

Photos by Steve Martaindale / The Antarctic Sun

The first pallet of food slips from a C-17 airplane near the South Pole in the series of photos above, then drifts down in the photo below.



Airdrop a success at Pole

By Steve Martaindale
Sun staff

It is not a question of whether there will be another emergency necessitating a winter airdrop at the South Pole. The questions are when will there be such an emergency and whether the responding agencies will be prepared to answer the call.

An affirmative answer to the readiness question was underlined recently when a new aircraft proved it could handle the task.

More than half of the occupants at Amundsen-Scott South Pole Station turned out on the evening of Dec. 20 in temperatures of about minus 25

degrees Fahrenheit to witness the trial airdrop.

Around 9:45 p.m., one group of about 80 people who had gathered in an area overlooking the drop zone watched as a C-17 Globemaster III airplane flew from left to right. After making its initial pass, it banked left and returned in the direction from which it came, continuing until it faded from sight.

The crowd continued waiting.

In a matter of minutes, the four-engine aircraft again appeared. This second approach seemed lower and slower. Before reaching the drop zone, the first parachute was seen snaking out of the rear ramp, soon pulling the first pallet from the

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IGY research still bearing fruit

Behrendt continues 50 years of Ice work

By Peter Rejcek
Sun staff

Fifty years ago, John Behrendt was a tall and skinny 24-year-old scientist cruising through the Weddell Sea on a U.S. Navy ship en route to the Filchner-Ronne Ice Shelf.

The young geophysicist was headed to the world's last great frontier as part of the International Geophysical Year (IGY), an 18-month period of intense, global scientific investigation. The IGY involved scores of nations

collaborating peacefully in a Cold War era that had fractured the planet into halves, both sides bristling with hostility and suspicion. But in Antarctica, the world's scientists found a common ground and goal – scientific discovery.

Behrendt not only stood witness to this watershed period but also played a role in its creation. He has remained active in Antarctic geology and geophysics for half a century. These days he's still actively writing scientific papers, publishing his memoirs, and keeping an indirect hand in the upcoming International Polar Year (IPY).

"To be the very first to see things and do things [during the IGY] was remarkable. We were at the

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John Behrendt

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Quote of the Week

"Can we have heaters on stage?"

— Musician mulling outdoor concert temperatures

Break on Through



Charlie Kaminski / Special to *The Antarctic Sun*

Oden at a glance

Oden is one of seven icebreakers operated by the Swedish Maritime Administration.

Overall length: 345 feet

Number of berths: 80

Icebreaking capability: 6 feet of level ice at 3 knots

Speed in open water: 16 knots

Endurance: 30,000 nautical miles in open sea at 13 knots or 100 days

The Swedish icebreaker Oden churns through the sea ice in McMurdo Sound to clear a channel to McMurdo Station. The channel will be used later this season by the cargo re-supply and fuel vessels. The U.S. Coast Guard icebreaker Polar Sea is also en route to McMurdo Sound and will arrive next week to help break and maintain the channel connecting open water to the station.

Cold, hard facts

International Geophysical Year

Period of IGY: **July 1957 to December 1958**

Number of countries involved: **67**

Number of U.S. stations constructed for IGY: **7**

Person credited with suggesting the IGY: **Lloyd Berkner**

Event that IGY was timed around: **The high point of the 11-year sunspot activity.**

IGY rocket and satellite research: **Led to the development of the U.S. space program.**

Years covered in the IGY archives of reports, letters, photographs and other documents : **1953-1962**

Number of linear feet spanned by the archive: **152**

Source: *The National Academy of Science*

The Antarctic Sun is funded by the National Science Foundation as part of the United States Antarctic Program (OPP-000373). Its primary audience is U.S. Antarctic



Program participants, their families, and their friends. NSF reviews and approves material before publication, but opinions and conclusions expressed in *The Sun* are

not necessarily those of the Foundation.

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Level 1 Comix

Matt Davidson



Jean de Pomereu / Special to *The Antarctic Sun*

A helicopter hovers over Lita Albuquerque's one-day art installation, Stellar Axis: Antarctica, an interactive exhibition that represents the sky over McMurdo Station on the summer solstice. More than 50 McMurdo residents participated in the earth art performance.

Bill Jirsa / Special to *The Antarctic Sun*

Lita Albuquerque has created art installations around the world, including at Abu Simbel in Egypt.

Albuquerque creates stellar art on ice shelf

By Bill Jirsa
Special to the Sun

A few days before the summer solstice in Antarctica, Lita Albuquerque stands upon the expansive surface of the Ross Ice Shelf, a glacial ice sheet roughly the size of France that is near perfect in its flatness. A colorful woolly scarf coils about her neck, and her long, dark hair cascades over her big red U.S. Antarctic Program parka. It is about 11 p.m. and cold, but the skies are clear and calm.

Behind her, several blue spheres are scattered in apparent haphazard fashion on the hard, wind-blown snow. From this vantage, the scale is hard to gauge. The spheres may be as tall as a man or they may be mere basketballs. They are uniform in their deep ultramarine color, brilliant in the mid-evening sun of the Antarctic summer. They are resting on the surface of the snow; however, at times, they appear to hover just above it.

"The energy is great," Albuquerque says as she surveys the first few elements of her project coming together on the ice shelf outside McMurdo Station. "I love it."

"Stellar Axis: Antarctica," the largest earth art installation in Antarctica, represents the McMurdo sky on the summer solstice. The blue spheres, ranging in size from four feet in diameter to 10 inches, will mimic the configuration of constellations across the flat white of a snow canvas. Each sphere represents one of the 99 brightest stars in the southern sky.

Nearby, Simon Balm follows his hand-held GPS across the snow as if it were a divining rod.

"They're not visible right now, of course," he says of the stars as the midnight sun approaches its place somewhere over

Mount Discovery. "But they are there."

At sporadic intervals, he stops to bore a hole with a one-meter long, gasoline-powered ice drill. Such holes will serve as the starter holes for the aluminum posts that anchor each sphere on the 400-foot-wide plot that lies between the two ice shelf runways, Williams Field Skiway and Pegasus White Ice Runway.

Balm looks the part of the group's astronomer, compact and bespectacled, with a trim beard. It's difficult to resist his enthusiasm about science and the heavens, and it's not hard to imagine him standing before classrooms of undergraduates at Santa Monica College, where he teaches astronomy.

After a first night of work, Sirius, the Dog Star, the largest sphere at 48 inches, has been anchored. Albuquerque selected the spot for the installation based on aesthetics, the combination of the "expansive field of white" with the surrounding mountains marbled with snow. Once the site was chosen, she selected the center of the installation, Sirius, using a slightly more intuitive approach.

"I feel the right spot," Albuquerque says.

Using Sirius as a reference, Balm is now mapping the coordinates for the rest of the stars using GPS.

"Ninety-six," he calls out, indicating the number of the sphere that belongs in the location he has just marked.

A ways off, the remainder of the team unpacks the spheres. The one-eighth-inch thick fiberglass orbs have been constructed as hemispheres for easier shipping. They lie on the snow like huge blue eggshells after hatching.

Most of the team is here to document the happenings, including plans for still

photography, an art book, a documentary film and an art film intended for gallery exhibitions. Tonight they are busy matching up the pieces and carrying them to their homes for the duration of the temporary exhibit.

While she remained vague early in the week about exactly what would happen on the solstice, Albuquerque was eager to explain how the concept of a star alignment at either pole creates a metaphor of our connection to the cosmos:

"If we look at it in terms of the motion of the stars, which is in concentric spiraling counter-clockwise circles at the North Pole and clockwise at the South Pole, and if you extend that motion from the north to the center of the earth and from the south to the center of the earth, you get the double helix strand of DNA."

While logistical considerations have forced some compromises in the original concept – the star alignment is being installed near McMurdo instead of at the South Pole, and Albuquerque will not attempt to construct the North Pole axis simultaneously – the interactive goal of her artwork remains the same, she says.

"It's a physical relationship that aligns the body to the stars above and in doing that it aligns the body to the earth and the cosmos."

Art of the Earth

Albuquerque traces her artistic influences to two sources. The first is the Earth Art movement that sprang from North America in the early 1970s. Albuquerque drew inspiration from artists such as Michael Heizer, Walter de Maria, James Turrell and Christo.

In its early days, large-scale "earth-
See EXHIBIT on page 4

Exhibit shows art and astronomy share same sphere

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works” characterized the movement. Robert Smithson’s 1970 “Spiral Jetty,” a formation of rock and earth hundreds of feet across in the shallow waters along the remote north shore of Utah’s Great Salt Lake, was an iconic example: grand in scale, difficult to reach and clearly intentional.

Initially schooled as a painter at UCLA, Albuquerque moved her art outdoors when she began to arrange pigment powders in the California desert in the 1970s.

“I thought that dry lake beds were such a beautiful, minimalist canvas, that I thought, ‘If I can put a color object on this minimal landscape, what would that look like?’”

She says that part of the attraction to such projects lies “... in setting up the right conditions, making a mark on the landscape, and then letting nature take hold.”

While Albuquerque stresses her indebtedness to earth artists, she is clear that a second source also informs her work: her connection to more ancient understandings of the heavens, what is called archeo-astronomy.

“It’s interesting, the juncture of the autobiographical and the art-historical. There’s no way I would have done what I do without the earth artists; I really come out of the second generation of that, in the ’70s. But also, my own autobiography, which comes from a desert culture, very connected to the land, very connected to the earth. It fit right in, in terms of that aspect of it.”

Albuquerque recalls the stars in Carthage, Tunisia, where she was raised. “They literally formed a dome that came all the way out to the sea. That was my first feeling for that kind of connection. And, of course, being of that kind of Mediterranean culture, the ancient culture is so much about the relationship between the earth and the sky.”

By the late 1970s, Albuquerque was constructing star alignments in her repertoire of earth art installations. Ancient monuments that demonstrate sophisticated astronomical knowledge have become important to her work. Albuquerque has found inspiration from sites such as Chitzen Itza in Mexico and Chaco Canyon in the America Southwest and even created work near sites such as Abu Simbel in Egypt.

“It’s something very deep within me that I’ve always had ... I feel that kind of connection is what’s missing ...,” she says. “And also that existed in ancient times where we really had that kind of understanding.”

An unorthodox approach

Albuquerque and her team are aware that putting astronomy to such uses may appear fairly unorthodox when compared to the more empirical sciences or the more broadly approachable work of other artists supported by the National Science Foundation (NSF).

“I can easily imagine some people saying this is a waste of resources,” says Balm, “to have a bunch of artists down here sticking blue spheres in the snow.”

But the group is confident that its work serves the program well.

“I think this is our goal here,” Balm explains, “... to highlight basic scientific principles to people in a more direct visual way who might not normally be able to understand the technicalities of glacial flow or penguins studies. Also, another aim is to bring to people’s awareness the continent and all that is going on here.”

Kim Silverman, the director of the NSF’s Antarctic Artists and Writers program, agrees.

“My approach is about encouraging all forms of art and literature to apply to the program,” Silverman explains via e-mail. “From the traditional to the avant-garde. This affords viewers/readers the opportunity to experience and discover Antarctica and

the science in ways that they may not have otherwise imagined.

“I would say that yes, Lita’s project is a good example of broadening the types of projects supported by the program, which includes supporting modernist approaches to art and literature in addition to the more traditional forms.”

Solstice arrives

At 1:26 p.m. local time on Friday, Dec. 22, 2006, the sun reached its maximum declination in the skies of the southern hemisphere. Midsummer Day. The solstice.

On the ice shelf, the 99 blue spheres became momentarily aligned with their celestial counterparts.

Later in the day, 51 members of the McMurdo community, wearing their standard issue big red parkas, marched in a single file out of the bus that transported them to the installation.

“That morning, Simon and I had created with our feet an Archimedean spiral,” Albuquerque explains.

The participants traced the spiral with their footsteps as they entered the installation and walked from the horizon of the star map to a spot that corresponds to the celestial center, the point in the heavens over the southern rotational axis of the earth.

Sophie Pegrum, the team’s documentary filmmaker, captured the event from a helicopter hovering above. Meanwhile Jean



Bill Jirsa / Special to *The Antarctic Sun*

Sophie Pegrum, left, and Simon Balm prepare to lay out the Stellar Axis art exhibit of blue spheres on the Ross Ice Shelf on Dec. 15.

de Pomereu, the team’s still photographer, and Lionel Cousin, making the art film, covered the performance from the ground. Albuquerque coordinated and took part in the performance among the spheres. The group began from the celestial center of the installation and traced the spiral back out.

The film and photography will help the installation reach a larger audience. After the solstice, the installation was disassembled and most of the spheres will find homes with donors. Albuquerque will leave one star behind for display in McMurdo.

The “performance” on the solstice concluded with all of the participants standing equally spaced around the horizon of the star map: a field of blue stars encircled by a ring of red parkas.

“I was pretty close to the end,” Albuquerque says, “and next to me was a guy named Isaac. And he said, ‘Why don’t we do snow angels?’ We all laid down, which was hysterical.”

The humorous coda seems to delight Albuquerque.

“It’s important to get the responses, and I realize how that really completes the piece for me, that the piece was meant to be for the individual. I had a certain intention, whether or not that happened for everyone. Obviously, everyone has a different reaction.”

NSF-funded research in this story: Lita Albuquerque, Antarctic Artists and Writers Program.

around the continent



PALMER

Palmer LTER after big picture

By Kerry Kells

Palmer correspondent

The research and re-supply vessel, the *Laurence M. Gould*, arrived at Palmer Station for the last time this year. New personnel arriving at the station included Joe Pettit, station manager.

Scientists who are part of the Palmer Long Term Ecological Research (LTER) project presented this week's science lecture, an introduction to all the Palmer LTER components. The Palmer LTER began in 1990, and was the first addition of an offshore marine research site to the LTER program. The LTER program is a collaborative effort involving more than 1,800 scientists and students investigating ecological processes over long temporal and broad spatial scales at 26 sites, most in and around the United States.

Situated in a region experiencing temperature increase, the Palmer LTER looks at how variations in the seasonal dynamics of pack ice and climate change affect the marine ecosystem on the shelf of the western Antarctic Peninsula. Studies include work on bacteria, phytoplankton, zooplankton (including krill and salps), seabird populations and research on associated hydrographic and meteorological variables.

Matthew Erickson introduced the bacteria component of LTER. Bacteria work as recyclers in the ecosystem: they return nutrients to the food chain. His group collects water samples from the surface, 10 meters and 20 meters down once a week at the sampling sites of Station B (just off Bonaparte Point) and Station E (at the two-mile limit distance from station). Station B, closer to shore, is influenced by a glacier and Station E is the open water location. Their research looks at the abundance, activity and diversity of the bacteria they collect.



Langdon Quetin / Special to *The Antarctic Sun*

Kelly Moore and Alex Lowe, field team members of a krill research team that works out of Palmer Station, use a Go-Flow device in a Zodiac to take water samples at different depths for chlorophyll sampling.

Tristan Wohlford is the field team leader for the phytoplankton ecology and bio-optical component. For the bio-optics component, the team uses an instrument called a profiling reflectance radiometer to catch light that reflects both down into the water and up through the water column. With their conductivity, temperature and depth instrument, they can track the temperature, salinity, transmittance and chlorophyll levels of the water column. The water samples are then processed for phytoplankton pigments, particulate carbon and nitrogen, dissolved nutrients and primary productivity.

Kelly Moore, a field member with the zooplankton research team headed by Robin Ross and Langdon Quetin, discussed the "anchovies" of the Southern Ocean, the shrimp-like krill. An important food source for seabirds, seals and whales,

krill can both grow and shrink in length, form swarms that extend for many kilometers and go hungry for up to a year and survive.

Research activities include pack ice diving, acoustic transects, trawling and lab experiments. The scientists look at school characteristics (depth, length, density) to provide an estimate of krill biomass and number per school. They also use a fish finder to locate the krill and drop nets to catch them. In the lab, they study krill grazing rates, growth rates and take measurements of the krill caught to assess the condition and structure of the population.

At the top of the food chain is the seabird component of LTER. Jen Blum, field team leader with Bill Fraser's Polar Oceans Research Group, introduced the

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the week in weather

McMurdo Station

High: 36 F / 2 C

Low: 7 F / -14 C

Max. sustained wind: 26 mph / 43 kph

Min. wind chill: -15 F / -26 C

Palmer Station

High temperature: 47 F / 8 C

Low temperature: 32 F / 0 C

Max. sustained wind: 50 mph / 80 kph

Melted precipitation: 10 mm

South Pole Station

High: -17 F / -27 C

Low: -28 F / -33 C

Peak wind: 23 mph / 37 kph

Max. physio-altitude: 3,250 m

Continent

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group's research on seabird ecology. The birders look at the population trends, foraging ecology and breeding biology of Adelié, gentoo and chinstrap penguins.

Adeliés breed on several local islands and are the first to lay eggs. Chinstraps breed on Dream Island (and lay eggs two weeks later) and gentoos breed on Biscoe Island (with varied egg-laying times). The researchers also study the brown skua, South Polar skua and the giant petrels that breed on all local islands except Eichorst and Torgersen. They also take censuses of blue-eyed shags (cormorants) and kelp gulls.

This past week, Palmer residents celebrated the holiday season with a Christmas dinner on Saturday, stockings full of treats for Christmas Day and the traditional Christmas gift exchange on Sunday evening.

The gift exchange included the usual opening of presents, stealing of presents and final group photo of all the gifts given and exchanged. Presents in the mix included a handmade knitted hat, sketchbook journal, two cutting boards (one in the shape of a penguin, one in the shape of Antarctica), cribbage board, and beer can airplane, as well as scarves, hats and even an iPod Shuffle.

SOUTH POLE

Final touches put on Cryo lab

By Cathy Morrell

South Pole correspondent

The warming trend at the South Pole has ceased this week, surrounding Polies with unseasonably cold temperatures and reminding us all that summer at the South Pole makes just a brief appearance each year.

These colder-than-normal temperatures have not, however, slowed the works in progress here at the Pole.

South Pole residents gathered together in hordes last Wednesday to watch a C-17 aircraft drop cargo near the South Pole. All of the packages were collected over the next three days and found to be undamaged.

"It was a beautiful sight to see," said Scott Jackson, cargo handler.

IceCube continued in its strides toward completing 14 holes this season and successfully deployed sensors into hole No. 3. Six additional data lines were also successfully pulled to the newly inhabited IceCube laboratory.

The final plans are now in place to set the 10-meter dish atop the booms of the



Al Baker / Special to *The Antarctic Sun*

The finishing touches were recently completed on the new South Pole cryogenics Lab, the large building at right, which dwarfs the old structure just to the left.

South Pole Telescope, according to Brad Coutu, South Pole FEMC manager. The dish is the last of the major pieces to be placed in this huge undertaking and is a major accomplishment in the project.

The finishing touches were also completed on the new cryogenics lab. Construction of the new lab started during last year's austral summer. It offers more than three times the space of the old lab as well as features that allow the staff to maintain their cryogenics supply over the long winter. This much-needed advance in facilities is an asset to the cryo program that, according to Coutu, is "a long time coming."

The annual Race Around the World was held on Christmas Day. South Pole residents came out in force to compete in the traditional two-mile race around the Pole at 90 south. Along with the runners, came skiers, bikers and some racers that fit no description. One group fashioned a sled consisting of a couch pulled behind a snow machine and an entry from IceCube included a working solar shower. Bystanders cheered the racers along their three laps around the Pole. This year's winners, Curtis Moore and Rose Myers, both had impressive finishes of 15:14 and 20:17, respectively.

Christmas at the Pole was celebrated in style, with another amazing showing from executive chef James Brown and his dining hall staff. Attending Polies were greeted by a spread of hors d'oeuvres before dinner that included baked brie with chutney, warm lobster dip, and a huge tray of fresh vegetables with dip.

Before the feast of beef Wellington, crab legs, and a delicious assortment of side dishes, Polies toasted to the good friends around them, family and friends across the world, and cheered the loudest to a toast of "no malls and no traffic jams" from South Pole Area Director BK Grant.

Polies listened quietly as National Science Foundation Representative Jerry

Marty read a Christmas card from Charlie Bevilacqua, a member of the first team of Navy Seabees to spend Christmas at the South Pole. We were all reminded of those who have come before us and the legacy we work to continue as our season stretches on in front of us at the South Pole.

SHIPS

LMG

Compiled from reports by Herb Baker
Marine projects coordinator

The *Laurence M. Gould* enjoyed an unusually smooth crossing of the Drake Passage last week en route to Palmer Station. It stopped at a bay at the foot of the Boston Glacier to look for reasonable landing and camping sites for an upcoming science cruise for the *Nathaniel B. Palmer*.

Christmas found the vessel in the Drake Passage, returning to Punta Arenas, Chile.

NBP

Compiled from reports by Jim Dolan
Marine projects coordinator

The *Nathaniel B. Palmer* departed Lyttleton, New Zealand, on Dec. 22 for a science cruise around the Cape Adare region in the western Ross Sea.

On board are 18 scientists, with two teams. One group will study seafloor spreading in the Adare Basin and its relationship to the continental basins of the Ross Embayment. The second team will dredge samples from the numerous, small volcanic seamounts in the Adare Basin and analyze these samples for critical age, petrographic, petrochemical and isotopic data to help determine the age of the seamounts.

The ship's company celebrated Christmas with an excellent lunch and dinner. Weather has been favorable throughout the transit to the Cape Adare region.

2006 Antarctic Photo Contest winners



1st place Palmer Rainbow

Christina Hammock,
Palmer Station
research associate

Overlooking Palmer
Station and Hero
Inlet

Olympus C-765

Mastro: The winning photo combined lucky happenstance (the rainbow) with perfect framing. There were a hundred ways to frame that shot, but the photographer chose the one that placed the picture elements in the best arrangement to take advantage of the situation.

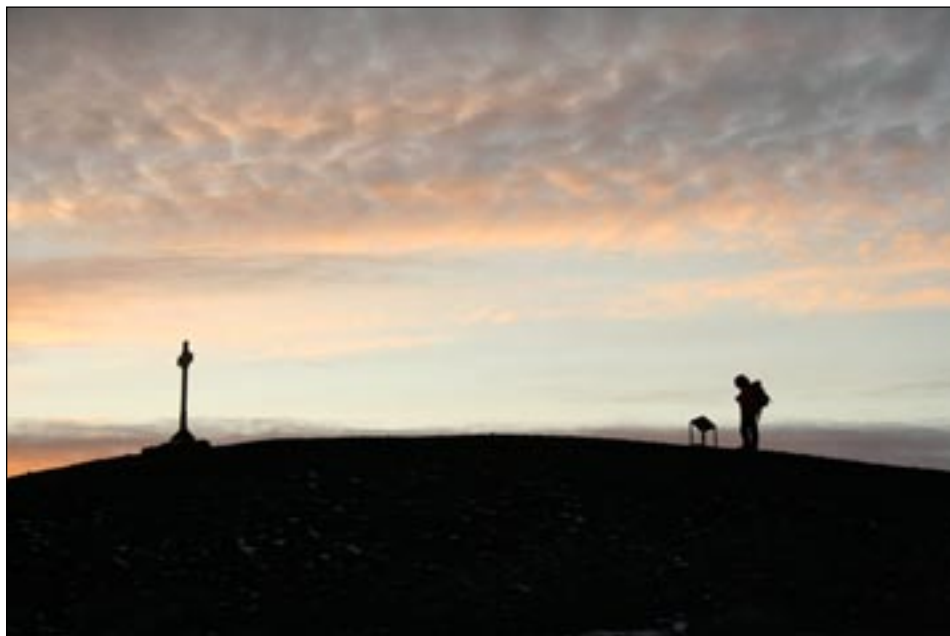
Myers: This image of a magnificent rainbow over Palmer Station is one of those shots where the lucky and prepared photographer was rewarded by being in the right spot at the right time. Bravo!

U.S. Antarctic Program participants turned in a record-breaking 431 photos for this year's Antarctic Photo Contest. Fifty-three people, representing all three USAP stations, participated in the contest, and the entries were judged by two professional photographers, Joan Myers and Jim Mastro.

"It was tougher this year, particularly in some categories," Mastro wrote about the selection process. "There were not only more shots, but more good shots. ... All were great photos in their own right. Some were very creative, some technically perfect, many both. All showed that there are many talented and keen-eyed photographers working on the Ice."

Congratulations to the winners and thanks to all those who participated.

- The Sun staff



2nd place Cross Observer

By Dave Barud, McMurdo dining attendant
Hut Point near McMurdo Station
Canon Digital Rebel XT



3rd place The Neumeyer in Black and White

Glenn Grant, South Pole
research associate
Neumeyer Channel,
Antarctic Peninsula
Nikon D70S



3rd place Palmer Station Sunrise

Glenn Grant, South Pole
research associate
Palmer Station
Nikon D70S



1st place

Mote Ice Wall
Anchor Ice



Shawn Harper,
McMurdo Sound
science diver

Ferrar Fjord in New
Harbor

Nikon D200

Mastro: The winning photo is a repeating pattern of circles and circle derivatives, juxtaposed with irregularly shaped stones, that is both eye-catching and biologically interesting. The earth tones and splashes of pink and red, mixed in with the anchor ice, are also visually appealing. And the shot is perfectly exposed.

Myers: Only someone who is working on the continent can take a beautiful shot like this that shows the abundance of Antarctic wildlife that tourists never see.



3rd place

Flight

Curt Smith, Palmer network engineer
DeLaca Island, near Palmer Station
Canon Rebel XT

2nd place

Emperors at the
Ice Edge

Cara Sucher, McMurdo lab manager
Ross Sea ice edge
Canon 10D



1st place

C-17 flight

Glenn Grant, South Pole research associate
Somewhere over Antarctica
Nikon D70S



Mastro: I thought the winning shot epitomized the Antarctic people experience. It's a very interesting shot that captures the attention, and it was perfectly exposed and framed. I could sense the undercurrent of excitement and anticipation that defines every new deployment.

Myers: This is a beautifully composed shot that gives a visceral sense of what it's like to fly South. I wish my flight had been this comfortable.



2nd place

Tour of the Golf Ball

Katie Leum, McMurdo lead janitor
McMurdo Station
Canon PowerShot 5400

3rd place

Silversmithing with Harry

Jeff Gebauer, McMurdo assistant housing coordinator
McMurdo Station
Nikon D70



3rd place

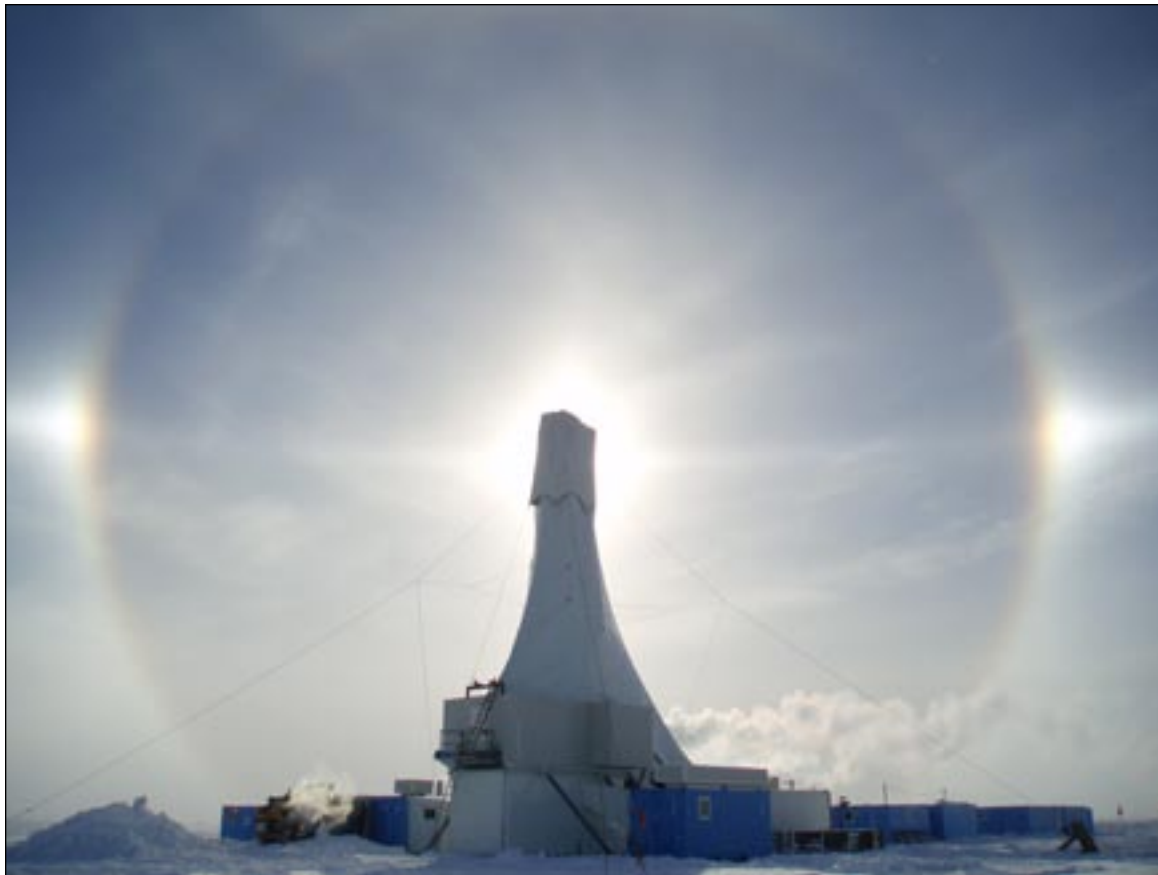
At Peace

Rebecca Peace, McMurdo general assistant
Summit of Mount Falconer in the McMurdo Dry Valleys
Optio A10



1st place

Divine Intervention at MIS 2006



Cliff Atkins, senior core technician for the ANtarctic geological DRILLing project (ANDRILL)

ANDRILL site on the Ross Ice Shelf

Olympus U digital 600

Mastro: I found the winning shot to be very eye-catching. It was perfectly framed and exposed and had the advantage of juxtaposing a dramatic meteorological phenomenon (sun dog) with a symbol of cutting-edge science (ANDRILL). Well done. This could be the defining ANDRILL publicity photo.

Myers: I loved this juxtaposition of cutting-edge Antarctic science with a stunning Antarctic sun dog.



2nd place

McMurdo Ground Station at WinFly

Cara Sucher, McMurdo lab manager
McMurdo Station
Canon 10D



3rd place

Summer Departure

Andre Fleurette, McMurdo firefighter
Pegasus Airfield, near McMurdo Station
Olympus Evolt e300





other: Antarctic Tourism: The Rotterdam visits Palmer Station

Cara Sucher

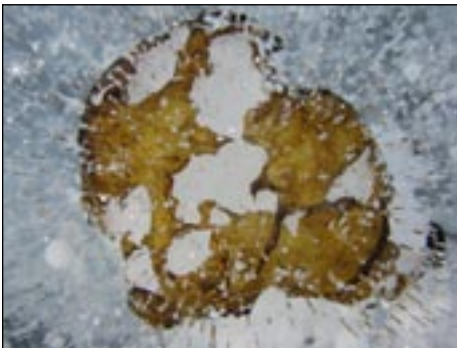


wildlife: *Cione antarctica* Shawn Harper



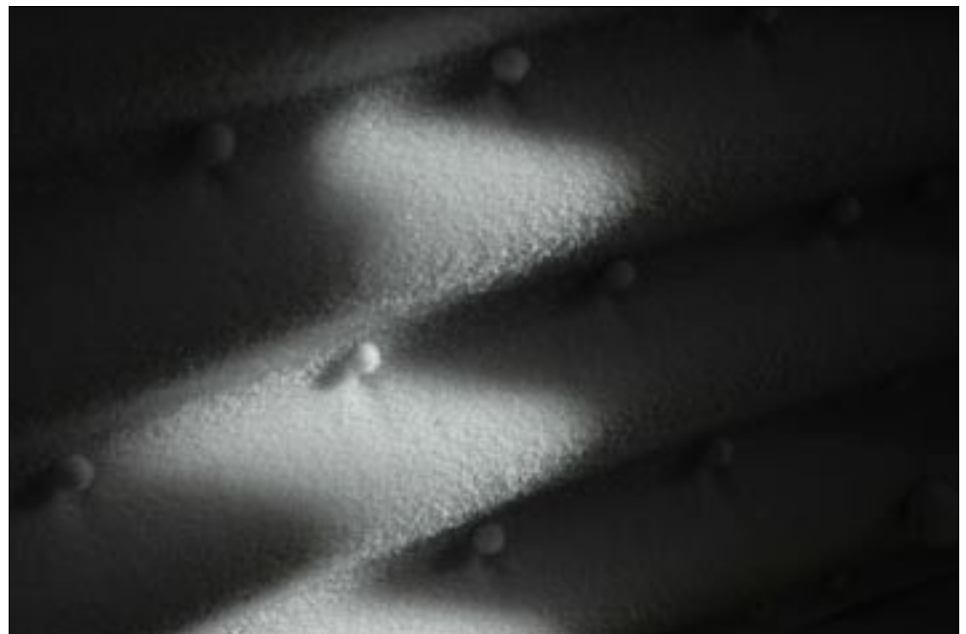
wildlife: Untitled

Dan Duncan



other: Algal Bloom

Kris Light



other: Inside the Beer Can – South Pole

Michelle Belacic



scenic: Mirror Pool

Seth White



wildlife: Adelié Penguins on Torgersen Island

Cara Sucher

honorable mentions

2006 Antarctic Photo Contest winners

Genomics show cold fish cannot take the heat

By Peter Rejcek
Sun staff

Antarctic fish may even be worse off than Goldilocks when it comes to finding a comfortable place to call home.

The coldwater fish species here live at a constant negative 1.85 degrees Celsius. But a research team from the University of California, Santa Barbara is finding that while various fish have adapted to life in the Antarctic, they don't necessarily do it all that well.

It turns out that common Antarctic fish like the *Pagothenia borchgrevinki* and *Trematomus bernacchii* produce a high number of abnormally folded proteins, according to Gretchen Hofmann, principal investigator for the team studying how Antarctic fish respond to temperature variations.

"For whatever reason, protein folding in the cold is thermodynamically difficult and more protein than we expected ends up not folding properly," she said.

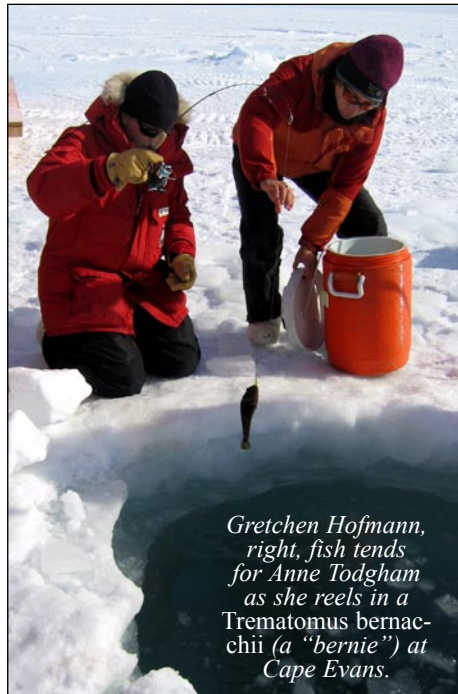
Proteins are large organic compounds made of amino acids arranged in a linear chain. Before a protein can begin doing whatever job it's designed to do for a particular organism, it is "folded" by other proteins (in science speak, by other proteins called molecular chaperones) into the "machine" that defines its purpose.

The extreme cold environment, Hofmann explained, somewhat disrupts this process, causing the organism to expend more energy to produce the requisite number of proteins than its lower latitude (i.e., warmer water) counterpart does for the same function.

In essence, the cold stunts or slows its growth, as the creature is not able to turn energy into body mass very efficiently, what Hofmann calls "the cost of life at cold temperatures."

The research group out of Santa Barbara has been increasingly using techniques in genomics to examine how fish respond to temperature. This uses emerging technologies in genomics, a field of study that examines the expression of all genes in an organism. Gene expression is the process by which a gene's DNA sequence codes for the proteins that make up cell structures and that perform cell functions.

One such genomic-enabled tool is called a DNA microarray. It is a collection of microscopic DNA spots attached to a solid surface, in this case a glass microscope slide, forming an array for the purpose of gene expression profiling, allowing scientists to monitor expression levels for thousands of genes simultaneously. Less than a decade ago, Hofmann said she was relegated to the "stone tablet and chisel" method of studying one gene at a time. In



Gretchen Hofmann, right, fish tends for Anne Todgham as she reels in a *Trematomus bernacchii* (a "bernie") at Cape Evans.

Courtesy of Gretchen Hofmann / Special to *The Antarctic Sun*

contrast, the microarray can get the expression profile for hundreds of genes at once, which not only saves time but also allows the researchers to learn about entire pathways of metabolism.

"You're getting a physiological fingerprint of how an organism is responding to its environment," Hofmann said. "We are particularly interested here in temperature and how Antarctic fish respond to temperature."

But not just cold temperature, she noted. The marine biologist also wants to know how the organism might physiologically behave if the oceanic thermostat was turned up a few degrees in the upper water column. In one recent experiment at her Santa Barbara lab, *P. borchgrevinki* and *T. bernacchii* were exposed to a change of 4 degrees C for four hours, a temperature still colder than inside a refrigerator. Researchers took genetic samples of the gills for the test. As one might expect, the fish weren't too happy.

"It looks like they are very thermally sensitive," Hofmann said. Though both fish reacted to the temperature change at the genetic level, the *T. bernacchii* responded better than *P. borchgrevinki*. How either species might react to such a change over the long term is still unknown.

Temperature is not the only variable scientists must study to get a true picture of how Antarctic fish and other marine organisms may physiologically respond to climate change. They must also factor in what's become known as ocean acidification, the name given to the ongoing

decrease in the pH level of the Earth's oceans. Acidification occurs when carbon dioxide, the key greenhouse gas, transfers from the atmosphere into the ocean.

Although it is unclear how acidic polar waters would become, testing the effect of various physical conditions of the ocean on marine animals is a priority for the group, according to Hofmann. "The ocean acidification is really interesting to us," she said. "The consequences are kind of unknown."

In a student lab project, one of Hofmann's graduate students, Mackenzie Zippay, mimicked the absorption of carbon dioxide and its effect on a species of sea urchin. An extreme drop in the pH – from a McMurdo Sound pH of 7.9 to an artificially simulated 7.2 – caused the urchin larvae to develop abnormally.

"In fact, they didn't develop at all," Hofmann noted, adding that the organism's well-defined cell walls and structures warped under the precipitous drop in pH.

Equatorial areas are particularly vulnerable to acidification, Hofmann said, because of the upwelling of deep water that tends to have a lower pH than surface water. Calcifying organisms such as corals are especially in danger, as the chemical process of decreasing the pH could cause the calcium carbonate, basically the organism's exoskeleton, to dissolve.

In reality, she explained, "all these bad things happen at once" – temperature increases and acidity decreases. "In nature, these organisms are going to experience all of these changes at once. ... The debate for climate change happening for me as a marine biologist has been over for quite some time."

This is the second field season for the team, which is in its second straight funding cycle from the National Science Foundation (NSF). The next logical step for her program, Hofmann said, is for the team to start studying embryonic development using the genomic approach. She said the NSF is particularly interested in using genomics to assess how organisms respond to their environment.

While some marine species may have the capacity to move to a different environment as climate changes – like the penguins in the Antarctic Peninsula that are moving farther south as the temperature warms – species like *T. bernacchii* and *P. borchgrevinki* may not have that option because they are already living at the extreme.

"When you're an Antarctic fish, where are you going to go when climate changes?"

NSF funded research in this story: Gretchen Hofmann, University of California, Santa Barbara, <http://hofmannlab.msi.ucsb.edu/>.

Scientist looks ahead to IPY

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beginning of the scientific age and at the end of the heroic age in that transition,” reminisced Behrendt during an August interview at his somewhat cluttered office at the University of Colorado at Boulder.

Behrendt, 74, doesn’t appear to have put on much if any weight in the intervening years – perhaps it’s the 10 miles a day that he bikes around Boulder, even in winter. Or perhaps it’s the 13 trips he made south to the Ice, the latest coming in just 2003. He’s quick to note that he has spent some time in Antarctica in each of the last six decades beginning in 1957, when he, eight other scientists and 30 Navy men wintered at the newly constructed Ellsworth Station.

Taking a seat across from his visitor, Behrendt crosses his long biker legs and with little prodding launches into the inevitable comparisons between the IGY and the IPY.

“It’s a world of difference,” he said, coming straight to the point. “There were essentially no stations on the main body of Antarctica at the beginning of the IGY.”

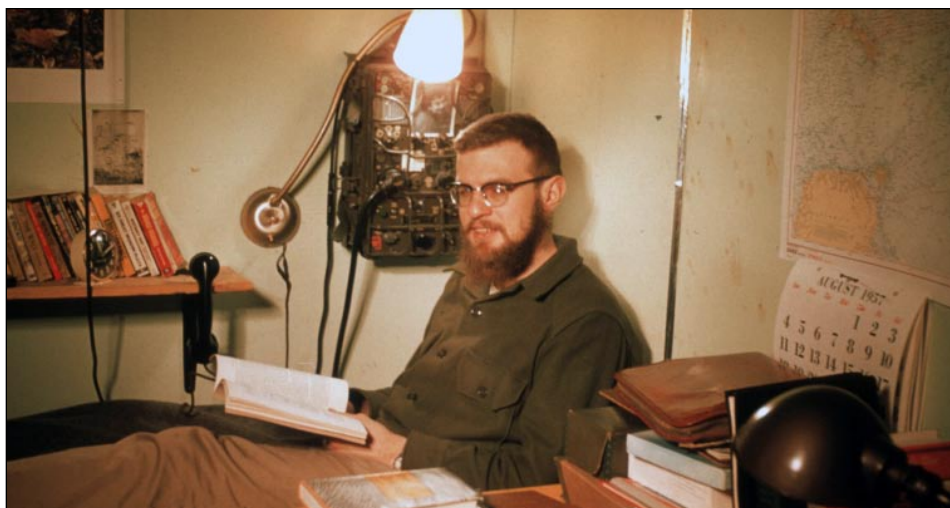
Indeed, there was not much of anything in Antarctica when Behrendt arrived aside from several scattered stations across the continent and a few extant huts from the explorers of the early 20th century. The IGY was meant to be a short-lived endeavor, a hit-and-run science expedition driven by a number of technological advances that had emerged since World War II. Special emphasis was placed on the polar regions; in fact, the IGY was an idea born out of the legacy of two previous IPY events.

But the IGY never really ended in 1958 as originally planned, at least not in Antarctica. “Basically, the major research activities that are ongoing today were started during the IGY,” Behrendt noted.

For that reason, it’s difficult to make comparisons between the two initiatives, Behrendt said. The IGY was certainly more ambitious, and it reached around the globe and even to outer space with the successful launching of the Sputnik satellite by the Soviet Union and two U.S. satellites. On the other hand, the IPY may not generate as much fanfare in the United States because of the robust and ongoing program already under way at the poles, according to Behrendt.

That hasn’t diminished his enthusiasm for the IPY. Behrendt was recently elected the president of the American Polar Society, a group founded in 1934 to foster interest in research and exploration of the polar regions.

He said he would use his new position



Courtesy of John Behrendt / Special to *The Antarctic Sun*

John Behrendt settles down for a little reading during the austral winter at Ellsworth Station in 1957. He has made trips to Antarctica during each of the past six decades.

to promote the IPY, which he sees as an excellent opportunity for the next generation of scientists to make their mark in much the same way as the IGY launched so many careers. Behrendt had just received his master’s degree in geophysics when he got the call to head south. He would eventually use his experience in Antarctica for his doctoral thesis.

Behrendt’s adventures in Antarctica would also serve as a source for two books: “Innocents on the Ice: A Memoir of Antarctic Exploration, 1957” published in 1998 and “The Ninth Circle: A Memoir of Life and Death in Antarctica, 1960-62” published in 2005.

The first book recounts those early months wintering at Ellsworth under what some passages characterize as the near-tyrannical rule of Finn Ronne, an Antarctic explorer of some fame who served as the station’s military and civilian leader. The memoir also goes into detail about the exploration of the ice shelf during a 1,300-mile traverse in two Sno-cat tractors. The field party measured ice thickness and snow accumulation along its route, helping to establish the parameters of the Antarctic ice sheet.

Behrendt said realizing that goal was likely the single greatest accomplishment for IGY in Antarctica. “That was hardly known at all ... prior to the IGY,” he said.

“We took it for granted as we were going along that we were going to places that no one had ever flown over or seen before. We didn’t know if there were mountains there or not,” Behrendt said. “It was quite remarkable to be going over places where no one had been before but we didn’t think about it too much.”

Keeping in mind a bit of wisdom someone once imparted to him – “you can only go to Antarctica the first time – once” – Behrendt kept a journal of his work and experiences, which serves as the basis of the book.

So why did he wait more than 40 years

to publish his earliest memoirs? “I didn’t have time to write it,” Behrendt replied matter-of-factly. “I was too busy doing my career.”

He didn’t wait nearly so long to publish his second book, a memoir of his two busy field seasons during which Behrendt led another traverse party, this time to the southern Antarctic Peninsula and to a mountain range that was eventually named for him in recognition of his work.

Both books contrast the difficulties and risks of that earlier era with present-day life at the stations and in the field, when DVDs are regularly dropped off at some permanent camps in addition to other supplies. Safety and environmental stewardship have improved exponentially, Behrendt also noted.

“It was a peaceful cooperation with the Soviet Union, but there was still a competition,” Behrendt said regarding the dangers of the early seasons. “The attitude was ... the mission came first, and we had to take risks to accomplish the mission.”

While Behrendt has watched the Antarctic program evolve over the years, he said its mystique and value have not changed or diminished.

“I keep coming back to Antarctica because I find it a fascinating area. It’s relatively unknown,” he said. “It’s how it fits into the global system, both geologically and glaciologically, that keeps drawing me back.”

In 2003, during his most recent field season, Behrendt had stopped in McMurdo after a geophysical science cruise on the research vessel *Nathaniel B. Palmer*. He spoke at a community lecture one night and fielded the one inevitable question: would this be his last trip to Antarctica?

“I was somewhat dumbfounded by the question, and I had to think for a few seconds. I said, ‘No, I’m never going to make my last trip to Antarctica.’”



Steve Martaindale / The Antarctic Sun

A cheer went up from some of the South Pole residents who trudged out to the fringe of the station to watch the Dec. 20 airdrop.

Crowd welcomes food drop at Pole

From page 1

belly of the plane. In short order, three more pallets followed, each making a controlled, if not graceful, descent to the South Pole's snowy surface.

As the first pallet landed, a cheer arose from observers.

"Principally, what we were looking to do is a proof of concept," said David Bresnahan, "... so if we have an emergency – not if, when we have an emergency – in the wintertime, we've already worked out all of those procedures to assure that we could safely do that."

Bresnahan, who is systems manager of operations and logistics with the Office of Polar Programs of the National Science Foundation (NSF), said the operation resulted in 100 percent recovery of the cargo with no damage to anything.

The cargo consisted of 68,000 pounds of dry food distributed over four pallets. The total weight of the pallets, packaging, chutes and rigging approached 90,000 pounds.

Airdrops at the South Pole – even winter drops – are nothing new, but the C-17 is a considerably different airplane and both the U.S. Air Force and Boeing, its manufacturer, were interested in proving it could be done.

'... If we have an emergency – not if, when we have an emergency – in the wintertime, we've already worked out all of those procedures to assure that we could safely do that.'

– David Bresnahan
NSF representative - McMurdo

"Before, all airdrops in the C-141, LC-130 and older aircraft at the Pole were computed by the navigator," said Lt. Col. Greg Pyke, a Reserve C-17 pilot who helped plan the airdrop.

"The C-17 has done away with the navigator and flight engineer and replaced them with computers," he said in a released statement. "These are far more accurate and, in normal conditions, somewhat reliable."

Acknowledging that the South Pole is not a normal place, plans were drawn up to test the concept.

"The pilots have run the profile in the simulator with mixed results, and Boeing thinks it should work just fine," Pyke said prior to the drop. Boeing also installed a special data collection computer to supply data for any future software upgrades for polar operation.

Capt. Jennie Steldt, the aircraft commander, outlined some of the challenges in a press release.

"Navigation is more complex down

there," she said. "Instruments in the plane work differently due to flying that close to the magnetic South Pole."

The elevation of the South Pole, 9,300 feet, is another challenge.

"We will have to drop 1,000 feet above that so the parachutes attached to the load have time to inflate," she said. "That means we'll be dropping above 10,000 feet in temperatures approximately negative 30 degrees Celsius."

Lt. Col. James McGann, deputy commander of the 62nd Operations Group, said by e-mail that the aircraft did slow down for the drop.

"We do slow considerably," he said. "For this drop we were flying at 150 knots, down from 230 knots during the 'racetrack' and approach."

Airdrop's role

While Bresnahan said the C-17 could deliver a payload to McMurdo almost three times as great as the C-141, he stressed that

See GOAL on page 15

Goal is to keep options open

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the only projected use at this time for the aircraft at the Pole was for an emergency drop.

“It’s a fairly expensive operation,” he said, “and you also wind up with a significant labor problem at South Pole because you have to recover all the dropped material and chutes. ... It’s expensive, a lot of flight hours involved, so I don’t think that’s a viable way to routinely deliver cargo to Pole, but we keep looking at options.”

The idea, he said, is to know what options the U.S. Antarctic Program has at its disposal.

“We continue to look at, is there a different way to re-supply the South Pole besides the traditional way we do it through McMurdo with the LC-130s?” Bresnahan said. “We’ve still got some other options we’re exploring, including the traverse that we’ll utilize to deliver materials to Pole that will relieve some of the burden from the LC-130s so that we can support more remote field activities.”

He said a traverse – an overland delivery of fuel and materials by a tractor caravan – is slated for next austral summer.

This flight’s cargo was loaded in Christchurch, New Zealand, and the C-17 stopped at McMurdo to take on more fuel. It returned straight to Christchurch after making the drop. In a winter emergency, he said, the Pegasus White Ice Runway can be opened for a landing at McMurdo, but the C-17 is capable of making a Christchurch-South Pole round trip if it is carrying a lighter load, as would likely be the case if it was an emergency airdrop.

“The other option we have is we can air-to-air refuel the airplane,” Bresnahan



Forest Banks / Special to *The Antarctic Sun*

A cargo handler inspects one of the pallets dropped at the South Pole.

said, “which we did with C-141 airdrops, where a tanker would come down, and they would do an air-to-air refueling. We could do the same thing with a C-17.”

That means moving a lot of equipment around. The C-17s come out of McChord Air Force Base in Washington state. The tanker would likely come from Hickam Air Force Base in Hawaii, he said.

“But if it’s an emergency, it’s nice that we know we have that capability to go to our military partners in the program,” he said. “Nobody else has that capability to do that. You don’t go buy that capability from a commercial airline operator, for sure.”

A midwinter airdrop at South Pole was a regular feature from 1981-1995. Bresnahan said the Air Force considered it a training operation and helped cover the expenses but assigned all costs to the NSF once it felt its crews were proficient with the procedure. By that time, the Antarctic stations were receiving Internet service and were using greenhouses to help provide fresh vegetables. The decision was made to halt the drops.

The need to maintain the capability was demonstrated during the 1999 winter

after South Pole physician Jerri Nielsen discovered a lump in her breast. A July airdrop delivered supplies needed for a diagnosis and to start treatment. She was evacuated on Oct. 16 with the earliest landing ever made at Pole.

“Now we’re prepared to do that, if necessary, with the C-17 aircraft,” Bresnahan said of the airdrop.

In addition to a heavy cargo load, the Dec. 20 flight carried an extra large crew. While only five members of the crew actually dropped the supplies, another nine were aboard to become familiarized with flying conditions at the Pole, according to an Air Force Command News Service release.

“They’re professionals,” Bresnahan said of working with the Antarctic program’s military partners. “This wasn’t a cowboy operation. They did it by the numbers, very carefully.”

Also playing a key role in the project were the New Zealand Defense Forces, which assisted with rigging the load in Christchurch and sent members to the South Pole to share their experience with handling the chutes and riggings with workers at the Pole.

Continental Drift What do you wish you’d packed before deploying?



“More UHT milk.”

Dorothy Burke
McMurdo Station
computer help desk
San Rafael, Calif.
seventh season



“A kite.”

Chris Wilson
South Pole Station
project specialist
Denver, Colo.
second season



“More sandals.”

Matthew Erickson
Palmer Station
research technician
Williamsburg, Va.
second season

Profile

Life on the move

Shuttle Bill takes the road less traveled

Edited by Steve Martaindale
Special to the Sun

Antarctica was here before Shuttle Bill and will be here after he is gone, but Antarctica may not be the same.

The fifth of five children, William "Bill" Sunde (pronounced Sunday) was born a surprise to his "poor but happy" family of Salem, Mass., on May 27, 1939. The McMurdo Station shuttle driver grew up liking school and dreamed of going to college, but money was not available when the time came, so he joined the Air Force instead.

After putting in his "four years and change" with the Air Force, Bill returned to the familiarity of the Boston area. By the summer of 1969, he headed to Miami Beach, where he would thrive for the next 31 years.

Bill started off his new life as a bartender at a quaint "cut and shoot" joint on the beach called Jessie's Doll House where "most arguments were settled without lawyers." He said he loved his job serving libations to returning soldiers and roughnecks.

Prior to leaving Boston, one of Bill's primary pastimes was courting Carol Collin at the steak house where she worked. He moved south with the idea those encounters would never come to fruition. But fate had other plans.

Some four years later, an early morning stroll on Biscayne Boulevard in Miami Beach reunited him with his lost love. "I know you," Bill said as he saw Carol, who was visiting with a friend for Orange Bowl festivities. "I convinced her I wasn't as bad as she thought I was," Bill said.

They later drove down the Pan American highway. Touring through Mexico, Guatemala, El Salvador, Honduras and Nicaragua, Bill said he realized he had found his true love. After Bill suffered a burn to his hand in a camping accident, Carol drove back to the States.

Bill wed "the half that makes me whole" in a small ceremony at Las Vegas City Hall in 1975. He said the hardest part of life on the Ice is being separated from Carol during the holidays but added, "I can feel her presence; she's always with me."

Marriage and responsibility for their children carried Bill into the next phase of his life. He started working for Dade County in 1979 as a bus operator and retired as a safety officer after 20 years



Steve Martaindale / The Antarctic Sun

Shuttle driver Bill Sunde is no stranger to operating big vehicles like "Ivan" the Terra Bus. He worked for Dade County in Florida as a bus driver for a number of years and later retired as a safety officer in 1999.

of service. Bill said that he never missed a day of work and had a perfect driving record. His only close call came during the McDuffie riots of 1980, which began after four white police officers were acquitted on charges related to the beating death of a black insurance salesman.

"That was May 17, 1980," Bill said. "You never forget that date. I left Miami Beach on the G Route, going up to Bunch Park, which was from Miami Beach across the mainland. I remember, it was just after 10 o'clock at night, and there was a big crowd of young people chanting, screaming."

The crowd's anger turned toward the bus and its white driver as rocks and gunshots broke out windows. He said four black men got out of a car and offered their help.

"So I say, 'Can you get these people off and get me up onto the highway?'" he said. "And they did, they got the people off and, in the meantime, the crowd was screaming for my blood, I thought. This young woman – also, she was black – came out of the crowd and stood right by my driver's window on the bus. She was just a little bit of a thing, and she wouldn't let them near me. So, they put their flashers on, and I followed them up onto the highway."

Bill's fascination with the Antarctic began in 1955. He rode with his father to Newport, R.I., to drop off his brother, who was beginning his service on the *USS Edisto*, a Navy icebreaker headed for Antarctica. Fifty years later, he heard about

working in Antarctica through a friend who took care of his property in Idaho on Lake Pend Oreille.

After discussing with his wife about his desire to work in Antarctica, he started the process of going "through the hoops like we all do." He is in his third consecutive summer season, with plans to continue. Bill said he lost 14 pounds, his cholesterol went down 100 points and his energy level has gone way up since his first season.

He appeared on the Discovery HD Theater network in a documentary filmed two years ago. He shook hands with an astronaut, joined the Polar plunge club and slept in a shelter he built on the Ross Ice Shelf. And, at 67, he can climb 750-foot-tall Observation Hill in about 35 minutes from the dining hall.

Bill now calls Abilene, Kan., home. Carpentry is his first love, and he said he gets lots of time applying his skill as he constantly upgrades his 107-year-old house.

"Work is my hobby. Playing golf and inactivity are not in my blood," he said. Indeed, retirement has not come easily. Before heading south, he tendered his third, and he said final, resignation as a building inspector in Abilene. He plans to spend the off-season on a European tour with Carol.

After a prosperous life, Bill said he only wants his grandchildren to be proud of him and hopes that everyone will "leave the world a better place than you found it."