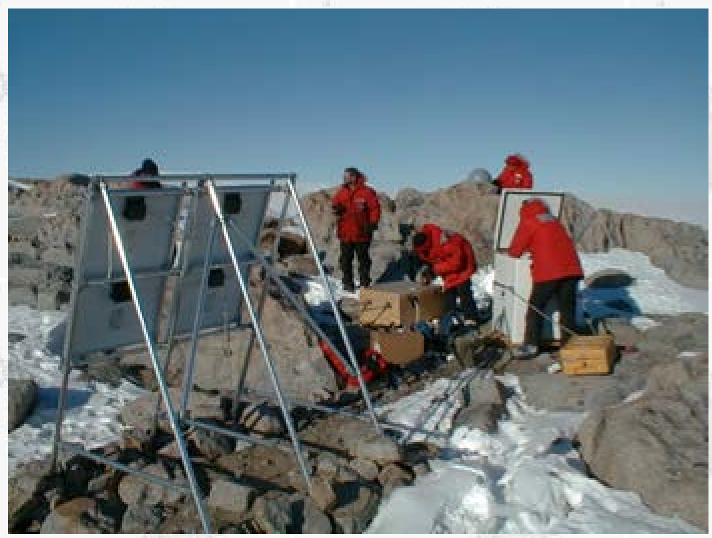
Research Site(s): Beacon Valley, Cape Roberts, Fishtail Point, Hidden Valley, Mt. Doorly, Mt. Fleming, Brosnahan Island, Cape Kerr, North Conway Range, Westhaven Nunatak, Ant Hill, Butcher Ridge, Deverall Island, Lonewolf Nunatak, Bratina Island, Cape Bird, Cape Royds

Dates in Antarctica: Mid November to early February

Transantarctic Mountains deformation network: GPS measurements of neotectonic motion in the antarctic interior

Dr. Terry J. Wilson

Ohio State University
Geological Sciences and Byrd Polar
twilson@mps.ohio-state.edu
http://www.geology.ohio-state.edu/TAMDEF



Setting up a continuously-operating GPS station at Fishtail Point. Photo courtesy of USGS team.

Deploying Team Members: Elizabeth Demyanick . Robert Glover . Jerome Hall . Jane Turner . Esteban Vazquez . Mike J. Willis . Terry J. Wilson

Research Objectives: The TAMDEF project is a joint program of the USGS and Ohio State University to measure crustal motion in the Transantarctic Mountains of Southern Victoria Land.

Crustal movement is predicted as a result of variations in the ice volume and loading of the East and West Antarctic Ice Sheets through time. Researchers also suspect that there is active tectonism associated with the Terror Rift, an nearby offshore fault zone. There are also active volcanoes in the region that may also be responsible for a measurable amount of crustal deformation.

The TAMDEF-II (Transantarctic Mountains DEFormation) program will extend this project's GPS time series by repeat surveying of key sites in the existing TAMDEF network. Project researchers are also implementing new strategies to discriminate glacio-isostatic from tectonic motions and thus increase the significance of previous results for modeling ice sheet behavior. The objectives of this program are to:

+ Constrain neotectonic deformation patterns across the frontal fault zone of the Transantarctic Mountains, the active Terror Rift, and the zone of active volcanism on Ross Island, by resurveying original TAMDEF sites;

+ Test models of postglacial rebound by extending the array southward across a significant gradient in predicted vertical motion and across known time points in West Antarctic deglaciation history where ice mass loads, crustal structure and rheological characteristics are relatively well characterized;

+ Assess regional tectonic and rebound-related motion patterns in the antarctic interior by integrating TAMDEF measurements with an Italian GPS array deployed in northern Victoria Land; and

+ Model regional and continental-scale postglacial rebound and neotectonic activity using GPS measurements integrated with independent records of relative sea level, deglacial chronology, ice mass load changes, and tectonic strain patterns.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Bernhard Lettau
Program Manager

NSF/OPP Award 03-41861

A-357-P
Station: Palmer Station
RPSC POC: Rob Edwards
Research Site(s): Palmer Station
Dates in Antarctica: September

Extending the South American Meridional B-field Array (SAMBA) to auroral latitudes in Antarctica

Dr. Eftyhia Zesta
University of California Los Angeles
Department of Atmospheric Sciences
ezesta@atmos.ucla.edu
http://samba.atmos.ucla.edu

Photo not available.

Deploying Team Members: Mark B. Moldwin

Research Objectives: The South American Meridional B-field Array (SAMBA) is a of ground-based longitudinal magnetometer chain extending from low latitudes to mid-latitudes. This project will extend the existing chain into Antarctica. Two magnetometers will be placed, one at Palmer Station and the other at Patriot Hills, a remote Chilean summer-only station. The autonomous installation at Patriot Hills will be accomplished with the logistical support of the Chilean Antarctic Institute.

The main scientific goals are the study of ULF (ultra low frequency) waves and the remote sensing of mass density in the inner magnetosphere during geomagnetically active periods. The expansion of the array will

+ Increase the spatial resolution of existing cusp-to-cusp chains,

+ Extend the number of conjugate pairs of stations between the northern and southern hemisphere thus increasing the size of the inner magnetospheric region that can be remotely monitored from the two hemispheres, and

+ Establish an auroral latitude station conjugate to the Canadian Poste de la Baleine station in order to study conjugate differences of substorms and general auroral activity.

Top of Page

2004-2005 USAP Field Season

Aeronomy & Astrophysics

Dr. Vladimir Papitashvilli, Program Manager

PI Last Name	PI First Name	Project Title	Award	Event #
Besson	Dave	RICE - Radio Ice Cherenkov Experiment	NSF/OPP Award 03-38219	A-123-S
Bieber	John	Solar and heliospheric studies with antarctic cosmic rays	NSF/ATM (Division of Atmospheric Sciences) 00-00315	A-120-M/S
Bristow	William	South Pole SuperDARN (Super Dual Auroral Radar Network)	NSF/OPP Award 03-37635	A-369-S
Caldwell	Douglas	A search for extrasolar planets from the South Pole	NSF/OPP Award 01-26313	A-103-S
Carlstrom	John	South Pole observations to test cosmological models	NSF/OPP Award 01-30612	A-379-S
Church	Sarah	Next generation CMB polarization measurements with the QUEST experiment on DASI	NSF/OPP Award 03-38138	A-366-S
Deshler	Terry	Measurements addressing quantitative ozone loss, polar stratospheric cloud nucleation, and large polar stratospheric particles during austral winter and spring	NSF/OPP Award 02-30424	A-131-M
Ejiri	Masaki	All-sky imager at South Pole	US/Japan agreement	A-117-S
Engebretson	Mark	Conjugate studies of ULF waves and magnetospheric dynamics using ground-based induction magnetometers at four high-latitude manned sites	NSF/OPP Award 02-33169	A-102-M/S
Fraser-Smith	Antony	The operation of an ELF/VLF radiometer at Arrival Heights	NSF/OPP Award 01-38126	A-100-M
Halzen	Francis	IceCube	NSF/OPP Award 02-36449, 03-31873	A-333-S
Hernandez	Gonzalo	Austral high-latitude atmospheric dynamics	NSF/OPP Award 02-29251	A-110-M/S
Holzapfel	William	High resolution observations of the CMB with ACBAR	NSF/OPP Award 02-32009	A-378-S
			NSF/OPP	

Inan	Umran	Global thunderstorm activity and its effects on the radiation belts and the lower Ionosphere	Award 02-33955	A-306-P
Inan	Umran	A VLF beacon transmitter at South Pole (2001-2004)	NSF/OPP Award 00-93381	A-108-S
Lange	Andrew	Background Imaging Of Cosmic Extragalactic Polarization (BICEP)	NSF/OPP Award 02-30438	A-033-S
Lessard	Marc	A proposal for the measurement and analysis of extremely low frequency waves at South Pole Station	NSF/OPP Award 01-32576	A-136-S
Lessard	Marc	Development of an Autonomous Real-time Remote Observatory (ARRO)	NSF/OPP Award 02-16279	A-362-S
Mende	Stephen	Dayside auroral imaging at South Pole	NSF/OPP Award 02-30428	A-104-S
Mitchell	John	Balloon-borne Experiment with a Superconducting Spectrometer (BESS)	NSF/NASA agreement	A-140-M
Morse	Robert	AMANDA 2004 (Antarctic Muon and Neutrino Detector Array)	NSF/OPP Award 03-37726	A-130-S
Murcray	Frank	Infrared measurements of atmospheric composition over Antarctica	NSF/OPP Award 02-30370	A-255-M/S
Palo	Scott	Dynamics of the antarctic MLT region using ground-based radar and TIMED instrumentation	NSF/ATM (Division of Atmospheric Sciences) 03-36946	A-284-S
Parks	George	Balloon observations of MeV electron precipitation	NSF/OPP Award 02-30441	A-144-E
Peterson	Jeffrey	PAST: The Primeval Structure Telescope	NSF/OPP Award 03-42448	A-375-S
Seo	Eun-Suk	Cosmic Ray Energetics And Mass (CREAM)	NSF/NASA agreement	A-137-M
Sivjee	Gulamabas	The antarctic investigations of upper atmospheric disturbances over the South Pole Station	NSF/OPP Award 03-37618	A-129-S
Stacey	Gordon	Wide-field imaging spectroscopy in the submillimeter: Deploying SPIFI on AST/RO	NSF/OPP Award 00-94605	A-377-S
Stark	Antony	Continued operation of the Antarctic Submillimeter Telescope and Remote Observatory (AST/RO)	NSF/OPP Award 01-26090	A-371-S
Stepp	Bill	Long Duration Balloon (LDB) program	NSF/NASA agreement	A-145-M
Weatherwax	Allan	Studies of the polar ionosphere and magnetosphere from measurements in Antarctica and conjugate regions	NSF/OPP Award 03-38105	A-111-M/S

Weatherwax	Allan		Polar Experiment Network for Geospace Upper-atmosphere Investigations (PENGUIN): A new vision for global studies	NSF/OPP Award 03-41470	A-112-M
Zesta	Eftyhia		Extending the South American Meridional B-field Array (SAMBA) to auroral latitudes in Antarctica	NSF/OPP Award 03-41861	A-357-P

Top of Page

2004-2005 USAP Field Season
Biology & Medicine

Dr. Polly Penhale, Program Manager

Long-Term Ecological Research (LTER)

Palmer Station | McMurdo Station

PI Last Name	PI First Name	Project Title	Award	Event #
Ainley	David	Geographic structure of Adélie penguin populations: Demography of population expansion	NSF/OPP Award 01-25608	B-031-M
Blake	James	Origin and evolution of antarctic and deep-sea macroinfauna: Systematics and reproductive patterns of polychaetes	NSF/OPP Award 00-86665	B-292-E
Blanchette	Robert	Investigations on deterioration in the historic huts of Antarctica	NSF/OPP Award 02-29570	B-038-E/M
Bowser	Samuel	Remotely operable micro environmental observatory for antarctic marine biology research	NSF/OPP Award 02-16043	B-015-M
Castellini	Michael	Effects of foraging on the lipid biochemistry of freely diving Weddell seals	NSF/OPP Award 01-30417	B-199-M
Chin	Yu-Ping	Biogeochemistry of dissolved organic material in Pony Lake, Ross Island	NSF/OPP Award 03-38260	B-300-M
Conrad	Pamela	SPISE3: A non-contact instrument suite for rapid detection of chemical biosignatures	NASA ASTEP (Astrobiology Science and Technology for Exploring Planets) 02-0040-0014	B-330-M
Day	Thomas	Response of terrestrial ecosystems along the Antarctic Peninsula to a changing climate	NSF/OPP Award 02-30579	B-003-P
DeVries	Arthur	Antifreeze proteins in antarctic fishes: Integrated studies of freezing environments and organismal freezing avoidance, protein-structure and mechanism, genes and evolution	NSF/OPP Award 02-31006	B-005-M
Doran	Peter	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-426-M
Ducklow	Hugh	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	NSF/OPP Award 02-17282	B-045-L/P

Dye	Timothy	Culture and health in Antarctica: Year 3	NSF/OPP Award 01-25893	B-027-M
Emslie	Steven	Occupation history and diet of Adélie penguins in the Ross Sea region	NSF/OPP Award 01-25098	B-034-M
Fountain	Andrew	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-425-M
Fraser	William	Long-Term Ecological Research (LTER) on the antarctic marine ecosystem: Climate migration, ecosystem response and teleconnections in an ice-dominated environment (seabird component)	NSF/OPP Award 02-17282	B-013-L/P
Fraser	William	Monitoring the effects of tourism and environmental variability on Adélie penguins at Palmer Station	NSF/OPP Award 02-17282	B-198-P
Garrott	Robert	Patterns and processes: Dynamics of the Erebus Bay Weddell seal population	NSF/OPP Award 02-25110	B-009-M
Gast	Rebecca	Comparative and quantitative studies of protistan molecular ecology and physiology in coastal antarctic waters	NSF/OPP Award 01-25833	B-207-N
Goes	Joaquim	Ultraviolet radiation induced changes in the patterns of production and biochemical composition of antarctic marine phytoplankton	NSF/OPP Award 01-26150	B-206-N
Gooseff	Michael	Hydrologic controls over biogeochemistry and microbial community structure and function across terrestrial/aquatic interfaces in a polar desert	NSF/OPP Award 03-38267	B-268-M
Halanych	Kenneth	Relevance of planktonic larval dispersal to endemism and biogeography of antarctic benthic invertebrates	NSF/OPP Award 03-38218	B-281-L
Hildebrand	John	Mysticete whale acoustic census in the GLOBEC west antarctic project area	NSF/OPP Award 99-10007	B-239-L
Hollibaugh	James	Distribution and ecology of ammonia oxidizing bacteria in the Palmer LTER study area	NSF/OPP Award 02-34249	B-114-L/P
Jeffrey	Wade	Interactive effects of UV and vertical mixing on phytoplankton and bacterial productivity of Ross Sea Phaeocystis bloom	NSF/OPP Award 01-27022	B-200-N
Kennicutt	Mahlon	Temporal variability in natural and anthropogenic disturbance of McMurdo Station	SGER (Small Grant for Exploratory Research)	B-518-M
Kieber	David	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea	NSF/OPP Award 02-30499	B-266-N
Kiene	Ronald	Impact of solar radiation and nutrients on biogeochemical cycling of DMSP and DMS in the Ross Sea	NSF/OPP Award 02-30497	B-002-N
Kim	Stacy	Community dynamics in a polar ecosystem: Benthic recovery from organic enrichment in the Antarctic	NSF/OPP Award 01-26319	B-010-M

Kremer	Patricia	Salpa thompsoni in the Southern Ocean: Bioenergetics, population dynamics and biogeochemical impact.	NSF/OPP Award 03-38290	B-307-L
Lee	Richard	Physiological and molecular mechanisms of stress tolerance in a polar insect	NSF/OPP Award 03-37656	B-256-P
Lyons	W. Berry	Soil biodiversity and response to climate change: A regional comparison of Cape Hallett and Taylor Valley	NSF/OPP Award 02-29836	B-259-M
Lyons	W. Berry	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-420-M
Manahan	Donal	Energetics of protein metabolism during development of antarctic echinoderms	NSF/OPP Award 01-30398	B-006-M
Marsh	Adam	CAREER: Genomic networks for cold-adaptation in embryos of polar marine invertebrates	NSF/OPP Award 02-38281	B-029-M
Martinson	Douglas	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	NSF/OPP Award 02-17282	B-021-L
McKnight	Diane	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-421-M
Naveen	Ron	Long-term data collection at select Antarctic Peninsula visitor sites	NSF/OPP Award 02-30069	B-086-E
Neale	Patrick	Interactive effects of UV and vertical mixing on phytoplankton and bacterioplankton in the Ross Sea	NSF/OPP Award 01-27037	B-203-N
Palinkas	Lawrence	Prevention of environment-induced decrements in mood and cognitive performance	NSF/OPP Award 00-90343	B-321-M/S
Pitman	Robert	Genetic and photogrammetric investigations of three ecotypes of Killer whales in the southern Ross Sea	NSF/OPP Award 03-38428	B-289-M
Ponganis	Paul	Diving physiology and behavior of Emperor penguins	NSF/OPP Award 02-29638	B-197-M
Priscu	John	Microbial diversity and function in the permanently ice-covered lakes of the Dry Valleys	NSF/MCB (Division of Molecular and Cellular Biosciences) 02-37335	B-195-M
Priscu	John	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-422-M
Ross-Quetin	Robin	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	NSF/OPP Award 02-17282	B-028-L/P
Sidell	Bruce	Cold body temperature as an evolutionary shaping force in the physiology of antarctic fishes.	NSF/OPP Award 01-	B-036-L/P

			25890	
Smith	Raymond	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	NSF/OPP Award 02-17282	B-032-L/P
Smith	Walker	Interannual Variability in the Antarctic-Ross Sea (IVARS): Nutrients and seasonal production	NSF/OPP Award 00-87401	B-047-M
Thiele	Deborah	International Whaling Commission Southern Ocean Collaboration Program: Cetacean ecology, acoustic detection and sea ice habitat	International Whaling Commission	B-280-N
Trivelpiece	Wayne	Foraging behavior and demography of Pygoscelis penguins	NSF/OPP Award 01-25985	B-040-E
Uhle	Maria	Biogeochemistry of Victoria Land coastal ponds: Role in terrestrial ecosystem organic carbon dynamics and structure	NSF/OPP Award 02-30237	B-011-M
Vernet	Maria	Palmer Long Term Ecological Research Project (PLTER): Climate migration, ecological response and teleconnections in an ice-dominated environment.	NSF/OPP Award 02-17282	B-016-L/P
Virginia	Ross	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-423-M
Wall	Diana	McMurdo Dry Valleys LTER (Long Term Ecological Research)	NSF/OPP Award 98-10219	B-424-M
Ward	Bess	What limits denitrification and bacterial growth in Lake Bonney, Taylor Valley?	NSF/OPP Award 02-30276	B-310-M

Top of Page

2004-2005 USAP Field Season

Geology & Geophysics

Dr. Thomas Wagner, Program Manager

Table of Contents | List projects by PI | List projects by program | List projects by institution | List projects by station | List projects by event number digits | List deploying team members

PI Last Name	PI First Name	Project Title	Award	Event #
Anderson	John	SHALDRIL: A demonstration drilling cruise to the James Ross Basin	NSF/OPP Award 01-25922	G-083-N
Butler	Rhett	Global seismograph station at Palmer and South Pole stations	NSF/EAR (Division of Earth Sciences) 00-04370	G-090-P/S
Harvey	Ralph	The Antarctic Search for Meteorites (ANSMET)	NSF/OPP Award 99-80452	G-058-M
Johns	Bjorn	UNAVCO Geodetic GPS Support	NSF/EAR (Division of Earth Sciences) 03-21760	G-295-M
Kemerait	Robert	Dry Valley seismic project	NSF/DOD agreement	G-078-M
Kyle	Philip	Mount Erebus Volcano Observatory and Laboratory (MEVOL)	NSF/OPP Award 02-29305	G-081-M
Marchant	David	Age, origin, and climatic significance of buried ice in the western Dry Valleys	NSF/OPP Award 03-38291	G-054-M
Marsh	Bruce	Magmatism in the Dry Valleys: A workshop	NSF/OPP Award 02-29306	G-056-M
Mullins	Jerry	Geodesy and geospatial data program	NSF/OPP Award 02-33246	G-052-M/P/S
Putkonen	Jaakko	Stability of landscapes and ice sheets in Dry Valleys: A systematic study of exposure ages of soils and surface deposits	NSF/OPP Award 03-38224	G-076-M
Stock	Joann	Collection of marine geophysical data on transits of the R/V Nathaniel B. Palmer	NSF/OPP Award 03-38317	G-071-N
Wilcock	William	High-resolution seismic tomography and earthquake monitoring at Deception Island volcano	NSF/OPP Award 02-30094	G-135-E
Wilson	Terry	Transantarctic Mountains deformation network: GPS measurements of neotectonic motion in the antarctic interior	NSF/OPP Award 02-30285	G-079-M

Top of Page

2004-2005 USAP Field Season

Glaciology

Dr. Julie Palais, Program Manager

PI Last Name	PI First Name	Project Title	Award	Event #
Anandakrishnan	Sridhar	Tidal modulation of ice stream flow	NSF/OPP Award 02-29629	I-205-M
Borns	Harold	West antarctic ice sheet stability	NSF/OPP Award 03-38189	I-187-M
Cole-Dai	Jihong	Investigating atmospheric chemistry through oxygen and sulfur isotopes in volcanic sulfate from South Pole ice cores	NSF/OPP Award 03-37933	I-355-S
Fricker	Helen	Monitoring an active rift system at the front of Amery Ice Shelf, East Antarctica	NSF/OPP Award 03-37838	I-277-E
Hallet	Bernard	Mechanics of dry-land calving of ice cliffs	NSF/OPP Award 02-30338	I-139-M
Holt	John	Airborne Geophysical survey of the Amundsen Sea Embayment, Antarctica (AGASEA)	NSF/OPP Award 02-30197	I-141-M
Kreutz	Karl	Dry Valleys Late Holocene climate variability	NSF/OPP Award 02-28052	I-191-M
MacAyeal	Douglas	Collaborative research of Earth's largest icebergs	NSF/OPP Award 02-29546	I-190-M
Stone	John	Late Quaternary history of Reedy Glacier	NSF/OPP Award 02-21394	I-175-M/S
Tulaczyk	Slawek	Is Kamb Ice Stream restarting? Glaciological investigations of the bulge-trunk transition on Kamb Ice Stream, West Antarctica	NSF/OPP Award 03-38295	I-345-M

Top of Page

2004-2005 USAP Field Season

Ocean & Climate Systems

Dr. Bernie Lettau, Program Manager

PI Last Name	PI First Name	Project Title	Award	Event #
Avallone	Linnea	In situ measurements of halogen oxides in the Troposphere	NSF/OPP Award 04-11437	O-251-M
Chereskin	Teresa	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Laurence M. Gould	NSF/OPP Award 03-38103	O-317-L
Dempsey	John	Physics and mechanics of the breakup of warm antarctic sea ice: In-situ experiments and modeling	NSF/OPP Award 03-38226	O-316-M
Emerson	Steven	Tracers of biological productivity and gas exchange	NSF/OCE (Division of Ocean Sciences) 02-42139	O-271-L
Firing	Eric	Shipboard Acoustic Doppler Current Profiling (ADCP) on R/V Nathaniel B. Palmer	NSF/OPP Award 03-38103	O-315-N
Gordon	Arnold	ANSLOPE: Cross slope exchanges at the antarctic slope front	NSF/OPP Award 01-25172	O-215-N
Hansen	Anthony	Solar / wind powered instrumentation module development for polar environmental research	NSF/DBI (Division of Biological Infrastructure) 01-19793	O-314-M
Hofmann	David	South Pole monitoring for climatic change: US Department of Commerce NOAA climate monitoring and diagnostic laboratory	NSF/NOAA agreement	O-257-S
Hofmann	David	Collection of atmospheric air for the NOAA/CMDL worldwide flask sampling network	NSF/NOAA agreement	O-264-P
Keeling	Ralph	A study of atmospheric oxygen variability in relation to annual to decadal variations in terrestrial and marine ecosystems	NSF/ATM (Division of Atmospheric Sciences) 00-00923	O-204-P/S
Sanderson	Colin	Remote Atmospheric Measurements Program (RAMP) of the University of Miami / U.S. Department of Energy's Environmental Measurements Lab	NSF/DOE agreement	O-275-P/S
Sprintall	Janet	The Drake Passage high density XBT / XCTD program	NSF/OPP Award 00-03618	O-260-L
Stearns	Charles	Antarctic Meteorological Research Center 2002-2005 (AMRC)	NSF/OPP Award 01-26262	O-202-M/P/S

Stearns	Charles	Antarctic Automatic Weather Station (AWS) program 2004-2006	NSF/OPP Award 03-38147	O-283-M/P/S
Takahashi	Taro	Processes driving spatial and temporal variability of surface PCO2 in the Drake Passage	NSF/OPP Award 03-38248	O-214-L
Warren	Stephen	Solar radiation on the East Antarctic Plateau	NSF/OPP Award 00-03826	O-201-M

Top of Page

2004-2005 USAP Field Season

Artists & Writers

Mr. Guy Guthrige, Program Manager

PI Last Name	PI First Name	Project Title	Event #
Arthus-Bertrand	Yann	Mission Antarctica	W-217-M
Glasberg	Elena	End as beginning: An American antarctic imaginary	W-219-M/S
Nutter	Judith	Time, place, and imagination: Images and poems from Antarctica	W-220-P
Rogers	Susan Fox	Antarctic Anthology	W-218-M/S
Samaras	Connie	Vast active living intelligence system: Photographing the South Pole	W-221-S
Walker	Gabrielle	Antarctica: The biography of a continent	W-223-M

Top of Page

2004-2005 USAP Field Season

Projects not based at a USAP station

Event #	Award	PI Last Name	PI First Name	Project Title
B-292-E	NSF/OPP Award 00-86665	Blake	James	Origin and evolution of antarctic and deep-sea macroinfauna: Systematics and reproductive patterns of polychaetes
I-277-E	NSF/OPP Award 03-37838	Fricker	Helen	Monitoring an active rift system at the front of Amery Ice Shelf, East Antarctica
B-086-E	NSF/OPP Award 02-30069	Naveen	Ron	Long-term data collection at select Antarctic Peninsula visitor sites
A-144-E	NSF/OPP Award 02-30441	Parks	George	Balloon observations of MeV electron precipitation
B-040-E	NSF/OPP Award 01-25985	Trivelpiece	Wayne	Foraging behavior and demography of Pygoscelis penguins
G-135-E	NSF/OPP Award 02-30094	Wilcock	William	High-resolution seismic tomography and earthquake monitoring at Deception Island volcano

2004-2005 USAP Field Season

Palmer Station LTER: Climate migration, ecological response and teleconnections in an ice-dominated environment

Project Manager:

Dr. Hugh Ducklow
Virginia Institute of Marine Sciences
School of Marine Sciences
The College of William and Mary
Box 1346
Gloucester Point, VA 23062-1346
duck@vims.edu

http://www.icess.ucsb.edu/lter/lter.html

List of 2004-2005 Palmer Station LTER projects

The Palmer Long Term Ecological Research (LTER) project is focused on one major ecological issue: To what extent does the advance and retreat of sea ice each year physically determine spatial and temporal changes in the structure and function of the antarctic marine ecosystem?

Evidence shows this dynamic variability of sea ice to have an important (perhaps determinant) impact on all levels of the food web, from total annual primary production to breeding success in top predators. For example, variability in sea ice may affect prey and predators directly by controlling access to open water or preferred habitats. That variability may affect prey and predators indirectly as changes in the sea ice cover affect other species that serve as food. Four hypotheses drive current Palmer LTER research:

- The timing and magnitude of seasonal primary production,
- The dynamics of the microbial loop and particle sedimentation,
- Krill abundance, distribution and recruitment,
- Survivorship and reproductive success of top predator

These factors probably differ for key species since the magnitude and timing of sea ice changes can have specific local impacts. What remains unclear are the implications for the whole antarctic ecosystem. As one of the basic examples, greater sea ice areal coverage promotes more available krill which enhances the survivorship and reproductive success of Adelie penguins.

General objectives of the Palmer LTER project are:

- Document the interannual variability of annual sea ice and the corresponding physics, chemistry, optics, and primary production within the study area,
- Document the life history parameters of secondary producers and top predators,
- Quantify the processes that cause variation in physical forcing and the subsequent biological response among the representative trophic levels,
- Construct models that will link ecosystem processes to environmental variables and which will also simulate spatial/temporal ecosystem relationships,
- Employ those models to predict and validate ice/ecosystem dynamics.

A key challenge for the Palmer LTER project is to characterize and understand the many cross-linkages that have developed in the antarctic ecosystem. Environmental phenomena vary over time and across areas, having both physical and biological consequences. These changes in turn can develop other loops and linkages that influence each other.

Principal Investigator	Institution	Event Number	Component
Hugh Ducklow	College of William and Mary	B-045-L/P	Project Manager
William R. Fraser	Polar Oceans Research Group	B-013-L/P	Seabird
Douglas G. Martinson	Lamont-Doherty Earth Observatory	B-021-L	Modeling
Robin Ross	University of California Santa Barbara	B-028-L/P	Zooplankton
Raymond Smith	University of California Santa Barbara	B-032-L/P	Bio-optical
Maria Vernet	Scripps Institution of Oceanography	B-016-L/P	Phytoplankton ecology

Top of Page

2004-2005 USAP Field Season

McMurdo Dry Valleys LTER: The role of natural legacy on ecosystem structure and function in a polar desert

Project Manager:

Dr. W. Berry Lyons
Ohio State University
Byrd Polar Research Center
1090 Carmack Road, 108 Scott Hall
Columbus, OH 43210-1002
lyons.142@osu.edu

http://huey.colorado.edu

List of 2004-2005 McMurdo LTER projects

The largest ice-free area in Antarctica can be found in the McMurdo Dry Valleys on the western shore of McMurdo Sound. Among the most extreme deserts in the world, the Dry Valleys are the coldest and driest of all LTER sites. Consequently, the biological systems are limited to microbial populations, microinvertebrates, mosses, and lichens. Yet complex trophic interactions and biogeochemical nutrient cycles develop in the lakes, streams, and soils of the Dry Valleys. In the austral summer, solar energy produces glacial melt water, providing vital water and nutrients that are a primary influence on the ecosystems. Such material transport and climatic influences shape all ecosystems, but nowhere is this more apparent than in the McMurdo Dry Valleys.

In 1993, this region was selected as a study site for the National Science Foundation's Long Term Ecological Research (LTER) program. During the first six years, investigators studied the perennially ice-covered lakes, ephemeral streams, and extensive areas of soils to assess the role of physical constraints on the structure and function of the ecosystem. Clearly, the production of liquid water in both terrestrial and aquatic portions or this environment is a primary driver in ecosystem dynamics. Thus, the role of present-day climate variation is extremely important. However, one of the most significant discoveries was that past climatic legacies strongly overprint the present ecological conditions in the McMurdo Dry Valleys.

The McMurdo LTER project focuses on the aquatic and terrestrial ecosystems in the Dry Valleys landscape as a context to study biological processes and to explore material transport and migration. During the second phase of this LTER project, the LTER researchers will continue to investigate the McMurdo Dry Valleys as an "end-member" system, hoping to better ascertain the role of the past climatic legacies on ecosystem structure and function. They will test a series of eight hypotheses in three major focus areas -- hydrology, biological activity/diversity and biogeochemical processes.

Understanding the structure and function of the McMurdo Dry Valleys ecosystem requires understanding hydrological response to climate -- both now and in the past. Current patterns of biological activity and diversity reflect both past and present distributions of water, nutrients, organic carbon, and biota. Biogeochemical processes responsible for the transport, immobilization, and mineralization of nutrients and other chemicals provide the linkages between the region's biota and the physical environment. The timing, duration, and location of biogeochemical processes in the past and present are controlled by water availability. The LTER researchers continue to focus on the integration of the biological processes within and among the lakes, streams, and terrestrial ecosystems that comprise the McMurdo Dry Valleys landscape. The interdisciplinary research team will continue to use modeling and other integrative studies to synthesize data and to examine the McMurdo Dry Valleys ecosystem.

Principal Investigator	Institution	Event Number	Component
Peter T. Doran	University of Illinois, Chicago	B-426	Paleoclimatology, paleoecology, meteorology
Andrew G. Fountain	Portland State University	B-425	Glacier mass balance, melt and energy balance
W. Berry Lyons	Ohio State University	B-420	Chemistry of streams, lakes, and glaciers
Diane M. McKnight	University of Colorado Boulder	B-421	Flow, sediment transport, and productivity of streams
John C. Priscu	Montana State University Bozeman	B-422	Lake pelagic and benthic productivity and microbial food webs
Ross A. Virginia	Dartmouth College	B-423	Soil productivity
Diana H. Wall	Colorado State University	B-424	Soil productivity

Top of Page