February 12, 2006

The Antarctic Sun

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Emily Stone / *The Antarctic Sun*

Kaelin Cawley extracts a water sample from a tube inserted into the bottom of a stream in the McMurdo Dry Valleys. The experiment was part of a Long Term Ecological Research study.

Collaboration is key to Dry Valleys work

By Emily Stone
Sun staff

Byron Adams made his way up a slope in the McMurdo Dry Valleys recently, adjusting a series of bundt pans filled with marbles and a screen used to catch blowing dirt.

The low-tech equipment is not what made the excursion so remarkable. Nor the frozen lake, tumbling glacier and jagged peaks that created his backdrop.

What's most unusual is that it wasn't even Adams' experiment. After using the bundt pans for eight years to look for microscopic organisms in the soil, his group turned the pans over to another science team that's testing for carbon. Adams was in the area collecting samples for a different study and offered to do some maintenance on the pans.

Such cooperation typifies the Dry Valleys Long Term Ecological Research (LTER) Project. The 13-year-old project is made up of seven separate field groups that work cooperatively to better understand the area's unique ecosystem. It's a textbook example of an interdisciplinary approach to research in a world where many scientists are trained to be independent and protect their turf.

"You don't usually see this many big shots who work together and like each other," said Adams, of Brigham Young University and a

See UNIQUE on page 10

Adélie penguin studies are part of the Palmer LTER.

Related stories:

Palmer's maritime LTER, page 7
Peninsula penguins in flux, page 9
Two projects part of network, page 13

Winter's pull is strong for many

"The curtain of blackness which has fallen over the outer world of icy desolation has descended upon the inner world of our souls. Around the tables, in the laboratory, and in the forecastle, men are sitting about sad and dejected, lost in dreams of melancholy from which, now and then, one arouses with an empty attempt at enthusiasm."

Frederick Cook, 1898-99 *Belgica* Expedition, on the first winter spent below the Antarctic Circle.

By Peter Rejcek
Sun staff

Zoe Vida approaches winters in Antarctica with a very "Buddha" attitude: reminding herself to let go of the ego and become immersed in the experience of the long austral night.

Embarking on her fourth winter in five years, the McMurdo Station retail coordinator says winter is "ugly and beautiful, the worst of times, but the best of times," when people tune into one another, but also when

See SMALL on page 14

Quote of the Week

"Was I in Antarctica?"

— Man in an e-mail on adjusting to post-Ice life, 24 hours after leaving McMurdo

INSIDE

Heading north

Photos by Peter Rejcek / *The Antarctic Sun*

Above, passengers heading north to Christchurch, New Zealand, crowd into the McMurdo Station Movement Control Center building Feb. 9 before being transported to Pegasus airfield.

Right, passengers load into a line of shuttle buses for the trip to Pegasus. One hundred and forty people were scheduled to fly that day on the 16th of 24 proposed C-17 flights taking summer workers north.

Cold, hard facts

Winter's arrival

The U.S. stations will soon enter their winter modes with darkness, isolation and no scheduled flights.

McMurdo

Last flight out tentatively set for: **March 1**
First sunset: **Feb. 20 at 1:38 a.m.**
Last sunset: **April 24 at 2:35 p.m.**
First sunrise of spring: **Aug. 19 at 1:28 p.m.**

Palmer

Last ship of the season: **June 22**
Shortest amount of daylight during the winter: **3 hours; including twilight, 7 hours**

South Pole

Last flight out scheduled for: as late as **Feb. 24**
One and only sunset: **March 22 at 8:58 p.m.**
One and only sunrise: **Sept. 21 at 12:53 a.m.**

Sources: station weather departments, Kerry Kells, Beth Watson

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Level 1 Comix **Matt Davidson**

The Mother of All Field Trips

Antarctic class gives students, instructors hands-on experience for biological studies

By Steven Profaizer
Sun staff

Seeing isn't only believing; it's understanding.

That is the principle that leads Donal Manahan to bring a graduate-level biology course to Antarctica every other year.

"If you don't have hands-on training, you just won't get it," Manahan said. "You could probably speak some Antarctic science if you just read the textbooks, but I don't think you'd be a leader."

Manahan is a professor at the University of Southern California, Los Angeles, and serves as the lead instructor for the National Science Foundation-funded course. This year's 21 students and 11 instructors make up the seventh class he has brought to the Ice.

The course focuses on the adaptation of marine life in Antarctica and combines lab work, lectures, and field experience to train the next generation of Antarctic scientists.

By exposing young scientists to Antarctica at a crucial point in their careers, Manahan hopes to not only affect their areas of scientific focus, but the careers of countless others not even enrolled in the program.

So far, the class has brought about 140 individuals, representing 120 universities in 18 different countries, to Antarctica. When students leave, they go back to their institutions and spread their interest in Antarctic science. If some of the people they talk to become interested and start sharing the information, each student can result in thousands of people hearing about Antarctica's scientific importance, Manahan said.

The course has already proven its ability to turn out influential members of the scientific community.

"I think the most successful matrix of the course is the number of people who are thinking and working in Antarctic science who otherwise would not have," Manahan said. "For example, there were two [principal investigators] here this season who started in this course and are now running their own programs."

The course is designed to equip students not only with a passion for Antarctic science, but with the tools to carry it out. Part of the course involves teaching students the logistics and limitations of running a research program in Antarctica.

"If you are really going to understand how to work in Antarctica, you're not going to do it watching TV and reading textbooks," Manahan said. "You've got to come here."

Dimitri Deheyn, a post-doctoral student in the class, has been interested in Antarctic science for a number of years and has applied for two NSF grants to come to the continent.

He said the proposals have been well-received, but both were turned down in part because of lofty goals he now knows were logistically impossible.

"I've learned a lot already," Deheyn said. "I am much more confident and capable of writing a realistic proposal."

Providing a new view

The class has been helping students like Deheyn since 1994, when instructors brought the first class to Antarctica.

Manahan, who said he was the catalyst for the class, said one of his driving forces was that he had been poorly educated about Antarctica.

"After I got my Ph.D., it started to cross my radar screen that this continent drives an enormous amount of the environment for the rest of planet Earth," Manahan said. "I thought we should bring students down here to see how important this place is and have them spread the word. It isn't just some out-of-the-way little place at the bottom of the Earth."

The opportunity to travel to Antarctica and learn about the oft-neglected continent keeps applications pouring in. More than 300 hopeful students submitted applications for the 21 slots this year, and the program's application Web site got more than 10,000 hits.

This year's selected students come from institutions in Germany, the United Kingdom, Canada, Australia and the United States.

The group meets seven days a week. Each day starts with a lecture at 8 a.m. and ends with a lecture at 8 p.m. In between, and often late into the night, the students are hard at work.

The course is designed to look at biological adaptation from all angles. Disciplines like biochemistry and biophysics are used to study Antarctic marine biology — from single-celled microbes to fish.

"It's beyond what I expected," said Sarah Johnson, a graduate student from Massachusetts Institute of Technology. "The lectures are really intriguing and cover all aspects of biology."

Courtesy of Donal Manahan / Special to *The Antarctic Sun*

Grad student John Hall looks at samples using a microscope at the McMurdo Station Crary Science and Engineering Center.

Classes are held both in the Crary Science and Engineering Center and in the field.

In the lab, the students work with state-of-the-art equipment to delve into organisms' physiology and biochemistry to see how they would react to environmental changes, like the ozone hole or global warming.

One way they do this is by looking at organisms' genes with a high-throughput automatic DNA sequencer. This instrument analyzes the structure of DNA and outputs the information to a computer screen. It is on loan from Applied Biosystems and is the first of its kind in Antarctica. The device allows the students to study organisms from their basic biological building blocks.

The group also has five regular field sites — from Bratina Island to the edge of the Ross Ice Shelf near New Zealand's Scott Base.

"This is not just about coming and working in the Crary Lab," Manahan said. "This is about coming to Antarctica. Students learn how to work in the cold, how to work effectively in all the [extreme cold weather] gear, how to keep your hands dry when you're working around seawater, how to use instruments in the field — all those types of things."

Un-canning education

The instructors make major changes to the course each season — the curriculum is modified, new field sites found, and new

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NSF soliciting for IPY science proposals

By Steven Profaizer
Sun staff

The last time the United States celebrated an International Polar Year, it built seven Antarctic stations in preparation to join 67 nations in concentrated polar research.

In March 2007, on the 50th anniversary of that IPY, the worldwide scientific community will again unite to further its understanding of the vital polar systems.

"There has been growing interest in the polar regions," said Scott Borg, head of Antarctic science for the National Science Foundation (NSF). "And the international community has decided it is again time for a collaborative effort to better understand these regions."

The NSF is the United States' official lead agency for its participation in IPY, which will engage all federal agencies involved in research and education.

The NSF released a solicitation Feb. 1 that requested proposals supporting three general scientific areas of focus: ice sheet history and dynamics, adaptations at the cellular and genomic levels of organisms for life in extreme cold and prolonged darkness, and the arctic observing network.

In addition to the science focus, there is an emphasis on education and outreach, as well as the useful management of scientific information produced during the IPY.

The NSF will now accept applications from grantee hopefuls on how to best address those areas of interest.

IPY will actually extend for more than one year, running from March 1, 2007, until March 1, 2009. The remote nature and extreme winters of polar regions limit when scientists can conduct their observations. The extra year provides more usable on-site time.

The International Council for Science (ICSU) and the World Meteorological Organization are leading IPY on the international level. More than 50 countries have pledged to participate.

The coming IPY will mark the third international celebration since the IPY was created in 1882.

The first IPY was inspired by Karu Weyprecht, an officer of the Austro-Hungarian navy. He helped fuel the idea that polar expeditions should be primarily for scientific research not exploration. During that first IPY, 11 countries led 15 expeditions to polar regions in the name of science.

Next summer: The International Polar Year hits full stride.

Fifty years passed before the scientific community again joined together to celebrate an IPY. In 1932, 40 nations dedicated resources to polar research, but the worldwide depression forced the IPY to be smaller than originally envisioned.

It took until 1957 for the event to reach the magnitude the scientists desired. It marked the birth of the modern age of research in Antarctica. The continent became accessible to scientists as it had never been before. The mysteries enshrouding Antarctica began to be pulled away, providing valuable information on a nearly blank spot on the map. Scientists now knew the thickness of Antarctica's ice sheet, learned how its weight was depressing the land mass deep below, and located fossilized tree trunks near the South Pole.

At the conclusion of that IPY, 12 nations maintaining 65 stations stayed behind to continue their research. Borg said he hopes the upcoming IPY leaves behind a similar legacy, saying he expects "that IPY will usher in a new era of polar research."

Learn more about IPY at www.us-ipy.gov.

Students do research in 'educational context'

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experiments created.

"When you're at a university, the experiments are designed in a way that pretty much everybody knows how they're going to come out," Manahan said. "Here, we don't know the answers. We're doing research in an educational context. Students here are working on organisms and doing things that have never been done before."

Several previous students have even been able to publish work they have done for the course — something nearly impossible with traditional canned experiments.

"It's unique," Deheyn said. "I don't think you'll find something like it anywhere else."

The students realize the opportunity this class affords them and try to make the most of their month here.

"I just feel so wide-eyed here," Johnson said. "I don't want to sleep at all, don't want to miss anything."

NSF-funded research in this story: Donal Manahan, University of Southern California.

Steven Profaizer / *The Antarctic Sun*

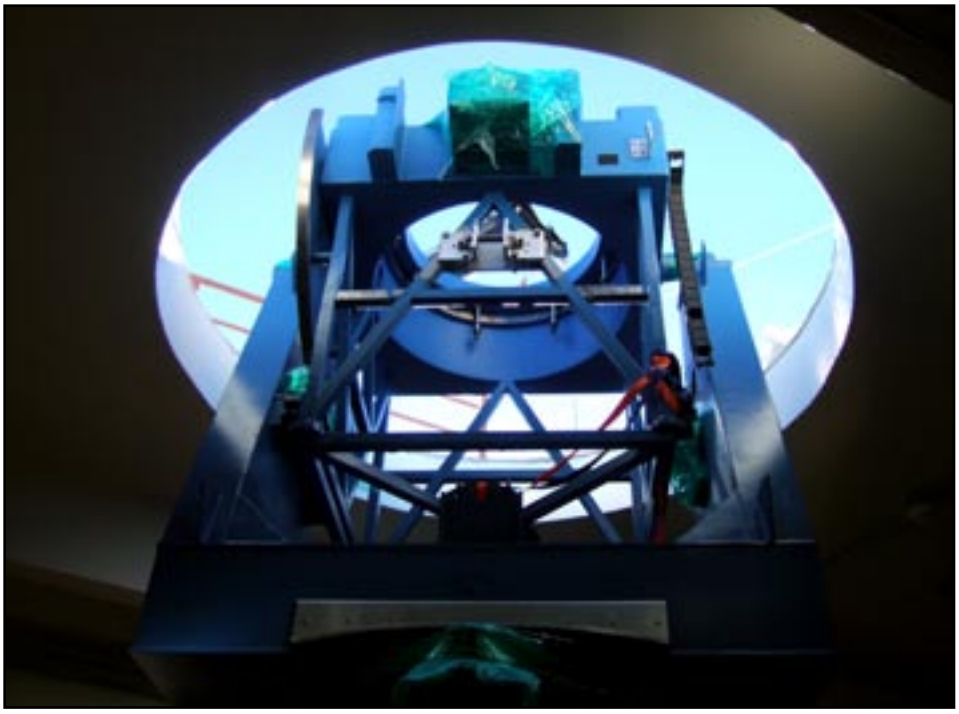
Donal Manahan, center, works with postdoctoral-level student Jonathan Cohen, left, and Ph.D. student John Hall as they use a micro-respirator in a lab at the Crary Science and Engineering Center. The device measures very low rates of embryonic metabolism.

around the continent

John Kovac / Special to *The Antarctic Sun*

Above, a crane lifts the BICEP telescope onto the top of the Dark Sector Lab.

At right, the mount for BICEP.



Yuki Takahashi / Special to *The Antarctic Sun*

SOUTH POLE

BICEP begins quest

By Katie Hess
South Pole correspondent

The remainder of the new elevated station, along with the Dark Sector Laboratory, was signed off by the design team this past week at South Pole. Hearty congratulations went to many Polies who made this happen!

People who will lose their familiar work space under the Dome during this winter's scheduled demolition are moving into new offices in the elevated station.

The BICEP telescope, which is designed to uncover the mysteries behind the beginning of the universe, has moved into the dark sector, an area devoid of light pollution during the winter months. BICEP is already collecting data, and the telescope is becoming more autonomous and will hopefully observe continuously during the crisp, winter night, according to Denis Barkats, the South Pole winter science leader. "Stay tuned for breaking news on the early universe," he said.

The IceCube project to create a subsurface neutrino detector is finished for this season. Crews are packing up all drilling equipment onto a snow berm after a successful summer. The IceCube team planted eight strings of Digital Optical Modules, bringing the total up to nine holes. That still leaves 71 holes to go.

Temperatures dropped below negative 40 degrees Celsius on Feb. 6. At that temperature, a thick cloud of exhaust, called a contrail, is created behind the LC-130 while it is on the ground because the engines must remain on. Little cargo can be sent north because contrails prohibit operators from approaching the tail of the aircraft due to complete lack of visibility.

However, more cargo can still be delivered to Pole using the drifting or "combat off-load" method. As of Feb. 8, there were still about 60 flights, mainly cargo, scheduled to fly before the end of the summer season. At seven flights per day, this could take just another week and a half, though weather and maintenance delays could push the date well into the later half of February.

Thus, a handful of Polies may stay another week or so this season after most of the summer population has left to help get as many of these last flights in to the station as dropping temperatures allow.

Lots of hearty freshies arrived this week, which will be rationed for as many months as possible into the winter. These freshies include potatoes, onions, eggs, apples, cab-

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the week in weather

McMurdo Station
High: 34F / 1C
Low: 9F / -13C
Max. sustained wind: 25mph / 41kph
Windchill: -27F / -33C

Palmer Station
High: 46F / 8C
Low: 30F / -1C
Max. sustained wind: 50mph / 81kph
Precipitation: 16mm

South Pole Station
High: -27F / -33C
Low: -49F / -45C
Peak wind: 23mph / 37kph
Max. physio-altitude: 3,267m

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bage and carrots. And for those wintering Polies, it is the crunch for last-minute tasks before the last flight leaves. They are scurrying to complete these projects, as they eagerly await the eight-month winter that's just around the corner.

PALMER

LTER cruise finishes

By Kerry Kells
Palmer correspondent

The summer season continues at Palmer Station after the return of the Long Term Ecological Research (LTER) cruise aboard the *Laurence M. Gould*.

Staying at Palmer for another two months are the LTER research groups with new and returning team members: Maria Vernet's primary production group, Hugh Ducklow's microbial biogeochemistry group, Langdon Quetin's krill group and Bill Fraser's seabird researchers. The terrestrial ecology group will continue researching in the area, and will be joined by principal investigators Thomas Day and Christopher Ruhland later in February.

Palmer Station had two significant celebrations during the *LMG* port call. We celebrated Wendy Kozlowski's engagement to our former boating coordinator, Doug Fink. Kozlowski worked with the LTER phytoplankton group for more than 10 years and was part of this most recent cruise. She is now attending graduate school in southern California. We also held a pizza dinner for Capt. Robert Vernet, who will be leaving the *LMG* this year to captain another ship.

Two science lectures were held this week. First was Fen Montaigne, a former grantee on the National Science Foundation's Artists and Writers Program, who has published articles in *National Geographic*. Fen returned this year as a field team member with Bill Fraser's seabird research group. He was here in January 2004 working on an article for *National Geographic*, which was published in September 2004. Fen talked about his time as a foreign correspondent in the Soviet Union, and his book "Reeling for Russia," which chronicled a 100-day, 11,200-kilometer fly-fishing journey across Russia.

After the pizza dinner, we had a bonus science lecture by Cindy Lee Van Dover, one of the pilots of ALVIN, a Deep Submergence Vehicle that can carry one pilot and two scientists to a depth of 4,500 meters. ALVIN has three 75-centimeter-diameter view ports, and is often used to research deep sea hydrothermal vents. Cindy piloted ALVIN at many locations including the East Pacific Rise, Juan de Fuca Ridge, Catalina Basin and the Santa Cruz Basin for research in biology, geology and geochemistry. She showed video clips and still images of the deep-sea life, hydrothermal vents and volcanoes observed on her dives.

We have another month of the summer season before the transition into winter. Everyone at Palmer Station wishes the crews at McMurdo, South Pole and all our neighboring stations on the peninsula a wonderful winter season!

Zee Evans / Special to *The Antarctic Sun*

The Laurence M. Gould *departs Palmer Station on Feb. 5 and headed north to Punta Arenas, Chile. At last report, waters were calm through the Drake Passage.*

SHIPS

NBP

Compiled from reports
by Karl Newyear
Marine projects coordinator

During its six-and-a-half hour port call at the McMurdo Station ice pier on Jan. 30, the *Nathaniel B. Palmer* off-loaded about 70 drums of waste, 65 thermo-safes of scientific samples and 6,800 kilograms of additional cargo. Between the 30th and Feb. 2, the *Palmer* hosted researchers for the Interannual Variability in the Ross Sea project, a five-year study to learn more about year-to-year changes in the biology, physics and chemistry of the Ross Sea.

On Feb. 2, the bridge crew noted some movement in the large icebergs remaining along the north shore of Ross Island, though their realignment did not pose any problems for our navigation south of Beaufort Island. We parked the ship near the fuel tanker, the *Lawrence Gianella*, at the 32-kilometer mark of the McMurdo ship channel and awaited the helicopters that were ferrying embarking and disembarking passengers between the *NBP* and McMurdo.

While cruising through afternoon foggy and icy conditions on Feb. 4, we lost the only magnetometer we had aboard the ship. Although satellite images show no appreciable ice within 150 kilometers, we found ourselves in a band of increasingly heavy ice. The decision was made to recover the magnetometer to avoid loss or damage, but we were unable to do it in time. Visibility limited to a few hundred meters also hampered the ability of the ship to maneuver. Otherwise, we continued to collect underway data while making minor corrections to the planned route to avoid the ice.

As of Feb. 6, the weather and seas continued to be quite favorable, and while we saw occasional icebergs, there was not much sea ice.

LMG

Compiled from reports
by Andrew Nunn
Marine projects coordinator

On Jan. 29, the *Laurence M. Gould* left Rothera, the British Antarctic Station, and got back to work on the Long Term Ecological Research (LTER) cruise.

The ship spent a couple of days around Avian Island collecting samples, though rocky shoals and dense ice hampered our planned sampling grid. By Feb. 1, we reached Prospect Point for acoustic calibration of the Biofish transducer in calm waters.

We took advantage of the time to conduct a lifeboat drill and sent some Zodiacs ashore as well. The weather remained spectacular, with mirror-calm seas and blazing sunshine.

On Feb. 3, we arrived at Palmer Station, ending the LTER cruise. We departed Palmer two days later and started making our way north to Punta Arenas, Chile.

Peninsula study sees effect of global warming

By Peter Rejcek
Sun staff

There's no trickle down effect when it comes to climate change on and around the Antarctic Peninsula. The repercussions of global warming start at the bottom of the ecosystem and work their way to the top of the food chain.

For about 15 years, researchers from various backgrounds and disciplines have worked in concert to understand how global warming is affecting the peninsula's ecosystem. The project is called the Palmer Long Term Ecological Research (PAL LTER). It's part of a larger system of 26 LTER sites in the United States, Puerto Rico, French Polynesia and Antarctica, studying ecological processes and ecosystem change over a large temporal and spatial span.

Since the first PAL LTER field season in 1991, scientists say they have observed dramatic changes, particularly in the sea ice coverage, which has had a direct impact on the Adélie penguin population and other species in the food chain.

"Our major finding is that this part of the Antarctic is changing — fast — with only poorly understood consequences," said Hugh Ducklow, lead principal investigator for PAL LTER. "The Antarctic Peninsula constitutes an early warning system for global climate and ecosystem change on our planet."

Cara Sucher / Special to *The Antarctic Sun*

Josh Sprague collects water for nutrient, phytoplankton and other analyses earlier this year near Palmer Station as part of an LTER study.

Hugh Ducklow / Special to *The Antarctic Sun*

The Lawrence M. Gould *and two Zodiacs ply the waters around the Antarctic Peninsula during a 2004 LTER cruise. The Zodiacs provide access to local islands for seabird studies and allow for krill and phytoplankton sampling near shore. The annual* Gould *cruise runs along the same grid of sampling stations each year between Anvers and Adelaide islands.*

Ducklow is a microbiologist from the College of William and Mary. He recently returned from the *Laurence M. Gould* research vessel's 14th consecutive midsummer cruise within the PAL LTER grid, an area of about 100,000 square kilometers around the peninsula south of Palmer Station.

Scientists collected samples and data on a wide variety of ocean properties, ranging from temperature and salinity; phytoplankton species composition; zooplankton abundance; seabird foraging; and bacterial activity, according to Ducklow. The samples are collected from the surface to sea bottom at 55 stations along five grid lines, ranging in depth from 200 to 4,000 meters, he said.

"Thus, over time, we are building up a three-dimensional picture of the changing marine environment and ecosystem in the peninsula region," said Ducklow via e-mail while on the *Gould*. The PAL LTER has six research components: climate and ice, physical oceanography, microbes, phytoplankton, krill and penguins. An additional component addresses information management, education and outreach.

At this point in the study, scientists are working under the assumption that a warming trend is indeed under way based on ice core and sedimentary records from research not associated with the PAL LTER. The amount of warming — 3 degrees Celsius in 50 years — is rapid and large, according to Ducklow.

"[That's] as fast and as much as anywhere on the planet," he said.

The changes that scientists are observing due to global warming are not steady, Ducklow said. For example, there's been a 30 percent overall decline in regional sea ice since 1978, but the sea ice varies greatly year to year. It's also affected by El Niño on about a six-year cycle.

"Last year was a high ice year," Ducklow noted. "Resolving the long-term trend against the variability is challenging and takes time."

Diminishing populations

The long-term trend faced by the Adélie penguin is not a good one.

In the 30-plus years he's been studying the species, researcher Bill Fraser, with Polar Oceans Research Group, has watched the dominant bird's population steadily decline.

"The changes we have seen have been pretty dramatic," said Fraser, a PAL LTER co-principal investigator who began researching at Palmer Station in 1974. The seabird component of the PAL LTER is probably the most well documented one thanks to a database that existed before the comprehensive LTER study began, he said.

Census numbers indicate a population decrease of about 70 percent in the 50 square kilometers around the station where the bird researchers have observed the Adélie penguins.

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Decreases seen in sea ice and penguins

From page 7

"That's a change in many thousands of breeding pairs," Fraser said. At its height in the study area, the Adélie penguin population numbered about 15,200 breeding pairs some 30 years ago. Today, it's roughly 4,500 breeding pairs, though researchers are still updating that number this season.

Adélie penguin colonies are also disappearing. There were about 75 colonies when Fraser first started studying the ecosystem. There's about half that number today, most only shadows of their former size. For example, the largest colony in the 1970s consisted of some 5,000 breeding pairs. Now it's barely one-fifth that number.

"We're probably losing a colony a year on average," Fraser said.

Like the decrease in sea ice, the reduction in the Adélie population varies from one year to the next, but the overall trend is obvious. "There's a definite pattern to the change," Fraser said.

Fen Montaigne / Special to *The Antarctic Sun*

Heidi Geisz / Special to *The Antarctic Sun*

Top, long-time LTER researcher Bill Fraser measures the beak of a southern giant petrel chick while its parent watches on Humble Island last month.

Above, Adélie penguins on Torgerson Island are losing eggs because of high snowfall and warm temperatures that are causing spring floods.

The population experienced marked decreases between 1988 and 1990 and has never recovered, Fraser said. The decrease coincided with a sharp decline in the availability of krill, he explained. The key driver in the reduction in both species is the shrinking of the sea ice, according to Fraser.

Weather records for this region of the peninsula show that the frequency of heavy sea ice conditions has substantially changed in the last half-century, Fraser said. Five decades ago, four out of five years would be heavy sea ice years. Now it's once or twice over the same five-year span.

"We know that high ice years are conducive to good krill recruitment," Fraser explained. By recruitment, he is referring to the number of young krill that survive and make their way into the adult breeding population. Their survival is directly related to sea ice because larval krill feed on the algae that grows on the sea ice in the winter. Without it, they die.

The cycle becomes even more vicious as the climate warms and sea ice is reduced: Less sea ice means fewer krill, reducing the primary food for the Adélie penguins. But the sea ice is also a primary winter habitat for the penguins, further straining its population and colonies.

"It's all related to sea ice," Fraser said.

Let it snow?

Increasing snowfall, another result of the long-term reduction of the sea ice, is also affecting the Adélie penguins and other parts of the ecosystem, according to Ducklow and Fraser.

Loss of sea ice in a polar environment causes more humidity, which increases snowfall during much of the year, Fraser explained. Adélie penguins evolved in a polar desert, meaning they are not adapted to handle excessive amounts of snow. So not only are the penguins losing their winter habitats, but their colonies are also being buried under snow, essentially drowning their eggs and chicks.

"It's just an added effect of the lack of sea ice. It's kind of a double whammy," Fraser said.

In essence, the Adélies are dying off because the number of chicks that survive to become breeding adults is not keeping up with population losses due to annual mortality, Fraser said. "Teasing apart why survival is not keeping up with mortality is one of the study's focal components."

Another effect of warming is additional glacier runoff into the ocean, which is changing the mixing and stability characteristics of the inshore water column, Ducklow said. This creates a more stable, stratified water column that reduces turbulence. He said turbulence tends to favor diatom growth. Diatoms are the preferred phytoplankton food for krill. A more stable water column favors flagellated forms of phytoplankton, which is a less nutritious food for krill.

Ducklow said there's not enough information at this point to draw any conclusions about the reduction of krill availability and the shift in phytoplankton species dominance from diatoms to flagellates. It's unlikely something as dire as the regional extinction of diatoms would occur, and the krill are resilient.

"Krill are quite omnivorous," Ducklow said.

Adding it up

With so many variables to consider, integrating the various components of the PAL LTER can be a challenge.

On the one hand, there is what Ducklow calls a well-established link among climate, ice and physical oceanography. So, for example, he can make a reliable connection between atmospheric

See INTEGRATED on page 9

New penguins moving in on Adélie turf

By Peter Rejcek
Sun staff

A warming climate around the Antarctic Peninsula is not doing the native Adélie penguins much good, but it's making room for two lower latitude species of penguins.

Global warming has caused a 30 percent reduction in sea ice cover around the peninsula since 1978. (See related story on page 7.) Sea ice is a key component for the reproductive success of Antarctic krill, *Euphausia superba*, particularly in the winter. Algae grow within the sea ice and are a source of food for larval krill. The nooks and crannies of sea ice also provide the krill a refuge from predators when they are small. Krill are the major food source for Adélies.

Scientists studying the long-term effects of climate change around Palmer Station say a reduction of species at one end of the food chain is having an effect at the top. Bill Fraser, co-principal investigator with the Palmer Long Term Ecological Research (PAL LTER), said that over the last 30 years about half of Adélie colonies near Palmer have been abandoned.

Moving in to the PAL LTER site are two sub-Antarctic penguins — gentoos and chinstraps. As the Adélie population has decreased, Fraser said the numbers of the other two species have increased. He said that at this point it doesn't appear that the invaders are challenging the dominant Adélies.

"Adélies still far outnumber these other two species," he said. The invasion appears to be passive, he explained. The gentoos and chinstraps, especially the former, are simply moving into colonies abandoned by the Adélies.

The southward migration of these more northerly penguin species illustrates the two paradigms by which PAL LTER scientists believe ecosystems may respond to climate change.

One paradigm is called ecosystem movement. It assumes that whole ecosystems will shift to a new location that better matches the original climate and environment.

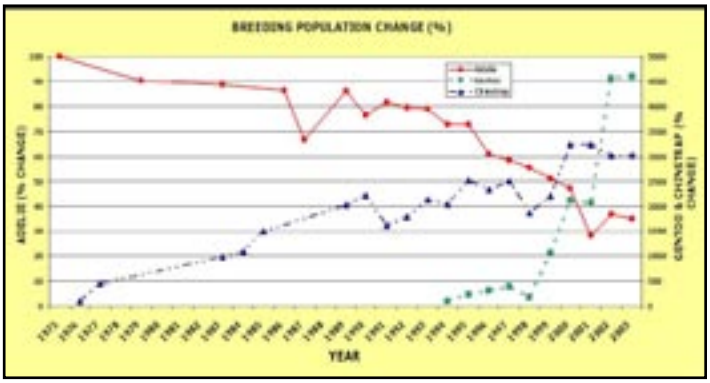
"The migration hypothesis is undoubtedly an oversimplification," said Hugh Ducklow, the lead principal investigator for the PAL LTER. The migration is probably more complex than that, he explained, but by keeping it simple at this stage scientists can more easily test their observations.

The other paradigm is ecosystem modification, which suggests that different populations migrate according to their own particular tolerances.

Whether the invasion of the gentoos and chinstraps is isolated, as in the modification theory, or part of a wholesale migration of the ecosystem remains to be seen.

"Climate is migrating south along the peninsula, and some populations are migrating along with it — or in response," Ducklow said.

NSF-funded research in this story: Hugh Ducklow, College of William and Mary, and Bill Fraser, Polar Oceans Research Group; http://pal.lternet.edu.



Courtesy of Bill Fraser / Special to *The Antarctic Sun*

The Adélie penguin population around Palmer Station has steadily declined over the last 30 years while two other penguin species, gentoo and chinstrap, have experienced significant population increases. While the different species are not in direct competition, the gentoo and chinstrap penguins are moving into abandoned Adélie colonies as they follow the warming climate south.

Fen Montaigne / Special to *The Antarctic Sun*

Peter Horne and Jen Blum conduct the annual census on Cormorant Island in November. The count determines the number of breeding Adélie penguins.

Integrated studies seek new answers

From page 8

warming, sea reduction and changes in ocean mixing. Another well-established theory addresses the link between ocean mixing and phytoplankton growth. Against these models is the food web theory that links the various species — phytoplankton, krill and penguins.

What is hard, Ducklow said, is getting these three separate concepts to mesh.

"How do food webs, as entities, respond to climate change modulated through sea ice and ocean mixing?" is one question Ducklow said the integrated study hopes to resolve.

"This area is on the cutting edge of climate change research," Ducklow said. "It is hard to reach conclusions because the pace of change, though rapid, still takes decades to establish firmly and conclusively. The LTER is a great tool for such research."

NSF-funded research in this story: Hugh Ducklow, College of William and Mary, and Bill Fraser, Polar Oceans Research Group; http://pal.lternet.edu.

Emily Stone / *The Antarctic Sun*

Soil researcher Diana Wall takes pictures of one of the longest-running experiments in the Dry Valleys. Wall's group has added nutrients to certain plots and put growth chambers over others to see if those changes affect soil biodiversity. Wall has studied the microbiology of the Dry Valleys since 1989 and is one of the original principal investigators on the LTER project.

Unique ecosystem highly sensitive to change

From page 1

member of the soil research group. "They produce something bigger than themselves by doing that."

By combining their data and ideas about the soil, streams, lakes and glaciers, the LTER scientists have determined that the Dry Valleys are extremely sensitive to environmental changes. A slight change in temperature affects lake levels, stream flow and soil biodiversity.

"Small changes from a temperate perspective are really amplified in this system," said Berry Lyons, lead principal investigator of the project and a geochemist from Ohio State University.

The Dry Valleys LTER is part of a larger LTER network of 26 sites, primarily in the United States. Each site is made up of interdisciplinary science groups that share information to understand their site. The network also allows for comparisons between sites, with the goal of understanding broader truths about Earth's ecosystems.

Each LTER site also conducts long-term monitoring. About two-thirds of the Dry Valleys groups' budget is spent doing the same tests and measurements in the same place each year, Lyons explained.

This creates a historical record of climate change in the valleys and at all the LTER sites that scientists can turn to, Lyons said, "as people have woken up and say, 'gee, the planet is in really bad shape.'"

A new approach

Robert Wharton started studying the lakes in the Dry Valleys in 1979 as part of a group trying to understand the ecosystem. His research there off and on over the next 10 years convinced him that it would be an ideal location for an LTER site.

The information scientists learn in simple ecosystems like the Dry Valleys can shed light on what is happening in more complex systems that are harder to study because they have so many more components. Wharton said he also felt strongly that the LTER's method was the best way to study the Dry Valleys.

"In my opinion, ecosystem research just isn't possible without an interdisciplinary approach," Wharton wrote in an e-mail. He is now vice president of academic affairs at Idaho State University.

> "Ecosystem research just isn't possible without an interdisciplinary approach."
>
> *— Robert Wharton, the first lead principal investigator of the Dry Valleys LTER*

Even before the actual LTER grant was approved, the various scientists in the Dry Valleys were supporting each other when possible.

Diane McKnight of the University of Colorado at Boulder, and principal investigator of the stream group, remembers early efforts at helping one another, such as searching out a helicopter window for Wharton's equipment so she could switch out the data recorders.

She also remembers watching lake and stream levels change dramatically from year to year.

"We could see how the Dry Valleys were changing before our eyes," she said. And they could see the need for a long-term study.

Wharton approached McKnight, John Priscu, and Diana Wall, who had all been conducting research in the Dry Valleys, about forming the first LTER team. He also contacted a few other scientists, like Lyons and Andrew Fountain, who had been working elsewhere in Antarctica. The group was awarded an LTER grant in 1993.

Five of the original eight principal investigators are still with

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Dry Valleys ecosystem initially a mystery

From page 10

the project 13 years later, and one of the other current principal investigators started with the group as a collaborator. That's a better track record than a lot of marriages, Lyons said. "It's kind of amazing."

When the group started out, the polar desert ecosystem was mostly a mystery.

For example, the soil in the valleys was assumed to be barren everywhere except in the streams when Wall started working there in 1989. Now, her group's work has shown that microscopic worms called nematodes live in 60 percent of the valley's soil. They've also learned that when nematodes sense a reduction in the soil moisture, they coil up into a dehydrated state.

"They no longer look like a worm. They look like a Cheerio," she said. Then, when moisture returns to the soil, the nematodes become worm-like once again.

The principal investigators needed several years to figure out how the LTER system worked, as well. Wharton said some of the principal investigators held onto the idea of having separate turfs during the first few years.

Lyons said that a typical, three-year National Science Foundation grant isn't long enough for scientists to maximize interdisciplinary collaboration. It takes a while for researchers from different disciplines to understand each other's language and approaches, he said, and to gain the important and intangible respect for one another that is necessary for true collaboration.

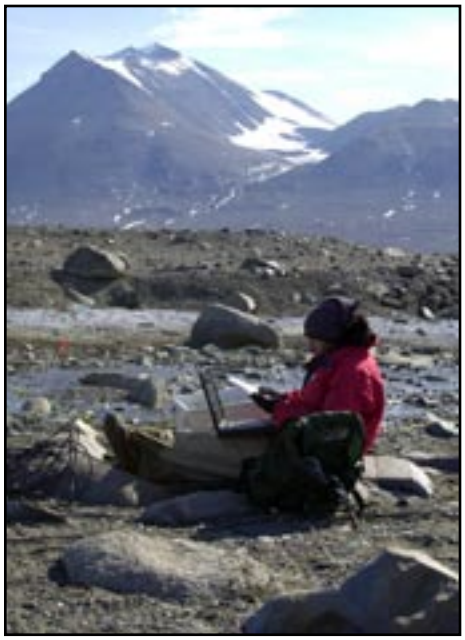
The point when the group really hit its stride is marked by a spike in the number of co-authored journal articles in 1997, four years into the project. The number roughly doubled from the previous year, doubled again the following year, and has stayed high since.

The sophistication of the groups' questions has grown over the years as they become more familiar with the area, Lyons said.

The LTER funding is done in six-year cycles, and each cycle has a theme. The first funding cycle's theme was basically to understand how the physical constraints of the environment shape the ecosystem. Now, in the first year of the third funding cycle, the project is focusing on biodiversity in the valleys, as well as the individual carbon, nitrogen and phosphorus cycles and how they're connected among glaciers, streams, lakes and soil.

Some of the different science groups within the project have studied this, but they haven't done so in a way that relates to each other, Lyons said.

Photos by Emily Stone / *The Antarctic Sun*



Top, soil biologist Byron Adams adjusts a bundt pan filled with marbles that catches blowing dirt along the shore of Lake Hoare.

Above, Karen Cozzetto and Josh Koch prepare for an experiment Cozzetto conducted last month to better understand the hydrology of a stream running into Lake Fryxell.

Left, Cozzetto works on her laptop computer during the stream experiment.

"We felt that we were losing information because we weren't doing it in a systemwide approach," he said.

Collaboration

Michael Gooseff sat down at the edge of a stream leading into Lake Fryxell earlier this month to take a break from the day's work. He was there to help with a complicated experiment that one of McKnight's graduate students was conducting.

Not that long ago, Gooseff was one of McKnight's students. Now he's at the Colorado School of Mines and is principal investigator on his own project looking at the wet soil zone around streams. Having come of age within the LTER, he said he's always been a proponent of the interdisciplinary approach to studying ecosystems.

"I've been sort of born with that perspective. … It's the one that makes the most sense in environmental science," he said. He's teamed up with a microbiologist and biogeochemist for his project, and although his project isn't part of the LTER, he works closely with the LTER scientists to keep abreast of one other's findings and exchange data. He often uses the LTER's meteorological data to correlate weather and stream flow.

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LTER approach passed on to students

From page 11

Many of the project's principal investigators point to this trickle down effect among the LTER's students as one of the project's main benefits. LTER students go on to lead their own projects and mentor a new batch of young scientists.

"It's changed the training of graduate students," McKnight said.

More than 175 undergraduate, graduate and postdoctoral students have worked with the Dry Valleys LTER groups. The scientists try hard to impart the importance of collaboration to these students, Lyons said, as opposed to the training that most scientists receive.

"We're trained that you have to stand on your own two feet," which at its most extreme teaches scientists to be "narcissistic," Lyons said. "Now the world is an interdisciplinary world, and we don't train them very well to work in groups."

The LTER's scientists share information and data both formally and informally. The Dry Valleys principal investigators meet each spring to give a presentation of their research and list their priorities for the coming year. They also correspond regularly during the rest of the year, and those who are at McMurdo Station or in the field together chat about their ongoing research.

All of the groups' data must also be in a manageable form and available through the LTER network within two years. The data sets can be queried by scientists from that site, from across the network or others interested in the information for their research.

The collaborative nature of the project doesn't eclipse the fact that the group is made up of leading scientists with strong egos, who all spend a good portion of their work on independent research, Lyons said. He admits that much of his time as lead principal investigator is spent "herding cats."

Still, Lyons paused several times while talking about the close friendships within the group to choose just the right words, and said he was getting goose bumps talking about it.

"I've learned so much from these people," he said. "It's been a great joy."

Data shows rapid change

It was at one of the spring principal investigators meetings several years ago that the group realized they'd spotted a trend, Wall said.

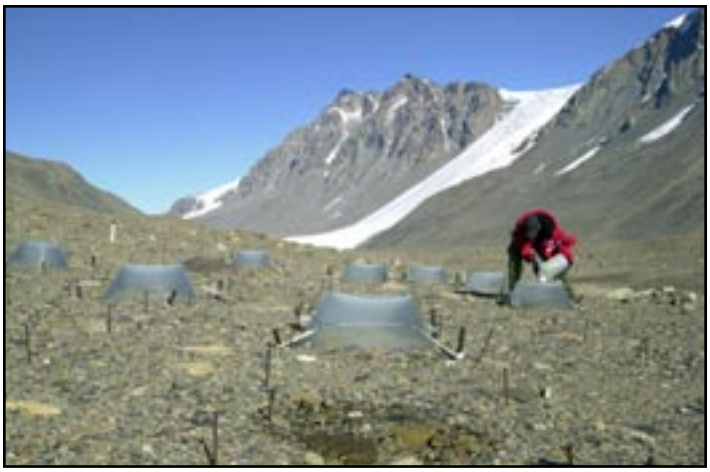
The lakes group said the water levels had dropped and the ice layer had grown, and that primary productivity in the water was decreasing. The stream team said flow had fallen off. And the soil team was recording lower biodiversity. All this had happened between 1986 and 2000 when the average temperature had fallen by 0.7 degrees Celsius.

Seven of the principal investigators co-authored a 2002 article in *Nature*, detailing this phenomenon, and emphasizing the delicate nature of the ecosystem.

"Summer temperatures are the critical driver of Antarctic terrestrial ecosystems, and our data are the first, to our knowledge, to highlight the cascade of ecological consequences that result from the recent summer cooling," the paper reads.

The Dry Valleys are so sensitive to climate change because temperatures hover so close to 0 degrees Celsius in the summer, Lyons said. Just below freezing means lots of ice, just above means more water. The group has learned that the number of days and even hours spent above freezing in the summer can rapidly change biomass and biodiversity there, Lyons said.

"There's a direct and immediate response by the ecosystem to what's going on climatologically," he said. "How far can you push the system 'til it changes?"



Top, Byron Adams takes a soil sample from Lake Hoare as Adler Dillman and Ed Ayres watch. The three are part of a group studying the soil biology in the Dry Valleys.

Above, Ayres adds water to a patch of soil as part of an experiment measuring how water and warming chambers affect biodiversity.

NSF-funded research in this story: Peter Doran, University of Illinois at Chicago; Andrew Fountain, Portland State University; Bill Hunt, Colorado State University; Berry Lyons, Ohio State University; Diane McKnight, University of Colorado at Boulder; John Priscu, Montana State University; Ross Virginia, Dartmouth College; Diana Wall, Colorado State University; www.mcmlter.org.

Network allows for comparisons between sites

By Emily Stone
Sun staff

It's hard to find a brochure about Antarctica that doesn't tout the continent's status as the highest, driest, coldest place on Earth. Those are the traits that lure scientists here as well.

These characteristics are particularly noticeable in the McMurdo Dry Valleys, which make up the largest ice-free area on a continent that's 98 percent covered by ice. The unique ecosystem this creates is why the Dry Valleys are part of the Long Term Ecological Research (LTER) Network.

The network has 26 sites, primarily in the United States, where researchers study a variety of ecosystems and the responses of each to climate change. The network includes terrestrial, marine and urban sites. The Dry Valleys is the network's only polar desert. The other Antarctic site, near Palmer Station, is a marine ecosystem.

The goal is for researchers to work cooperatively within the sites to understand the processes and biodiversity in each ecosystem. The network then allows for comparisons between sites, letting scientists see, for example, which ecosystems are more sensitive to climate change.

The National Science Foundation funded the first six LTER sites in 1980, adding new sites gradually, including Palmer in 1991 and the Dry Valleys in 1993.

Each site consists of a variety of projects, so scientists from different disciplines can gain a big-picture understanding of what is happening there. In the Dry Valleys, for example, biologists, geochemists, glaciologists and hydrologists pool their research to understand how the valleys' various features are connected.

> Twenty-six LTER sites provide long-term data on how different ecosystems react to climate change.

The first 20 years of the program focused on getting the projects within the individual sites integrated, said Berry Lyons of Ohio State University, who is lead principal investigator of the Dry Valleys site. The push now is integrating the different sites within the network so more cross-site studies are conducted.

"That's the future," he said.

Diane McKnight of the University of Colorado at Boulder and principal investigator on the Dry Valleys stream team is doing just that. McKnight is also a member of the Niwot Ridge LTER near Boulder, Colo. She teamed up with a scientist from the Everglades LTER to look at dissolved organic compounds at 18 LTER sites in the United States.

Warmer temperatures mean that many locations are losing ice earlier in the year than they used to. That gives algae living in the water more time to grow, which changes the composition of dissolved organic compounds in the ecosystem. Analyzing these compounds shows whether algae are increasing, which in turn will show what sites are more affected by the extended summer.

The LTER Network was created before climate change was an established concept, McKnight said. But having a record that goes back 26 years at some sites gives scientists the opportunity to study trends and changes.

"It's a very robust network now," she said. "It provides an important scientific framework."

NSF-funded research in this story: Long Term Ecological Research Network, www.lternet.edu.

Emily Stone / *The Antarctic Sun*

The side of the Canada Glacier extends into the Taylor Valley toward Lake Hoare. The Dry Valleys make up part of the 2 percent of the continent that is relatively ice free. An LTER site was established here in 1993 to study the unique ecosystem that has evolved to fill this niche.

Small community and travel options are lure

From page 1

all sense of privacy evaporates.

"Here you're companions with a diverse group of people. You know so much about them and you care so intensely about them," said Vida, 35. "I return to the Ice since I have more to learn."

Vida is one of several hundred people — winter-overs — who choose to remain in Antarctica when that curtain of blackness, as Cook calls it, falls across the continent. She's also a member of a growing fraternity who repeatedly reserve space on the continent during the winter year after year.

The three permanent U.S. Antarctic Program stations — McMurdo, South Pole and Palmer — are staffed year-round, with smaller crews during the winter months. Palmer is at one extreme, where winter isolation is relatively brief thanks to the occasional ship visit, and there's rarely more than a score of people living at the small station.

On the other hand, South Pole normally goes into deep freeze from mid-February through late October. Over the last several years, winter crews have been relatively large in order to complete construction on the new elevated station. Liesl Schernthanner, the South Pole winter site manager, said she expects a winter crew of about 70 when the welcome mat is rolled up until October.

There is a certain machismo associated with wintering at the Pole, along with a host of proud and quirky traditions. For example, on the day the last summer flight leaves, Polies will gather for a showing of the movie, "The Shining," Stephen King's horror classic about a hotel caretaker driven insane by isolation.

McMurdo snugly straddles the middle road. It houses the biggest winter population on the continent, with about 200 people expected to stay the night this year. The darkness itself is about a month shorter than Pole's. But the time of isolation is even briefer: several passenger flights arrive in August every year to help prepare the station for the coming summer season, which begins in early October. Mail, along with fruit and vegetables, or freshies, are usually on those flights.

Courtesy of Zoe Vida / Special to *The Antarctic Sun*

Zoe Vida

Another one?

There are many allures to wintering on the Ice, according to those who have turned it into a lifestyle. It's quieter and less crowded. The ghostly, shimmering aurora sweep across the night sky in a celestial dance few ever see. And with very little to spend money on, winter-overs can bank lots of cash, which many will habitually spend bouncing around the world for weeks or months at a time.

Vida spent three months on the island of Bali in Indonesia last year between winter contracts. This year between winters there was a 40-day trip to Thailand.

"I would never be able to [travel like] that working retail in the United States," she said.

Dennis Calhoun, a 58-year-old grandfather from Michigan, worked in oil fields in Michigan, Illinois, Pennsylvania, New York and West Virginia before coming to Antarctica. He first came south in the summer of 2002-03 and remained for the winter as the power plant mechanic at Pole. He returned in 2004, and the following winter moved to the big city, McMurdo, splitting his time between the heavy shop and the power plant.

Calhoun said the longer winter season puts more money in his pocket. But that's not the only reason he's planning on spending his third winter at the South Pole this year.

"Winter at pole is beautiful," he said via e-mail, after finishing a nightshift as a mechanic in the heavy shop. "The cold, crisp air is full of lights from the stars, moon and auroras. There are fewer people, and everyone pulls together to make things happen."

Intimacy and friendship are definitely big draws for people who do repeat winters. Chuck Kimball, a satellite communications technician at Palmer Station, first wintered there in 2003 and repeated the trick the following year largely because of the friends he had made.

"I guess the biggest thing is the community," said Kimball, who is currently at Palmer for the summer. "It was a really enjoyable group. We got along together."

While McMurdo is significantly bigger than the other two stations, it still has a small-town atmosphere for Chris Wilt, who is down for his fifth winter season. He did three in a row starting in 1998, working in the hydroponics growth chamber (greenhouse). He also did a winter in 2002 in the recreation department, and this time he committed for a full year in the waste department. He's also notched three summers.

"Winters are nice because you get to know everyone … you get to know who's grouchy and who to leave alone," he said.

See GETTING on page 15

Zondra Skertich / Special to *The Antarctic Sun*

The first signs of daylight appear behind the dorms of McMurdo Station at the end of winter. The station gets its first flights of the winter in August, bringing coveted mail and fresh fruits and vegetables.

Getting 'toasty' is part of the experience

From page 14

"You get to know people's grandkids' names, and what's going on with them. It's more family style."

Taking it in stride

A winter in Antarctica is not easy no matter where you are on the continent. Folks tend to get more irritated and have trouble sleeping. Memories turn into dry sponges, unable to absorb too much stimuli at times. In Antarctic lingo, wintering personnel generally sum up all those traits in one word: toasty. Incoming summer personnel are warned, half-jokingly, not to look a winter-over in the eye.

Calhoun agreed that some people do become quite toasty, a problem psychiatrists call the polar T3, or winter-over syndrome. It's believed that the body's thyroid gland, which is responsible for metabolism, is affected by the extreme cold. Depression isn't uncommon, accompanied by sleeplessness and even memory loss.

Courtesy of Chuck Kimball / Special to *The Antarctic Sun*

Courtesy of Don Jeter / Special to *The Antarctic Sun*

Above, South Pole meteorologist Don Jeter after a trip outside in the winter.

Left, Chuck Kimball, a satellite technician at Palmer Station, said the strong sense of community brings him back for the winters.

Larry Palinkas, with the University of California, San Diego, has studied the syndrome for years. He said in an e-mail that "alterations in thyroid hormones, the isolation from family and friends and interpersonal conflicts can produce symptoms of depression, sleeplessness, anger or irritability, and diminished cognitive performance."

But, he added, "The positive changes people experience is probably the most noteworthy aspect of my research down on the Ice. I think there are probably more people who get something positive from it than something negative."

Indeed, Calhoun said he's used to far gloomier winters in his home state of Michigan. "Being in the power plant requires a lot of concentration, too, so I think it keeps other things, like the dark, off my mind," he added.

> "The South Pole is a piece of cake compared to some of the other places I have been."
>
> *— Don Jeter, comparing a winter at the Pole to some of the places he was stationed while in the Air Force.*

Even in the dead of winter, there's still technically about three hours of sunlight at Palmer, which is roughly the same latitude as Fairbanks, Alaska, according to Kimball. There may be about five weeks when the sun is completely hidden behind the mountains and glacier, but it's not too bad. "Lots of gray, overcast days," he said. "It's more of a maritime environment here — more of a Pacific Northwest kind of thing."

Life in the Air Force kept meteorologist Don Jeter on the move for 24 years, taking him to places all over the world. Shortly after retiring from the military, he took a job as a meteorologist at Pole for the 2003-04 summer and winter. He's back at Pole for another full year. The military life forced him to adapt to isolated assignments, he said.

"They didn't give me a choice in the matter so I learned how to deal with these kinds of situations early in life," said Jeter via e-mail from the Pole. "The South Pole is a piece of cake compared to some of the other places I have been."

Despite winter-over studies that date back to the 1950s, researchers say there's no single archetype that can define a winter-over. "Our analyses of the human experience in Antarctica suggest that there are few, if any, traits that serve as useful predictors of performance during the austral winter," Palinkas wrote in a paper called "The Psychology of Antarctic Research."

However, "research has consistently demonstrated that interpersonal conflict and tension is the greatest source of stress in the Antarctic," Palinkas wrote. While winter-overs seem to agree there can be an inordinate amount of drama, they're also steadfast in their belief that the community is one of the best things about living down south.

"Bad news always gets better press," Vida said, referring to the tendency toward the kind of gossip that exists in any small community. But she's quick to add, "I come back for the people."

Winter is also a self-test, she said, a way to see if she "can hack it."

Indeed, despite the stresses of isolation, Palinkas reported that some individuals do well and even thrive in this kind of environment, saying that these pressures "could actually be beneficial and health-promoting."

The legacy

Today's winter personnel are part of a lineage that stretches back to the end of the 19th century. In 1898, the three-masted *Belgica* was icebound in the Bellinghausen Sea for over a year while on a mission to explore the continent. The 19-member crew unwillingly became the first "winter-over" party in the Antarctic.

The expedition's physician, the great polar explorer Frederick Cook, may have been the first person to recommend light therapy to fend off depression when he told his men to sit in front of large, blazing fires.

While fires aren't allowed these days, the concept hasn't

See PALMER on page 16

Palmer man holds record at 15 winters

From page 15

changed much. Wilt said he believes his three winters working at the McMurdo growth chamber definitely kept him energized thanks to the full spectrum lighting inside. "I never had problems with sleeping or with depression," he said. "I never really felt I did a winter down here because I never experienced [the] dark all day because I was in the greenhouse."

The modern winter season began 50 years ago when 93 U.S. Navy men remained behind at what would become McMurdo Station. The following year the first crew wintered at the South Pole. And this winter will mark the 42nd time people have remained at Palmer Station.

The National Science Foundation tracks winter-over records for the U.S. Antarctic Program for those who receive the Antarctic Service Medal, reportedly the only military medal awarded to civilians. The database is not comprehensive, according to Nadene Kennedy, NSF Polar coordination specialist. The statistics don't include the military, just science and support staff. It's also unclear when the database was first started, she said.

Of the 3,320 winter-overs who have been logged by the NSF, 988 of them have done at least two winters. As of the 2004-05 season, 26 people have wintered seven or more years. The all-time record is 15 winters by Gerald Ness, who last wintered in 2003-04 at Palmer.

Last winter, 241 people wintered at McMurdo, 86 at Pole and just 19 at Palmer. For those receiving a medal after the long night, a "Wintered Over" clasp accompanies the award. A bronze clasp signifies one winter, gold two and silver three winters.

Bill Spindler, the unofficial historian for the South Pole, writes on his Web site (www.southpolestation.com) that 1,110 people have wintered at 90 degrees south since 1957. The record for most winters at Pole is five, and only one person, Jake Speed, has done them all consecutively. In all, only 135 people have ever repeated a winter at Pole, according to Spindler's numbers.

The winter-overs for this story said family and friends are usually supportive of their decision to live abroad for what can turn out to be years at a time with only a brief return stateside.

"My kids think it's great that the old man is in Antarctica," Calhoun said. "I think my grandkids miss me, but I'll spoil them on the way home. We keep in touch through e-mail and the phone."

At least one of Vida's family members can relate to her Antarctic passion. Her father, Dave Ackley, also works at McMurdo. He's the one who convinced her to exchange the big-city life in Portland for a pair of Carhartts in Antarctica. In fact, they did a 14-month stint together on her first trip to the Ice.

Other winter-overs say their families puzzled over their decision to come to Antarctica, let alone spend so much time here. Jeter said his wife knew he had always wanted to travel to the Pole. She told him to go for it.

It's a decision Jeter is glad he made.

"During my Air Force career, I found out that the strongest and best friendships are found in places that are remote, secluded, destitute and just plain fun," he said.

Peter Rejcek / *The Antarctic Sun*

Chris Wilt is about to begin his fifth winter at McMurdo Station. He will continue working as a waste technician, which was his job this summer. He previously spent three winters working in the station's growth chamber and one winter in the recreation department.

Continental Drift — What's your Antarctic dream job?

"I have my Antarctic dream job!"

Stephen Barten, Palmer boating coordinator from New Prague, Minn., fourth season

"Helicopter pilot."

Amnesty Kochanowski, South Pole air transportation specialist from Junction City, Wisc., first season

"A grantee. I want to be a geologist. The excitement of discovery and learning, seeing remote places, and living without comforts — these are good things."

Edith Day, McMurdo prep cook from Ipswich, Mass., first season

CARGO CRAZY: *McMurdo off-load runs 24/7*

A crane on the M/V American Tern *places a container on a truck sitting on the McMurdo ice pier. By Feb. 5, cargo removal from the Tern was more than half complete, with 470 of 729 lifts done by noon.*

Photos by Peter Rejcek / *The Antarctic Sun*

Above left, a small forklift, called a pickle, pulls cargo out of a milvan.

Above, Seaman Michael Pucel maneuvers the onboard ship crane to unload cargo.

Left, Dave Pettengill, foreground, tracks unloaded cargo sitting outside Building 155 while Sue Root and Nate Rice mark boxes for inventory purposes.

New Zealand longshoremen ease a milvan onto an awaiting flatbed truck. It took less than a week to empty the Tern *and reload it with retrograde cargo and waste.*

Profile

Border Expansion

Sibaja may be first Costa Rican to work in Antarctica

By Steven Profaizer
Sun staff

The United States has a long history of working in Antarctica, but Costa Rica's may have just begun.

Alex Sibaja, McMurdo Station engineering drafter, and his family believe he is the first citizen of his nation to spend significant time on this continent. They have searched for any record of another person visiting Antarctica from the Central American country, which is slightly smaller than the state of West Virginia, with a population of about four million. As far as they can tell, Costa Rica's only previous experience with Antarctica was a person who briefly visited aboard a cruise ship.

"The only other way I can see another Costa Rican coming to Antarctica would be as part of a research team, but even in that case, I think it would have been in the news," Sibaja said. "I just don't think that's the case."

Sibaja, who now lives in Colorado Springs, is proud to help lead his country to a new continent, but he is not using the opportunity to tout his accomplishment.

"In the end, it really doesn't matter whether I end up being the first or not," Sibaja said. "I don't know if I'm the first, but I don't want to be the last one."

His trip to Antarctica, which is far removed from the reality of winterless Costa Rica, has drawn plenty of attention on its own.

"People in my family's neighborhood got so excited when they heard where I was," Sibaja said. "They seem to act like I've gone to another planet."

Most Costa Ricans know very little about Antarctica and the work that is going on here, he said. Sibaja hopes his trip will help to encourage other people from his country to seek out the opportunity as well.

"It's a harsh continent, just like the sticker says, but there are a lot of important things going on down here," he said. "Even though it looks like a desert, there's life. It may not be the way we're used to seeing it, but it's here."

Sibaja is now a permanent resident of the United States but spent most of his life in agricultural-based Atenas, a Costa Rican county with an average temperature of 24 degrees Celsius and a population of about 30,000.

Steve Profaizer / *The Antarctic Sun*

Alex Sibaja, right, believes he may be the first Costa Rican to spend significant time in Antarctica.

The small Central American country has a population of about four million people.

"When we reach about [seven to 10 degrees Celsius], everybody is shaking," he said. "We don't have air conditioning or heating in our houses. We don't need it. If it's too hot, we open the doors. If it's too cold, we close the door."

Sibaja said he used to complain about the weather sometimes when it got a little too hot or a little too cold. He said living in Texas for seven years and spending a season in Antarctica has made him realize how lucky Costa Rica is when it comes to its weather.

"In that sense, we are spoiled," he said, "but we'll take it."

Sibaja started college in Costa Rica and studied chemical engineering until the growing cost of school and an illness in his family forced him to drop out.

"[In Costa Rican culture], if you're single, you stay with your parents to take care of them with things like paying the bills, taking them to doctor and helping with chores," he said.

He worked odd jobs for about 12 years, until he moved to the United States in 1997 and returned to school at the University of Texas at Arlington.

Sibaja graduated with a bachelor's degree in mechanical engineering in 2001. He then worked as a fire protection designer until he joined the U.S. Antarctic Program last year.

Sibaja, now 40 years old, saw this job as a chance to develop his career and add interesting and applicable experience to his résumé, since he is entering the field a little later in life than most college graduates.

"Even though I'm not a kid, my engineering and professional career are still young," Sibaja said.

Sibaja left McMurdo Feb. 3, eager to return home to his wife, Irene, and two young children, Sam and Tova.

Sibaja met his wife when she was teaching English in Costa Rica. He could not speak English at the time, but Irene was fluent in Spanish. Although he now speaks English fluently, Spanish remains the first language in their home.

Sibaja hopes to return again to the Ice, but it likely won't be immediately or for a full season next time.

"Having a wife and little ones makes it tough to be away for so long," he said. "I don't know how long it's going to take me, but I'll be back one day."