Midwinter special
The Antarctic Sun

Published weekly during the austral summer at McMurdo Station, Antarctica, for the United States Antarctic Program

June 21, 2005

Dark days, starry nights

Photo courtesy of Keith Martin / Special to The Antarctic Sun

An apple hut shelter is illuminated while the moon hides behind Castle Rock during a sky-watching outing near McMurdo Station. On June 21 Antarctic workers celebrate mid-winter and begin the countdown to the return of the sun. For more on winter skywatching, see page 15.

Old mud offers future promise

By Kristan Hutchison
Sun staff

The tubes of olive-green mud John Anderson collected from his recent cruise represent 10,000 years of Antarctic history and a breakthrough in drilling technology.

"You do need a technological shift sometimes to really foster a new age of discovery."
- John Anderson
Marine geologist

For decades scientists have wanted to pull samples from the seafloor around the edges of Antarctica. The layers of sediment contain revealing remnants of the continent's past, including climate patterns and glaciation. But the sediment is in a no man's land with too much ice for drill ships to maneuver, yet not enough for a stable drilling platform.

"For the most part the whole Antarctic margin is off limits to drill ships," said Anderson, a professor of Earth sciences at Rice University. "We don't get a lot of drill core from Antarctica."

In 1994 a group of scientists began trying to find ways to tap into this rich resource under the project name Shaldril, short for Shallow Drilling on the Antarctic Continent Margin. Several years ago a promising new flexible diamond coring system was tried in northern high latitudes by Seacore Limited. Shaldril successfully tested the same system for the first time in Antarctica in April.

See Shaldril on page 18

New home for the Dome?

By Kristan Hutchison
Sun staff

After more than 30 years at the South Pole, the landmark aluminum dome may retire to Southern California.

The original plan was to recycle the dome, which is the equivalent of 2.6 million aluminum soda cans, but a veterans group is interested in using the structure in conjunction with the CEC/Seabee Museum in Port Hueneme, Calif.

"I think it's worth the effort from a number of perspectives," said Bill Hilderbrand, president of the CEC/Seabee Historical Foundation, keeping alive the history of the military construction battalion that built the dome. "Number one, to kind of recognize the Seabees who went down to Antarctica and what they did."

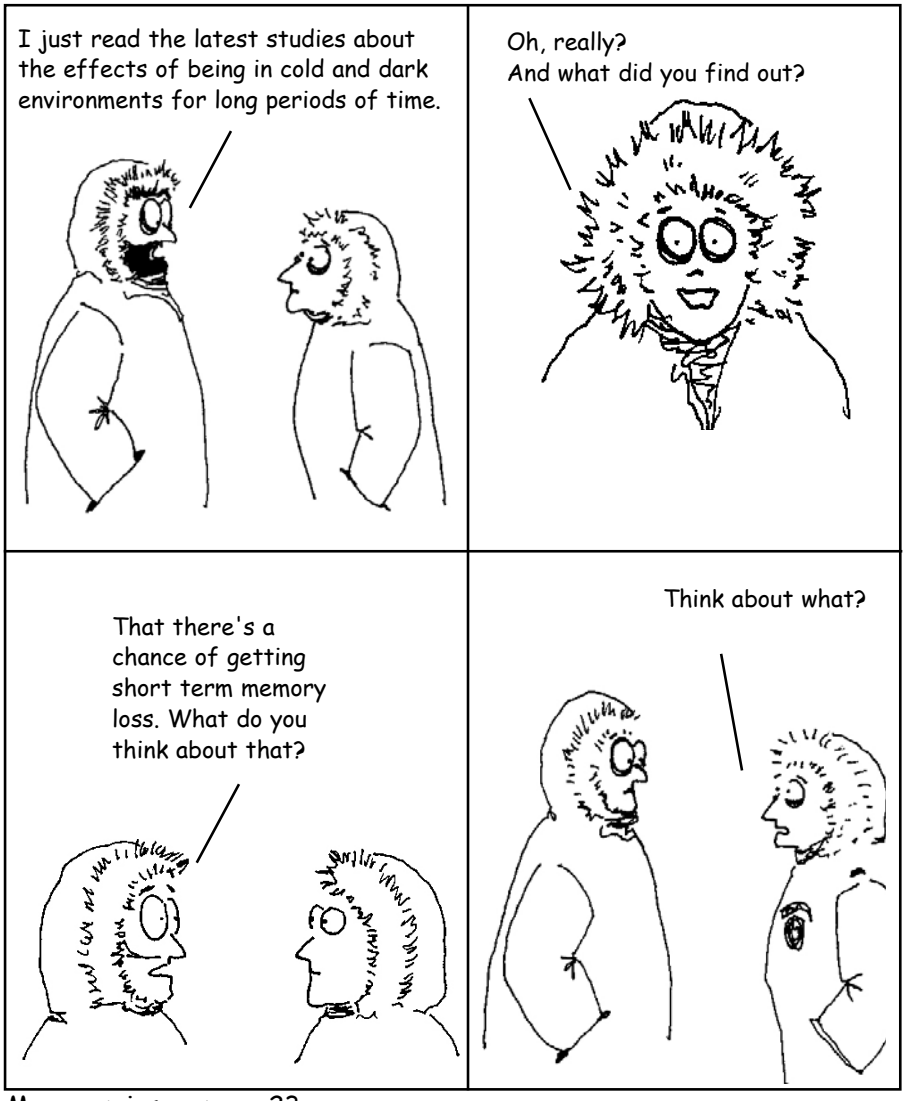
The dome has to be removed anyway. Under the 1991 environmental protocols of the Antarctic Treaty, the U.S. Antarctic Program must remove any structures from the continent after they are no longer in use. Several large buildings at McMurdo Station have been torn down and shipped to the U.S. as trash in recent years, but the dome will be the largest ever removed from the South Pole.

Several of the modular buildings the dome sheltered were removed this winter. The functions they housed - including the kitchen and dining area,

See Dome on page 20

INSIDE

Ross Island Chronicles **By Chico**



More comics on page 23

Cold, hard facts

Winter

Number of Antarctic research stations: **81**

Number of stations open all winter: **47**

Winter population at the U.S. stations: **241 at McMurdo, 86 at South Pole, 20 at Palmer.**

Percentage of women at McMurdo this winter: **33**

Average age at McMurdo: **38 years old**

Age range: **19 to 65 years old**

Where McMurdo winter workers are from: **49 from Colorado, 17 each from California, Washington and Minnesota, nine each from Alaska, Idaho and Wyoming**

Number two in *Maxim* magazines list of the seven worst spring break destinations: **The NOAA observatory at Amundsen-Scott South Pole Station**

Sources: *Station reports, Mike Blachut, Dani Dipietro, Amber Burton, RPSC*

It's a harsh cartoon **Matt Davidson**

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Contributions are welcome. The next issue will publish in October. Contact the *Sun* at AntSun@usap.gov.
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Ice on the move

By Emily Stone
Sun staff

Perhaps giant icebergs get stage fright.

B15a, the largest of the enormous bergs loitering around the edge of McMurdo Sound, was poised to smash into the Drygalski Ice Tongue in January. Instead, it waited until the sun went down and most of McMurdo Station cleared out for the winter to make its big move. And it didn't even turn out to be that big.

B15a, a Rhode Island-sized chunk of ice, hit the Drygalski sometime between April 11 and 12, according to satellite images from the two days. But it didn't bash into the ice tongue. It just scraped along it a bit, then continued on its way.

"Like a bad parallel parking job," is how researcher Kelly Brunt described the impact, comparing it to the way her grandmother used to scrape her Buick along fire hydrants while easing into a parking spot.

Brunt is a graduate student in Doug MacAyeal's research group at the University of Chicago. The team of scientists has been following the icebergs since they calved off the Ross Ice Shelf in 2000. B15a, at more than 3,000 square kilometers, is the largest remaining remnant of the original B15 iceberg.

B15a knocked a 50-square-kilometer chunk off the eastern edge of the ice tongue. The berg appears to be relatively unscathed, Brunt said, but the resolution from those satellite images is limited. There may be some "push mounds" along the western edge of the berg, which are smashed up sections that look much like the front end of a car would after hitting a brick wall.

This was a far less exciting collision than some anticipated. B15a started moving toward the Drygalski in November after spending several years partially blocking the entrance to McMurdo Sound. By mid-January, it was within 4.5km of the ice tongue, with the northern end of the iceberg aimed straight at the Drygalski. This prompted some in the iceberg community to start predicting "Death Match 2005: B15a vs. the Drygalski Ice Tongue."

The berg disappointed those waiting for an ice demolition derby. Instead of continuing forward, B15a stopped and backed up a bit before continuing forward again – a pattern that was repeated for the next few months.

Then the northern end of the iceberg started rotating east as the iceberg continued moving slowly north. Eventually B15a was lined up alongside the ice tongue, with its long western side facing the Drygalski. This position made a massive collision impossible, MacAyeal said.

Because the long side of the berg was facing the Drygalski, there was an enormous amount of water between the two pieces of ice. The only way to move that much water out of the way to allow a direct collision is through geophysical forces tied to the Earth's rotation. The laws that govern those forces, in particular the direction that water moves around low pressure areas, meant there was no way to get that water out of the way, MacAyeal said.

"That's a lot of water," he said. "It just can't happen."

The iceberg then continued on its trip north. For a while it was headed toward the Italian station at Terra Nova Bay. But between April 20 and May 4, the northern end of the berg rotated east again, this time by about 24 degrees. It now looks like it will pass safely out of range of Terra Nova.

The scientists haven't figured out why the iceberg veered off to the east a second time, MacAyeal said. It may have to do with the water depth in the area. Icebergs carry around the entire water column underneath them as they travel. It is difficult for water columns to change depth, because they don't like to get significantly fatter or skinnier as the floor rises or falls below them. B15a's path may be based on trying to stay in water of the same depth, MacAyeal said.

B15a's departure is good news from a logistical point of view. B15a and its fellow bergs had been blocking the winds and currents from sweeping out the accumulated sea ice in McMurdo Sound, making it difficult to get the annual ships to station.

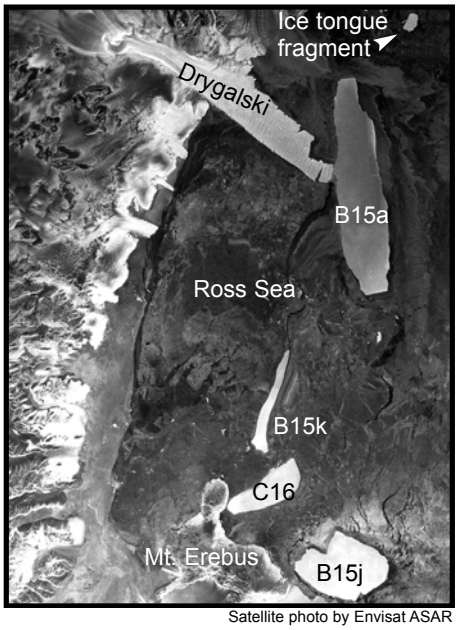
Almost the entire mouth of the sound had been blocked before B15a took off, Brunt said. Two other giant bergs, B15k and C16, are still blocking about 60 percent of the entrance to the sound. But that's a big improvement.

"B15a is out of the way and that's a good thing," said Marianne Okal, another graduate student with the group. "I'd be surprised if there's still 85 miles of sea ice out there next December."

There is, however, a new iceberg resident inside McMurdo Sound. George Weidner, a researcher at the University of Wisconsin, is tracking a small berg that managed to slip through the gap between B15k and C16 and enter the sound. The "interloper," as Weidner dubbed it, would not have gotten in if B15a hadn't moved out of the way.

"It just carried itself right in there," he said.

He's not certain where the iceberg came from, but suspects it was the product of an earlier calving off the Ross Ice Shelf in 1987. It has followed a similar path as those icebergs, he said.



Satellite photo by Envisat ASAR

Iceberg B15a deals the Drygalski Icetongue a glancing blow as it brushes by on April 15, knocking a chip off the old iceblock.

The interloper is about 16km long and 2km wide, Weidner said. It got within 60km of McMurdo Station, but backed up so that it's about 90km away now, about the same distance north as Beaufort Island.

The berg shouldn't affect any penguin colonies, he said. Nor should it interfere with the ships moving in and out of station in January. The closest the interloper got to the shipping channel was 40km and it's now sitting still about 70km away. The iceberg could move between now and next summer if the sea ice blows out and the berg has some open water to swim around in.

"Right now I don't think it's a factor in the shipping," Weidner said. "But it could be. It's hard to say."

MacAyeal's team will continue to track all the icebergs' winter movements through satellite images. Over the past several seasons they've placed GPS instruments, seismometers and weather-monitoring stations on several of the bergs. B15a's movement, while exciting, is going to make it difficult for the team to retrieve the instruments on its southern end. Among other things, they hope to learn if the December Sumatran earthquake registered on the seismometer.

For a while, as the berg headed toward Terra Nova, it looked like the group would be able to reach B15a from the station there.

"We were getting all excited that we were going to go to the Italian station," MacAyeal said. "We had our cappuccino orders ready."

NSF-funded research in this story:
Doug MacAyeal, University of Chicago,
http://amrc.ssec.wisc.edu/iceberg.html

Perspectives

The duality of the Southern thing

By Brien Barnett
Special to The Antarctic Sun

I stand still and feel the wind move through the trees. I hear it, I feel it, but I can't smell it.

I stare straight ahead, my palms pushed together above me. I concentrate on the clasp on the sewing machine and imagine a bar connects me to it. I'm in yoga class and I'm trying to be in two places at once. It's how it is at South Pole Station in the winter.

I'm happy I'm here. It's one of those once-in-a-lifetime opportunities I took at the last minute of the summer, just days before my plane was scheduled to take me back to fresh sushi, ripened fruit, fragrant forests, refreshing and warm beaches, and the sight of throngs of beautiful women outside a trendy club. Today, while pretending to be a tree, I'm wishing I were not in this cold place, not washing pots and pans for my village of 86 people, not pretending.

But I am at the bottom of the world. I'm here to see what it's like to spend the longest night on planet Earth. I recall the quote made famous long ago in Antarctic circles: "It's not the worst decision you'll ever make, just the longest."

Tick. Tock. Tick … the alarm rings and it's 10 a.m.; time for my shift in the dish-pit. But first, a tissue. This is a desert where drinking six liters of water a day is the minimum. Rarely do I succeed. The daily ritual of clearing my nose is my purgatory.

I stand at my post two hours later as the lunch crowd begins to pass by.

"Hey, Mark," I say, starting a pointless question. "What's up today?"

"Just another day in paradise, mate," the Aussie says. "Only 21 weeks to go."

Paradise.

I think I've been praying to the wrong god.

For every exciting day here, there are weeks of routine and monotony. I must give homage to Amundsen, Scott, Shackleton and all the other early explorers. I don't know how they did it without modern digital entertainment. We have walls of movies and several hours of Internet a day. These often form the basis of conversation. I can't really imagine life in the old days, but I now see Shackleton's wisdom in picking some of the men he did. They had been places and seen things and their stories got them through the winter

Photo courtesy of Brien Barnett / Special to The Antarctic Sun

Brien Barnett is a former journalist with The Antarctic Sun and chose to spend his winter working in the kitchen at the South Pole. You can read his personal stories and view photos and videos from Antarctica at his Web site at www.brienbarnett.com.

Outside it's … well, I don't go outside much. Every time I do make it outside for more than a moment I tell myself I'm going to do it every day. Then suddenly it's 10 days later and I haven't set foot past the food deck.

South Pole is strange at night. From the outside the station looks as if nobody's home. As Yoda would say, "Dark and empty, it is."

But open the door to the stairwell leading to the new station from ground level, and the light pours out. Six flights up and through a freezer door light and warmth surround me.

The new station is the Taj Mahal. Why would I ever want to go outside?

If I want, I can go from my bedroom, to work, to the lounge, to yoga class and back to bed without changing into anything heavier than my chef coat. There's something about putting on the many layers of Extreme Cold Weather gear that makes going outside seem daunting. Yet, once I'm dressed and set foot outside, I'm in love with it. I feel like a little kid on the first day of winter. The sastrugi crunch beneath me and the ice not far below resonates with a hollow sound. As I exhale, every particle of my breath freezes and is visible amid a whooshing sound. At -90F, I should be shaking. But I'm not. My ECW is good and I'm warm. My goggles freeze over almost immediately and become useless, but if I pull my hat and balaclava just right and tight so only my eyes are showing, I can create a shield of warm air from my breath to keep my eyelids from freezing. Between breaths I can see the Southern Cross and the other stars in the sky and sometimes, the beautiful cathedral-like auroras that shimmer green above me.

Most of my adventures outside have been little forays made with other people. There's still parts of this tiny station I haven't been to yet, but I've five months more. I have to save it. The sunset was the longest and among the most beautiful I've seen. I can imagine sunrise, but know it will be something to behold.

I can't wait. But I will.

around the continent

SOUTH POLE

All in a night's work

By Brien Barnett
South Pole correspondent

The last regular New York Air National Guard LC-130 dipped its wing as it flew over South Pole Station Feb. 15, saluting the 86 people spending the winter at the bottom of the world.

The sun already circled low in the sky, but took another month to set. Twilight faded to black several weeks after that and winter set in. Long before nightfall, about 50 winter workers were busy building the fully enclosed elevated station and tearing down some of the buildings under the dome. (See story on page 21).

Meanwhile, about a dozen scientists and research assistants were busy putting away summer gear, checking and calibrating their instruments, and starting work gathering data from the night air and sky.

Winter is primetime for science at South Pole, but there's not much to see in action. Bits and bytes of data are gathered by computers and saved or uploaded to universities and institutions in the home countries of the researchers. Most of the data gathered this winter won't be analyzed to conclusion until next summer at the earliest. There's little to witness, but the seemingly mundane chores of keeping instruments operating in sub-zero conditions, through power fluxes, computer freeze-ups and other temporary crises are why they are here.

The Clean Air Sector houses the National Oceanic and Atmospheric Administration's Atmospheric Research Observatory. The winter staff there have been measuring particles and substances that make up the air over the South Pole for more than three decades. NOAA-Corp Lt. Dan Simon said this year the instruments have recorded levels slightly higher levels of carbon dioxide than last year. This year's data, of course, must still be processed and analyzed back in the U.S., but if true it continues a trend that's been seen here for the past 30 years. Carbon dioxide is a greenhouse gas and the increased levels of the gas may indicate a global warming trend.

Photo by Daniel Simon / Special to The Antarctic Sun

Sunset at the South Pole is a once-a-year occasion that occurs over several weeks.

Station life mostly revolves around the temperature. Television screens in the dining hall and around the station and an intranet Web page report the temps, wind speed and pressure. Unlike McMurdo Station, which can have howling storms, the South Pole is cold, but fairly calm. Winds rarely exceed 40kph and often hover around 20kph.

At station closing the temperatures were about -45C and fell to -57C once night fell. Meteorologists at South Pole were a bit surprised by a warming spurt in April that eventually reached -34C. It gave all at the station a nice break. As June began, though, the cold was back and the thermometer briefly hit -73.6C (-100.5F). There wasn't enough time for some to join the infamous 300-degree club (when people race from a 200F-degree sauna outside into the -100F-degree cold and around the South Pole marker and back).

Five months into winter, and with four more to go, station residents like to get together to have fun and throw some good parties to keep things interesting.

Movies nearly every night, bingo for cash and prizes, yoga, tae-bo and salsa classes and a never-ending chess tournament offer some recreation to the winter residents. Every full moon, the South Pole Hash House Harriers meander about station and perform their rituals.

Since most of the people here this winter live in the new elevated station. The B1 Lounge has become the defacto gathering place since the demolition in March of the farthest-south adult-beverage establishment, "90-South". For the few smokers on station a new spot was opened up under the dome: BFK's Place. It's in the so-called Black Box below Upper Berthing and gets its name from the nickname for one of this year's residents, Kevin Shea, It's not much larger than a couple refrigerator boxes, but it's a reliable place to get in on a card game for the few who want to leave the "trailer park up there" to venture to the dome.

In May, the Black Box crew put on the BF5K, a fun-run inside the new station. Costumes and hijinx made for an entertaining day. That night the South Pole winter band Al Dente performed, singing a few original tunes and tons of favorite covers. Perhaps the funniest guest solo of the night belonged to five-time winter resident Robert Schwartz, who works with a new telescope called QUAD and is from Germany. His rendition of Rammstein's "Du Hast" had the crowd simultaneously dancing and laughing. That was followed closely by HR Director Kurt Montas dressed as Bob Marley singing "Puff the Magic Dragon" in a reggae style.

Mid-winter is drawing nigh. The weeks are flying by and soon the sun will return to blind and dazzle the 86 souls keeping South Pole Station up and running for the winter of 2005. See you all on the sunny side.

See McMurdo on page 6

winter weather *(February-June)*

McMurdo Station *(Feb. 15-June 10)*
Avg. temp: 1F/-17C to -13F/-25C
High: 30F/-1C (Feb. 16)
Low: -34F/-37C (June 8)
Peak wind: 66mph/106kph (May 18)
Total precipitation: 1.2 in/3.1 cm.

Palmer Station *(Feb. 11-June 10)*
Avg. temp.: 27F/-3C to 33F/1C
High: 42F/6C *(April 15)*
Low: 12F/-11C *(June 10)*
Peak wind: 79mph/146kph *(Feb. 19)*
Total precipitation: 8in/21cm
Snowfall: 45in/113cm

South Pole Station *(Feb. 16-June 10)*
Avg. temp.: -71F/-57C to -59F/-51C
High: -29F/-34C *(April 30)*
Low: -100F/-74C *(June 8)*
Peak wind: 33mph/53kph *(June 9)*
Top physioaltitude: 11,122ft/3,390m *(June 5)*

McMurdo From page 5

MCMURDO

From sunset to sunrise

Compiled by Mike Blachut and Sun staff

The first sunset of the year was hidden behind clouds, so even people who woke up for it at 12:38 a.m. Feb. 21 didn't see anything. But the clouds cleared later that week for the final flight of the season. McMurdo workers staying for the winter gathered outside to watch the plane disappear. It's not scheduled to return until August. They toasted a farewell to their friends and a welcome to winter.

Winter weather came in with gusts of 80kph as the sun dropped closer to the horizon, prolonging the sunsets.

"I walk out of my dorm in the morning and literally my breath is taken away from the wind," wrote Dani Dipietro, a labor allocator for the Facilities, Engineering, Maintenance and Construction department. "If you are talking to someone, forget it. Your conversation stops for a few seconds while each person catches their breath back."

Nobody saw the last sunset either, at 1:26 p.m. April 24, because it was hidden behind storm clouds. They celebrated anyway with a party at New Zealand's nearby Scott Base, including the traditional sunset polar plunge followed by a barbeque. Dipietro estimated the temperature with wind chill was about -57F.

Within a few weeks the station was in 24-hour darkness. Despite the constant night, it is not a sleepy little town. The science tech, Laura Tudor, is managing 15 ongoing experiments for science groups, which mostly involve gathering their data and transmitting to them. From their new home in the JSOC building, the NASA guys are tracking various satellites. Since NASA moved out of Crary Lab, only five people are rattling around inside in the winter months, which is quite a large contrast to the summer months when teams of researchers occupy every nook. Things are much busier at a newer science building, where construction workers are building the new long duration balloon facility. (See story on page 12)

After working 54 hours a week, the winter crew squeezes out time for chess matches, scrabble tournaments, bingo, trivia and other games. More than 150 people are part of the bowling tournament, either on one of the 27 teams or as pinsetters - well over half the 241 people at McMurdo this winter.

A fundraiser collected $2,000 by making and delivering calzones to people's rooms. The calzones were free, but the tips were donations to Cholmondeley Children's Home in Christchurch, New Zealand. Another group has been sewing a quilt to be raffled for charity at the end of the winter. (See story on page 14).

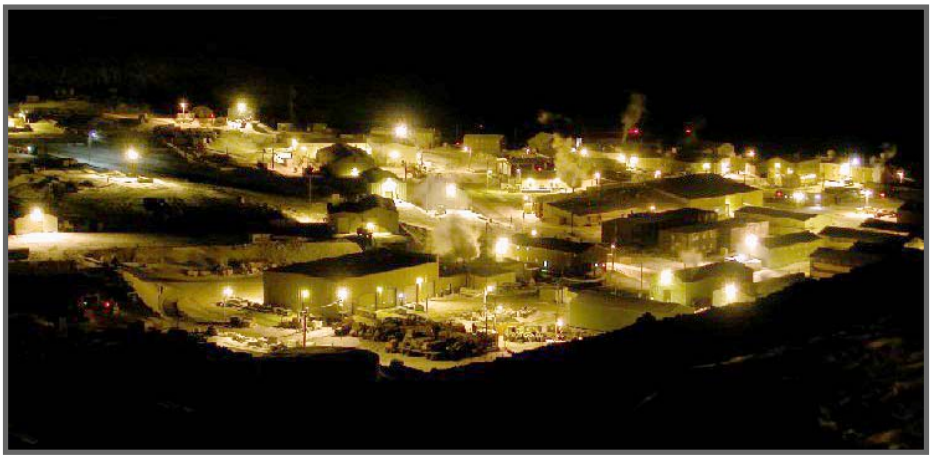


Photo by Mike Bair / Special to The Antarctic Sun

McMurdo Station glows in the winter darkness. The station has gone from the 24-hour daylight of summer to the 24-hour darkness of winter.

Since the last flight in February, the only visitors have been a couple Adelie penguins and two seals that crawled in and out of town in mid-May.

Near the end of May the sea ice roads were shut down due to water on the ice. A sudden warm spell, with thermometers hitting 17F, combined with the movement of the ice shelf, had kept the sea ice from freezing over. The fleet operations crew worked on the transition areas where the roads cross from solid ground to the sea ice, scraping off ice contaminated with rock. They also began establishing a flat area on the sea ice in front of the station for the Vorcore Project.

Vorcore, a French acronym for Experiment to Study the Stratospheric Antarctic Polar Vortex, will launch a series of 25 superpressure balloons to investigate the dynamics of the wind patterns that circle the continent and its interaction with ozone chemistry in the late Antarctic winter and spring. Each balloon is a few hundred cubic meters in size and will carry 10-20kg gondolas full of instruments. The balloons will drift for several months, sending back data. It's a collaborative project supported by the French Centre National C'etudespatiales and the U.S. National Science Foundation.

The scientists will arrive in August and send up the balloons in September and October. By then McMurdo residents will be able to watch the sun rise and set again – if clouds don't get in the way.

Meanwhile they celebrate midwinter, turning the dining hall into an Asian-themed restaurant for the night, with a dance area, more than 300 origami cranes hanging from the ceiling and custom-made paper lanterns, wrote Amber Burton, an IT worker helping plan the festivities.

See Palmer on page 7

'Frozen' vegetables

By Lane Patterson

McMurdo greenhouse operator

Once traffic to and from Antarctica stops, the fresh vegetables run out quickly.

As one might imagine, four months without sunlight and fresh vegetables can be difficult to endure. But because McMurdo and South Pole stations have greenhouses, the people wintering there don't have to go without.

Built in the 1980s, the McMurdo greenhouse provides the 200-plus winter personnel with fresh salads at least once a week during the winter. The 30sqm insulated building houses 41 high-intensity discharge lamps and a series of Nutrient Film Technique hydroponic systems. This winter the McMurdo greenhouse has produced on average 16 kg of lettuce and 2 kg of tomatoes a week, along with cucumbers, herbs and even flowers. The Antarctic Treaty requires that all crops grown in Antarctica be edible, so flowers like nasturtiums and pansies are grown as tasty and fun additions to salads.

The new elevated station at the South Pole has a digitally controlled "growth chamber" designed by the University of Arizona. This winter This winter the 18 square-meter chamber contains ripening cherry tomatoes, lettuce, spinach, cucumbers and a fragrant selection of herbs including rosemary, basil, cilantro, mint, dill, parsley and chives. In the first 13 weeks of winter it produced an average of 9kg of lettuce and 900g of tomato a week.

In addition to vegetables, the greenhouses provide a place where people home sick for daylight and plants can bask under high-intensity light while surrounded by dense vegetation. It's not like home, but it is warm, bright and full of green life – an environment one misses during the Antarctic winter.

Palmer From page 6

PALMER

Weathering the winter

Compiled by Sun staff

An unusual, triangular building appeared on the hill behind Palmer Station this winter.

At the end of March a nine-person construction crew began work on the International Monitoring Station, which will house instruments tracking changes in air quality, the atmosphere and seismic activity. It will replace three weather-beaten wooden buildings uphill from the station.

The 140-square-meter building's triangular design represents the three organizations that will use the building. Built high on the hill behind the station, the building's many windows will take advantage of the view of mountains and water while its elevated stature lifts the air sampling stacks above any local influence.

Photo by Stacie Murray / Special to The Antarctic Sun

A giant petrel chick spreads its wings on Humble Island. The birds are being studied by Polar Oceans Group scientist Bill Fraser.

By the end of April the crew had anchored the main columns in the granite bedrock, poured the 11 concrete footers and erected the foundation steel. In May they finished installing the deck, floor and roof. Part of the crew will remain through the winter to complete the building's interior and have it ready for occupancy by October.

"That building is going up so fast it's unbelievable," said Henry Malmgren, who maintains the station computer network. "It doesn't look as weird as I thought it would."

During the construction, wood, steel and other building materials were stacked in areas recently cleared of trash. The trash had been pulled out of an old dump site on the station in the 2003-2004 season and filled about 160 containers, each the size of a standard chest freezer. The gray trash containers had been stacked on the station since then, blocking the view of mountains, glaciers and water in some areas.

"They were stacked up on every flat piece of land they could find," said waste specialist Ildi Incze. "You'd be driving up the road and you couldn't see the beautiful view, you couldn't see the glacier because these offensive totes were in the way."

Over the past few months the trash has been shipped out on the *Gould*, with the final 14 containers leaving in June.

The weather cooperated for the first part of the winter, often snowing at night and clearing up during the day. That made work more pleasant for the construction crew and scientists.

"The weather here is just absolutely amazing," Malmgren said. "I don't think we've gotten colder here than maybe -5C. It's colder in Texas sometimes than it is here."

Perfect fishing weather

University of Maine biologist Bruce Sidell recruited many Palmer residents to help catch fish for his study of ways the icefish have adapted to the cold. (See story on page 17) Other interesting creatures came up in the nets as well, including a sponge that looked like a cored pineapple, giant starfish and octopi.

"It was really a beautiful part of the island and a beautiful bay," said Incze, who was on the night shift. "It's dark. It's exciting. The ship was kind of moving around and in the morning, little-by-little it unfolded itself - lots of beautiful glaciers and snowy mountains."

Other projects also gave Palmer residents a chance to get involved with the science. Twice a week Janice O'Reilly checked on the giant petrels on Humble Island, keeping track of how many were left and how many had flown for ornithologist Bill Fraser. About 26 hatched during the summer and by May they had gone from downy puffs to turkey-sized birds with feet the size of a woman's hand. Only five were left when Stacie Murray, the food service supervisor, saw them in May.

"It's pretty amazing to see these huge birds that are babes trying to figure out that they can fly," Murray said. "They're really beautiful in the air when they fly, they're very graceful and have huge wingspan, but their feet are so big that they kind of wobble and on the ground their not very agile at all."

Peeking at Palmer

A new science project set up a Webcam that allows anybody to take a peek at the weather in Palmer. The camera is the first piece of the Polar Remote Interactive Marine Observatory (PRIMO). PRIMO will consist of a set of instrumentation about 2km to 3km south of Palmer, said oceanographer Vernon Asper, who is leading the project along with biologist Scott Gallager from Woods Hole Oceanographic Institute. The instruments will be tethered to a node on the seafloor with a tether and winch, which will allow the instruments to rise to the surface or near it and then be retracted. A cable will provide power and allow the node to communicate with computers at Palmer Station and, via the Internet, anywhere in the world.

Photo by Ildi Incze / Special to The Antarctic Sun

A seal near Palmer Station.

Photo by Stacie Murray / Special to The Antarctic Sun

A whale flips its tail next to Palmer Station. Minke and humpbacks occasionally come into the bay to feed on krill.

Asper said the instrument package will have every imaginable sensor to measure the light, nitrate, temperature, salinity, and chlorophyll, as well as a microphone listening for mammals, a recorder detecting phytoplankton and zooplankton, and a remote controlled camera.

"The challenge is to find a place to put the node where it will be protected form iceberg scour," Asper said, "and also a route to run the cable where it too will be protected."

Asper and Gallager, crisscrossed the waters around Palmer in Zodiacs, taking about 780,000 depth measurements with an echosounder as they searched for a likely site. While mapping the seafloor, they discovered inaccuracies in the 100-year-old nautical charts used by research vessels and cruise ships. The new information reveals several submerged rocks in areas the old charts indicated were clear. The captain of the Gould immediately put the new data to work, modifying the ships established route.

Asper and Gallager also found several acceptable sites for the instrument. Though nowhere was completely safe from icebergs, a few deep holes were guarded by shallower areas surrounding them. The favorite site is on the far side of Bonaparte Point from Palmer Station.

Meanwhile, they set up a Webcam nearer the station to test how the

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Palmer

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equipment will interact with the Palmer network. Palmer residents like it because they no longer have to answer the most common question from family and friends – what's the weather?

"I can't find enough words for gray and blowing," Incze said. "Now you just say click on the link."

The link is http://4dgeo.whoi.edu/tsg/

Enjoying the weather

The weather has been good enough that some people camped in tents behind the station into May, despite the occasional ice storm and increasing darkness. The good weather allowed people to spend their one day off each week outside skiing, boating to nearby islands and practicing ice climbing with the Glacier Search and Rescue team.

If they're inside after work, Palmer residents are likely playing a German board game called Settlers of Catan. Several times a week they gather in the dining room to play the game, described as a cross between Risk and Monopoly. It became almost addictively popular after a rigger introduced the game to the station, said Malmgren. They made extra pieces out of Fimo clay to allow for more players and photocopied the playing cards to enlarge the deck.

"We've just been going nuts over it," Malmgren said.

They've also enjoyed the beauty, as baby-blue icebergs float in and out of the bay, sometimes accompanied by seals, humpback and minke whales, cormorants and penguins.

"We just had an absolutely jaw-dropping, stellar sunset and half the moon has just come up over the glacier," Palmer Station Manager James Slaughter said during a phone conversation in May. "It's one of those magical times."

Even on Midwinter's Day, people at Palmer get to watch the sun rise and set. Palmer is 197km outside the Antarctic Circle that marks the extent of 24-hour darkness in winter and 24-hour daylight in summer. The *Laurence M. Gould* was scheduled to be at Palmer on Midwinter's Day, which is usually celebrated with a holiday meal and exchanging greetings with other stations around the continent. As usual, they planned to bring out the white tablecloths and elegant serving dishes this year.

When the *Gould* leaves the station June 24, the 20 people remaining for the winter will be isolated for three months. About 80 percent of them have worked in Antarctica before, most at the South Pole.

"It's a really solid group of people," Slaughter said. "They know how things are going to work and they know how to get along."

Photo by Ildi Incze / Special to The Antarctic Sun

All hands help pull in nets at night on the deck of the Laurence M. Gould *during a fishing trip to collect samples for research by University of Maine biologist Bruce Sidell.*

SHIPS

Gould ferries fish, fossils

Compiled by Sun staff from reports by Al Hickey, Harold "Skip" Owen, Steven Ager and Andrew Nunn

For the *Laurence M. Gould*, it's time to do the chores – take out the trash and have an annual checkup.

Most of the year the research vessel shuttles back and forth between Punta Arenas, Chile and Palmer Station at least once a month, but when it pulls away June 24 the *Gould* will be gone for a full three months. The *Gould* will carry a load of hazardous waste all the way to Port Hueneme, Calif., a trip of 12,000km that takes nearly a month. All hazardous waste is removed from the station every two years. Then the *Gould* will go into dry dock for some annual maintenance before returning south.

It will be a change from the usual routine, but the usual isn't always routine anyway. Even a simple crossing of the Drake Passage can turn exciting, like the storm that came up on Feb. 12 as the ship headed south. As the *Gould* entered the Drake Passage it was hit by 9m seas from the southwest and sustained winds of 65-75kph gusting to 90-110kph. The *Gould* rolled to 40 degrees in the troughs, and it looked like science equipment secured on the back deck might be swept overboard, so the ship detoured. Even when the ship made it across the passage and into the more sheltered Bransfield Strait the strong winds and rough seas continued.

Photo by Ildi Incze / Special to The Antarctic Sun

An unusual sponge caught in the net during a fishing trip.

After the rather epic Drake crossing, the *Gould* reached the Weddell Sea and did surveys of the sea floor around the three Larsen ice shelves. The surveys led by sedimentologist Gene Domack from Hamilton College included extensive bottom sampling, oceanographic profiling and photos of the seafloor. The goal is to understand why the enormous ice shelves are breaking up. The 3,500sqkm Larsen B ice shelf disintegrated in 2002. By looking at the sediment below where the ice shelf used to be, Domack will learn how long the ice shelf had been there and whether its disappearance is part of a naturally recurring cycle.

After the surveys were complete, the *Gould* stopped by Vega Island to pick up a cache of fossils left the previous year by paleontologist Jim Martin and his field team. The crew had to wait for a break in the 75-90kph winds to go ashore in a Zodiac and retrieve the fossils.

From there the *Gould* headed east to do some work for the Consortium on the Ocean's Role in Climate - Abrupt Climate

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Change Studies, called CORC – ARCHES. CORC-ARCHES is an effort to understand and predict abrupt changes in the climate system, and their causes. They have instruments moored in several locations in the Weddell Sea to monitor changes in the production of Southern Ocean Bottom Water and the steady increase in subsurface temperatures, which has been documented over the last 20 years. After checking those instruments, collecting the stored data and redeploying them, the *Gould* headed north, arriving in Punta Arenas March 12.

The next few crossings of the Drake Passage were much calmer, allowing the *Gould* science crew to collect air and water samples, deploy buoys that listen for the presence of whales in the area, and stop at Petermann Island to retrieve equipment left there by a summer field camp studying the penguin colonies.

From late April through May, the *Gould* went on two fishing trips. Using nets and traps they fished for species needed by Bruce Sidell in his studies of icefish adaptations to the cold. (See story page 17).

The *Gould* was scheduled to be at Palmer Station on midwinter's day, and then begin its longer-than-usual trip north. It will return to Palmer Sept. 21.

Photo by Chris Kenry / Special to The Antarctic Sun

The 250-ton drill for Shaldril is installed on the Nathaniel B. Palmer in Punta Arenas, Chile. The test voyage proved the drill and ship were up to the task of collecting sediment samples in otherwise difficult to reach areas off-shore from Antarctica.

NBP headed for MaudNESS

Compiled by Sun staff

The crew of the *Nathaniel B. Palmer* is about to find out what it's like to spend months stuck in the Antarctic sea ice.

They won't actually be stuck, but for two months this winter the U.S. research vessel will stay in the eastern Weddell Sea as it freezes around the ship so researchers can study an unusual ice phenomenon.

"It's an area where there's a lot of sort of strange activity, I guess you might say," said polar oceanographer Miles McPhee, the lead scientist for the cruise, dubbed MaudNESS for the Maud Nonlinear Equation of State Study.

The strange activities involve polynyas – large openings in the sea ice – which sometimes develop in the middle of the winter in the Weddell Sea over a submerged mountain called Maud Rise. Maud Rise is centered at about 65S 2E. A large polynya was first noticed there in satellite images in the late 1970s.

Later named the Weddell Polynya, it persisted through several austral winters, slowly drifting westward and covering about 10 percent of the area normally frozen. McPhee calculated that in the region where the Weddell Polynya was active, it vented enough heat from the deep ocean to melt roughly 17m of sea ice. According to estimates by physical oceanographer Arnold Gordon at Columbia University, during its active years, the Weddell Polynya produced as much Antarctic Bottom Water as the continental shelf of Antarctica, where the cold, dense water is usually created.

In 1994 McPhee cruised to the Maud Rise area aboard the *NBP* but missed the formation of a sizable polynya just northeast of the rise by a couple of weeks. He did get to experience typical winter weather for the area, cruising through 7.5m seas to reach the edge of the sea ice. Once the ship was in the ice it was protected from waves but not wind, which reached 120kph at times.

"We made mixed layer measurements in a hurricane," McPhee said. "There was no vertical ship motion at all, but, boy, you could barely stand up on deck, the wind was blowing so hard."

On this cruise he and the 17 other scientists on the research team plan to spend longer in the area where they expect the circumstances for a polynya could develop. They'll camp on the sea ice at times.

It's worth braving the winter winds because the Weddell polynya may represent on a small scale a process that could someday affect a larger portion of the Southern Ocean. McPhee said a polynya likely occurs when the upper layer of water becomes slightly denser as the surface freezes in the winter. The increased density is enough to make the upper layer of water heavier than the water below, so the heavy top water starts to sink and relatively warm bottom water begins to rise. Once the sea ice is gone, the cycle continues with water cooling at the surface, becoming denser and dropping again. As it circulates the water releases large amounts of heat, and possibly carbon dioxide, into the atmosphere.

"It's one of the few places where the deep ocean can communicate directly with the atmosphere," McPhee said.

"Formation of a large polynya is kind of a wild card in the whole system," McPhee said. "If widespread deep convection becomes established again it can really change the rate at which deep water is produced. We don't really know what conditions would then shut it off."

McPhee's science group will be taking precise measurements of temperature, salinity, currents and turbulence; trying to spot the threshold point when the conditions prompt the polynya to form. The instruments usually used to measure currents, temperature and depth take measurements at scales of a meter or longer, but the ones McPhee's team uses will record changes on centimeter scales.

Crossing the Pacific

The MaudNESS cruise will be the finale of a busy winter season for the *NBP*. After two weeks in Lyttleton, New Zealand, for maintenance, the *NBP* headed east toward Chile on March 3. Calm seas and fair skies allowed the crew to begin preparing the ship for its next cruise. Along the way the instruments collected data on gravity, magnetics and the shape of the seafloor for Joann Stock of the California Institute of Technology. Stock uses the data to improve the understanding of the Antarctic continental plate. This cruise focused on several fracture zones and magnetic anomalies caused by the movement of the Australia plate away from west Antarctica.

The crew also released buoys designed to drift with the currents and send back satellite signals reporting their position, ocean temperature and other data.

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On St. Patrick's Day the science crew decorated the galley and put out candy. The luck held and, despite choppy seas and a moderate wind, the *NBP* arrived in Punta Arenas, Chile, a day ahead of schedule on March 23.

When the crew pulled the magnetometer back on board, they discovered it had been damaged during the crossing, possibly in a collision with a shark.

Drill test

In Punta Arenas, 250 tons of drilling equipment was loaded onto the *NBP*, raising the ship's center of gravity. The ship had been prepared for the load with some adjustments in Lyttleton. The purpose of the cruise was to test the drilling system to see if it could sample sediment along the continental margin of Antarctica in areas difficult for conventional drill ships to reach. (See story on page 1). The ship headed south, crossing the Drake Passage in rough weather.

"It was a challenge to keep some of the equipment tied down last night on a ship full of drilling equipment," wrote marine projects coordinator Ashley Lowe in an April 2 report.

The ship and equipment made it across safely and took shelter in Maxwell Bay in the South Shetland Islands to drill the first sample of sediment.

In three days they drilled 108.5 meters, recovering most of the core. The *NBP* then crossed Bransfield Strait to attempt drilling near Seymour Island in the Weddell Sea. High winds in the area prevented them from drilling, so the scientists collected seismic data to help identify alternate drilling sites. The ice, waves and winds increasing to 130kph battered the seismic instruments, putting holes in its outer cover and tearing wires inside.

"After retrieving the seismic gear, we decided to run and hide," Lowe wrote on April 9.

As the winds continued to howl, the scientists retreated to a more sheltered drill site in Herbert Sound, which would test different drilling and sampling techniques. They retrieved a 10.512m core before hitting something harder. Changing tools to drill through the harder material would take some time and by then the weather had calmed and the skies had cleared, so they returned to the Seymour Island drill site. Conditions remained good there long enough to hit a boulder at 20m, but by the time the drill was pulled back on board, ice was closing in on the ship.

Several more drilling attempts were thwarted by bad weather before the Seacore drilling team managed to cut a final 22m core in the more protected Lapeyrere Bay on the north side of Anvers Island. As they were drilling, the winds picked up and a 75kph gust knocked the ship 140m from the drill hole. The equipment wasn't damaged, but it marked an exciting end for the first Shaldril cruise, which arrived back in Punta Arenas on April 24.

Glacial comparison

After several weeks in port, the *NBP* sets out June 23 with a new team of scientists to measure erosion from the glacial tips of the third largest icefield in the world. It's the beginning of a three-year study spanning six tidewater glaciers from Patagonia to the Antarctic Peninsula, which the researchers expect will lead to an empirical law of glacier erosion. The findings could aid scientists using glacial sediment layers to interpret climate patterns.

Only the Antarctic and Greenland icesheets outsize the 13,000-square-kilometer Patagonian Ice Field. The long, narrow icefield stretches through 360 kilometers of the Andes Mountains. About 50 glacial fingers push through the valleys and touch the sea. Most of these tidewater glaciers have been receding, probably related to a general warming of the area by 0.4°C to 1.4°C in the last 100 years and a decrease of precipitation on the Pacific Ocean side of the icefield. The researchers will look at two of the glaciers, the Penguin and San Rafael glaciers, along with the Marinelli glacier in Tierra del Fuego. It's a stormy area difficult to approach because of the climate and rugged terrain.

In March a research team led by glaciologist Bernard Hallet from the University of Washington flew in by helicopter with stakes, GPS, and radar to determine the thickness and speed of the tidewater glaciers.

From June 23 to July 15 another team of researchers led by marine geologist John Anderson will approach the glaciers aboard the *NBP* to measure the seafloor where sediment eroded by the glacier spills down. They'll take core samples of the sediment layers, study the marine geology and take seismic data.

The same thing will be done next year at glaciers in Maxwell Bay in the South Shetlands, in Lapeyrere Bay on the North side of Anvers Island and in Flanders Bay along the Antarctic Peninsula. By comparing the movement of the glaciers with the sediment layers, Hallet and Anderson expect to determine how glacial erosion varied during climate changes in the last 2 million years.

Photo courtesy of Emma Reid / Special to The Antarctic Sun

Bold and cold, competitors in the first "Undie 500" race 'round the Scott Base sign. With windchill, the temperature was -21C with a light snow falling during the 500m to raise money for Child Cancer.

NEIGHBORS

Busy winter at Scott Base

By Kevin Rigarlsford

Scott Base winter manager

This year's crew of 19 is the largest group to winter at Scott Base since 1957. The high number of personnel is due to the construction work being completed on the new heated storage facility, the Hillary Field Centre. The Hillary Field Centre will replace the "Hangar" and several smaller storage areas currently in use. The new building will increase the heated space at Scott base by a third. The entire base staff have taken on the work with enthusiasm and morale has remained high through the season.

The winter started at Scott Base with a live concert with the Christchurch Symphony Orchestra playing Ralph Vaughan William's "Sinfonia Antarctica." For the concert the bar area was set up as a theatre, complete with tiered seating. Video from Scott Base was broadcast directly to Christchurch town hall, where an audience of over 2,000 people, including New Zealand's Prime Minister, Helen Clark, enjoyed our company for the evening. In true Scott Base tradition, the concert-goers attended in a variety of "formal attire," including the Gorilla and Vinyl Vera.

New Zealand pianist Michael Houston was fortunate enough to be accompanied by our very own Jeff Reid (piano) and Conrad Pearce (percussion) during his rendition of Psathas, View from Olympus. Jeff and Conrad will no doubt be approached by the New Zealand Symphony Orchestra upon their return to New Zealand.

On the more active side of social recreation, people have competed in various tournaments including dodgeball,

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volleyball, 10-pin bowling, trivia nights and Friday night darts, with the South Pole Station playing via the radio.

April started with "April Fools" day, this year celebrated by the replacement of the U.S. flag at the Long Distance Balloon Project site with a New Zealand one, only to find our flag at Scott Base had been replaced with an Australian flag.

ANZAC day, remembering those who fought in WWI and WWII, was commemorated with due ceremony on a snow-swept flag station. Traditionally a dawn ceremony, we opted for a respectable 0800 "dawn," as sunrise was still four months away.

The first polar plunge was a huge success with plenty of swimmers braving the –30C temperatures. The mid-winter plunge will take place June 25 with another open invite to McMurdo residents to swim, enjoy a meal and spend the evening with us.

Concordia's first winter

By Guillaume Dargaud

Concordia correspondent

South Pole shares the High Antarctic Plateau with a new neighbor this winter. The Franco-Italian station of Concordia has opened for year-round operation, after five years of challenging construction.

Hardly on any map yet, Dome C, 75°S 123°E, is not too far south (and indeed the sun disappeared only on May 4) but its high altitude (3,260m) make for a pretty cold and unforgiving place. By April we had already reached a temperature of -76°C, still far from the -84°C expected later in the season. The site of Dome C is interesting for various reasons: high altitude, very low snow accumulation, absence of auroras (good for astronomers but not so much for the larger public), very flat terrain, low winds and turbulence, absence of ice motion and finally easy communication with geostationary satellites.

Last year, as the personnel was selected for the first winter, there was still a lot of uncertainties about whether the construction would be finished in time. And indeed it wasn't. Summer construction workers were still working on the buildings on the morning the last plane was to leave.

The start of the winter was pretty hectic as the new station building wasn't yet operational. The generator wasn't running, there was no water, the kitchen was bare and there was no hospital. We lived in an increasingly colder summer camp for three weeks before moving to our new, shiny building, where work was pretty intense in the first months to get everything up and running. The buildings were still filled with construction equipment, so we spent weeks moving it out and moving the supplies in from outside .

Photo by Guillaume Dargaud / Special to The Antarctic Sun

The French, European Union and Italian flags are carried to Concordia Station, which is occupied for the first time this winter.

For this first "evaluation" winter 13 people are on station. Eight are part of the technical team, five have scientific activities, six are newcomers to this cold land, two are bachelors and only one is female. Eleven are French, but three are counted as Italian. Go figure.

We hit the news last December when, after eight years of work, the Epica drilling project stopped a few meters from the bedrock having extracted the oldest ice in the world, a core spanning 3,270.20 meters and 900,000 years. It covered a full eight glacial cycles, putting global warming in perspective.

Old timers may remember Dome Charlie, as it was called, where two C-130 crashed in 1974 and were later fixed and flown out by the VXE-6 team. Few visitors came to Dome Charlie in the 1980s, but in 1993 the French started traversing from the coastal station of Dumont d'Urville. In 1996 a summer camp opened as a joint project between the Italian and French polar institutes (PNRA & IPEV). Scientific research started in earnest that year and it was decided to build a permanent station.

Construction started in 1999 and proceeded quickly during the three months summers. The two main buildings are raised on hydraulic feet to avoid having the station disappear under snow over the years.

One is a quiet building with the bedrooms, laboratories and a hospital. The other building is 'noisy' with workshops, a gym, a TV room and a 3-stars panoramic restaurant.The power generators and water recycler are in a large container next to the building. Also outside are the many fuel tanks, water tanks and the garage also acting as a balloon inflation shed. We now go to the the closed summer camp, half a mile away, only to grab missing equipment.

Rothera

Compiled by Sun staff from reports by Jo Coldron, Simon Herniman, Rob Smith

When the British supply ship *RRS Ernest Shackleton* left Rothera Station in March, a happy band of twenty-one souls on shore "waved until our arms hurt and our colorful fusillade of flares died out."

Four of them had already been at the station for a more than a year, since the British Antarctic Program tour of duty is generally 30 months. Three were back for a repeat winter after some time away.

"But for the bulk of us, this is our first encounter with the bewildering ritual which is the transformation of austral summer to austral winter," wrote Simon Herniman. "At these latitudes the rate at which night steals minutes from the day is accelerated. It seems as if you can tell that each successive evening is darker and each morning later."

They also faced the mementos left by the summer crew, who according to tradition leave booby traps for those staying behind. This winter's gifts included hidden alarm clocks timed to go off every 30 minutes, beds filled with ping-pong balls, powder and scientific apparatus; doors hinged at the top rather than the side; and a fully packed skidoo and sledge parked in the loft.

The winter period is much more communal than the hectic summer season and Rothera life now resembles a combination of the 'Waltons' and the 'Discovery Channel'. Meanwhile the winter science program continues undaunted by lower temperatures and increased darkness and continues to deliver world class research. Meteorology, upper atmospheric studies, terrestrial biology, marine biology and the dive program all continue over the winter period along with essential base duties.

Due to the low levels of light from the station and clear air, they have a good view of meteor storms,

"In fact I thought I saw two shooting stars and wished upon them," wrote Rob Smith, "but they were only satellites. It's wrong to wish on space hardware."

Building **BIG** for **BIG** balloons

Story and photos by Eli Shorey
Special to The Antarctic Sun

Tucked in a cove on the McMurdo Ice Shelf, the long-duration balloon facility is creating its own weather.

The only fog in the area is in the little cove, where the tops of the 12m buildings rise above the haze. Water vapor, a product of combustion, freezes and falls softly. In the frozen mist, 17 workers waddle around the site encumbered by layers of clothing.

Construction started in mid-February on the $4 million project. The six buildings are being built for NASA to house Long Distance Balloons (LDB) launched each summer from Williams Field. The balloons rise and ride Antarctic winds circling over the continent at 40,000m, carrying experiments that would otherwise need to be launched in a space shuttle.

The construction site near the Scott Base transition is scenic, sitting between a cliff and a group of pressure ridges that appear as waves, frozen on their way to shore. Mt. Erebus smokes in the background.

The six buildings won't stay there. They are built on heated skis so they can be moved to the balloon launch site each summer. Come mid-October, several D-8 Caterpillars will tow the buildings 8km to Williams Field where they will be arranged in a row connected by trusses. At the end of summer the buildings will be moved again and stored on snow berms.

Above, the framework for the two payload buildings rises in the night. The buildings will provide facilities for the annual long-duration balloon projects launched from the ice near Williams Field.

Each building has its own identifying color at the base. The largest are the two payload buildings, one painted forest green and the other weathered copper. They are 12m high and 18m long to accommodate the large instruments carried by the balloons. Their 9m doors fold and swing inward. When completed, the payload buildings will weigh between 54,400kg and 59,000kg.

Smaller buildings hold the rigging (blue), telemetry (redwood), generator, water and restroom. Radar domes will be installed on the roof of the telemetry building to track the balloons. Also 80 percent of the computers will be in the building. The smaller buildings will weigh about 34,000kg each.

Building on an ice shelf has its own difficulties. Small cracks open and close in the ice around the job site throughout the day. This makes leveling the building a constant chore. The frequent wind piles snow into drifts, often burying the supplies.

Since the buildings are constructed on skis, no part of the building is below ground. This creates a problem of stability when high winds blow across the ice shelf. A 55sqm door on an unskinned building can act as a sail. To keep the buildings from sailing away, eight anchors were attached to each, sunk two feet into the ice. Permanent anchorages will be installed at Williams Field, with links of chain added as the snow piles up.

Powering up: New generation to make McMurdo more current

As McMurdo Station glows in winter darkness, workers prepare room for new generators to keep the lights on.

The six existing generators are all about 35,000 hours beyond their expected 65,000 hour lifespan.

In December construction workers began adding a room to the water plant at McMurdo Station. The expansion will house two new 1640 kW diesel generators, which should be churning out the watts by Jan. 2006.

"The new gens in the water plant (along with a rental unit we call a cat-in-a-box) will power McMurdo until phase two is complete" said Mike Papula, RPSC Project Manager, who has been working on the project since early in 2003. He joined the project midway, since design work on the new power plant began in 2001.

With the new generators, plus the cat-in-a-box, temporarily powering the station, the existing 850kW generators can be removed while the power plant building is renovated. The power plant was built by 1982, when

Photo by Skip Mackison / Special to The Antarctic Sun

A worker walks through the steel frame for new rooms on the McMurdo water plant, which will house backup generators.

the generators began producing electricity for the station. Since then, three to four of the generators have run at a time, depending on the time of year.

The old generators will be replaced with two 1640kW and two 1130kW diesel generators. Papula grinned as he described the new generators, twice as powerful as the old. Under normal operations, two of the four new generators will be able to supply all McMurdo's power needs. During the winter, when many buildings are shut down and the power needs are less, McMurdo could at times operate with only one of the 1640kW generators.

After the powerful new generators are running in Oct. 2006, the 1130kW generators will be used as peaking units to pick up any excess requirements. The Water Plant's generators will operate in rotation with the Power Plant generators to provide for the station's power needs. They will also provide emergency backup, with the ability to power the entire station if needed.

A reverse osmosis unit from the water plant will be moved to the power plant building, providing backup water generation. The swap will provide emergency backup, so if either the water or power plant building was unavailable either building could produce both water and power.

Both buildings will also get paint jobs, covering the current hodge-podge of weather-worn finishes with a fresh coat.

The IceCube drill, deployment tower and hose assembly ready to be put to use at the South Pole.

Photo courtesy of IceCube / Special to The Antarctic Sun

IceCube - One hole done, 79 more to go

By Kristan Hutchison
Sun staff

With hot water and a hose fit for a giant, drillers melted the first hole for the world's largest neutrino detector.

They sprayed 85C water straight down into the ice for 58 hours in January, melting a hole 2.5km deep before lowering in a string of volleyball-sized detectors.

"It was our first year and I think it was great to get a hole," said system engineer Jeff Cherwinka. "The difference between one hole and four holes is substantial, but the difference between one hole and no holes is infinite."

The hole is the first of 80 that will eventually perforate a cubic kilometer of Antarctic ice. When it's done, IceCube will be nearly invisible from above – just a field of flat ice blending seamlessly into the Antarctic plateau. But 4,800 glass eyes will be frozen into the ice below, each watching for a spark of blue light indicating one of the universe's smallest and most elusive particles had a fatal collision.

Phantom particles

Usually neutrinos whiz around the universe undetected. Though the subatomic particles are common, they have no charge; barely any mass and rarely react with anything. About 10 million neutrinos will zip through your body as you read this sentence, but only one in a lifetime will stop there, according to Francis Halzen, a University of Wisconsin-Madison professor of physics and principal investigator for the IceCube project.

This lack of interaction is both a blessing and a curse for astrophysicists. Neutrinos arrive at the Earth unchanged, like messages sent from the outer reaches of the universe. But the messages are in an invisible ink. They show up only when a neutrino crashes into a proton, creating another kind of particle called a muon. An existing experiment at the South Pole proved these blue flashes could be detected by light-sensitive optical modules frozen deep in the ice. IceCube is the next generation of that earlier experiment, the Antarctic Muon and Neutrino Detector Array (AMANDA).

With 750 optical modules in 19 holes, Amanda catches one blue flash every seven hours, Halzen said. That's thousands of neutrinos since 1997, but in order to map the origins of neutrinos in the sky, scientists need to detect millions.

"Neutrinos travel like bullets through a rainstorm," Halzen said. "Immense instruments are required to find neutrinos in sufficient numbers to trace their origin."

IceCube will expand AMANDA more than tenfold and detect 300,000 neutrinos a year when it is finished in 2010.

"As the detector grows you get more and more information and the picture gets more clear," Halzen said.

The picture he and other researchers expect to see will include gamma ray bursts, active galaxies, black holes and the dark matter researchers now say makes up 90 percent of the universe.

"One of the most exciting things about IceCube is that we just don't know what we will find," said astrophysicist Spencer Klein, who heads the IceCube physics analysis team for U.S. Department of Energy's Lawrence Berkeley National Laboratory. "When you open up a new window into the universe, you open up the possibility of entirely new discoveries."

See IceCube on page 14

Photo by Kurt Woschnagg / Special to The Antarctic Sun

Ryan Bay, left, holds the Dust Logger as he and IceCube scientist Albrecht Karle prepare to deploy it.

Looking down in the dust for clues to the past

By Kristan Hutchison
Sun staff

Even before the first IceCube hole was done, researchers were pulling useful data from it.

As the researchers lowered a string of neutrino detectors into the hole, a separate instrument at the bottom of the string shone a focused laser beam sideways, measuring layers of dust in the ice. Scientists at the surface watched the ashes from volcanic eruptions and dust signifying changes in world temperatures flash by on their computer screens as the Dust Logger dropped deeper into the ice and further back in time. It finally bottomed out at 80,000 years ago.

"By correcting for the dust that would otherwise blur their trajectories, IceCube can map the directions of sources of high-energy neutrinos to better than one degree and thus locate some of the most explosive objects in the universe," said Buford Price, a physics professor from the University of California Berkeley who is part of the IceCube collaboration. "Just as interesting to climatologists, however, is the extremely high quality of the dust data, which serves as a proxy for changes in the ancient Earth's climate."

For the Dust Logger it was something of a homecoming. The idea to build the Dust Logger came out of an ice hole at the South Pole in the late 1980s. At the time, Price and other astrophysicists were working on the Antarctic Muon and Neutrino Detector Array, IceCube's predecessor. In order to establish the clarity of the ice their instruments would be looking through, they embedded a series of lights and sensors into it. Some of the astrophysicists, particularly Price, took an interest in how the dust layers they found correlate to the climate history. Price decided to shrink the instruments they'd developed to test the ice for AMANDA into a probe that would fit into holes left by ice cores and other drilling operations. Post-doctorate fellow Ryan Bay and graduate student Nathan Bramall

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Drilling fast and deep

First the 80 holes must be drilled. In concept, drilling ice is simple – hot water melts a hole in the ice. Making it work on the large scale needed is difficult. Even the drill used for AMANDA was too small. Four years ago the Ice Core Drilling Service in Madison, Wis., began designing and building a new enhanced hot water drill, funded by the National Science Foundation. The drill has been turned over to IceCube and this season was the first chance to test it.

The goal is to penetrate 2.4 km into the ice in 30 hours, compared to the 100 hours it took to drill each hole for AMANDA. To do that the enhanced hot water drill has a longer hose and a higher flow rate. Hot water flows through the new drill at 760 liters a minute, compared to Amanda's 380 liters, basically doubling the drilling speed. The hose is more than 2.5km long, allowing them to drill from the top to the bottom without stopping to add sections.

The hose also had to be strong enough not to burst from the pressure required to pump water for kilometers. Made out of a heavy-duty rubber, reinforced with Aramid, the hose had to be special ordered from Italy. At 11,340kg, the hose still requires an auxiliary cable for support, even though the load is reduced to 6,000lb due to the buoyancy of the water in the hole.

"It's a pretty high-tech tool," Cherwinka said. "It's one of the most critical parts of the system and we've only been able to find one vendor who can make it."

Most components of the drill had been checked to see that they worked, but there was nowhere convenient with ice deep enough to actually test the drill before bringing it to the South Pole. Though they'd hoped to drill several holes the first year, just getting one done and proving the drill would work was a success, said Jim Yeck, the IceCube project director.

"We met all of the high-level milestones, including the most significant one, the installation of a string," Yeck said.

It wasn't easy. Almost 1 million pounds of cargo had to be shipped to the South Pole in LC-130s for the drilling to start. The drill alone took 30 flights. With only a three-month window of weather good enough to work at the South Pole, 24 cargo handlers, electricians, engineers and drillers worked in shifts. By the time the drill was assembled, the drill team had only two weeks to melt a hole and lower the first IceCube string.

Deep drilling of the first hole was not going very fast and the drill was veering off course. A thousand meters into the hole a decision was made to pull up the drill to investigate the problem. As the drill sat idle on Jan. 17, water began to freeze in the return line. While the drill crew was trying to solve this problem an experienced driller was hit by a cable and injured.

The driller was evacuated from the South Pole and in a hospital within 22 hours. Meanwhile, drilling was halted for several days to reassess its safety.

"It was a really bad day," Cherwinka said.

The safety assessments found the problem was a cable that had been on the ground and fell into the hole. A new procedure for handling the cable was developed and practiced and then drilling operations resumed at a new location 8 meters away.

"It wasn't a matter of ignoring something or taking a shortcut or misbehaving," Cherwinka said. "We just didn't recognize this particular cable on the ground as a hazard and now we do, so it's an easily remedied problem."

When they started drilling again there were only a few

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Photo by Kurt Woschnagg / Special to The Antarctic Sun

The Dust Logger descends into the IceCube hole on Jan. 28.

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designed the instrument, which records the amount of light that reenters the hole after bouncing around in the ice and catalogues it centimeter-by-centimeter as a function of depth.

"It worked way better than we thought it would," Bay said. "Sometimes you just don't know until you look what you can get. It's taken on a life of its own now."

Bay and Price have used the Dust Logger in mechanically drilled holes in Greenland and in Antarctica at Siple Dome. Several times they've deployed it into holes where ice cores had been removed. The Dust Logger has the advantage of looking over an area of several square meters around the hole, so it can reveal if a particularly thick or thin ice layer in the 4-inch-diameter core is caused by sastrugi. The Dust Logger is also immediate, profiling an entire hole in eight hours. It takes two years to transport an ice core back to the lab and process it.

"If you can do a Dustlog of a hole you have an ice core in, they complement each other very nicely," Bay said.

Though the Dust Logger was conceived at the South Pole, this was the first time it was used there. As it descended, Bay was able to compare the layers of dust to those found when AMANDA was drilled. The dust concentration at each depth tells the temperature at the corresponding epoch in the past. The astrophysicists-turned-climatologists were pleased with the fine detail the Dust Logger showed and even more pleased by clear signs of at least three significant volcanic ash layers, some a centimeter thick.

"We were looking for something totally different and it just kind of hit us between the eyes," Bay said. "Those are the discoveries you like, the unexpected ones. Those are often the best."

The ash may be from Antarctic eruptions, which show up as "dark, gunky layers that you can see with your eyes," Bay said.

In West Antarctica the Dust Logger found about 50 layers of volcanic ash, of which 23 matched sulfates found in East Antarctica. The Dust Logger also registers faint ash layers that might be missed by researchers looking at an ice core. The faintest volcanic traces at Siple Dome may have been from eruptions nearer the equator that were large enough to send ash around the world. Bay said there is a strong correlation between volcanic ash deposits and records of abrupt climate change over the past 100,000 years seen in Greenland ice.

This may indicate the volcanos trigger climate instability, or that climate change causes volcano activity. It's a debate going back at least 30 years and the detailed data from the Dust Logger may help resolve it.

"We may be in a position to do some neat stuff because we have such a highly resolved record now," Bay said.

Price and Bay are using data from the first IceCube hole in two papers they're currently writing. They've already published papers based on Dust Logger data in the Proceedings National Academy of Sciences in 2004 and Geophysical Research Letters in 2001.

Bay is building two more Dust Loggers to send into IceCube holes in the coming season. Eventually, he and Price hope to map the dust layers in 10 holes spread across IceCube so they can tell whether the layers vary from one side to the other.

"The ability of the Dust Logger to study climate and volcanism as well as to sharpen the images of neutrino sources exemplifies the unexpected spin-offs of basic research," Price noted.

Eyes to the skies

Antarctic workers watch solar displays while the sun's down

Photo by Anthony Powell / Special to The Antarctic Sun

Green light streaks the sky above Scott Base during an auroral display this winter.

By Karl Horeis
Special to The Antarctic Sun

A few years ago at McMurdo Station Deborah Morris saw the most exciting Southern Lights she's ever seen. Friends spotted them through a window from inside, but they had to go see them in person.

"It was as if I was lying under a glass table and God was pouring green sand on the top," she said. "It was swirling and cascading down in streaks and changing at this unbelievable pace. It was beautiful."

Now Morris, along with fellow McMurdo resident Mike Poole, leads regular aurora-watching trips out of town. The two, both currently living at McMurdo, have organized three trips so far this season.

They usually take about 12 people in two Pisten Bully tracked vehicles, leaving after dinner and heading up toward Castle Rock, away from the light of town.

"It's incredibly easy - working and living in a community full of street lights - to forget that we have a beautiful night sky above us," Morris said.

Many U.S. Antarctic Program employees feel that, along with the hot tub, auroras are the best part about the winters.

"It's a unique thing about being in Antarctica," said Amber Burton, who is running MacOps at McMurdo this winter. "You get to see them all day, everyday sometimes so it's pretty special."

Burton sends out regular aurora updates via e-mail to interested residents. She informs them about windows of high geomagnetic activity and the positions of coronal holes — letting them know when to look for impressive aurora.

"(I send the e-mail notices) just because I like to know when auroras are," she said. Auroras are caused when electrically charged particles (mostly electrons) accelerate along magnetic field lines in Earth's upper atmosphere, where they collide with gas atoms, causing the atoms to give off light. This happens mostly near the poles, where the magnetic field is strongest.

From the ground, this looks like sheets of light waving or even shafts coming down. Some describe it as like a swimming snake of light, half-submerged and wriggling.

Burton's e-mail updates often include history and scientific background on the mysterious lights. She wrote that Norse mythology makes reference to the bridge Bifrost, a burning, trembling arch across the sky, over which the gods could travel from heaven to Earth. It is likely that the inspiration for the bridge was the aurora, she said.

Chinese and European dragon legends, too, may have their origin in aurora activity. The wonders of the long Antarctic night are not limited to Southern Lights, however. Morris and Poole also encourage their 240 neighbors to watch for "Iridium Flares." These are bright flashes of light from sunlight reflecting off of the mirror-like antennae of orbiting Iridium satellites. No one living in Antarctica now should see the sun until August - but they can see sunlight reflected to them in Iridium flares.

"In the middle of winter that's the only way to see the sun — that's the way I think of it," said Morris. The McMurdo Station intranet page provides informative links about when the flares are visible locally.

With the four-month-long night of winter, Antarcticans have special opportunity to look for meteorites, satellites, star constellations and planets.

"Oh and not everyone knows it, but there are 'Moon Dogs' just like there are Sun Dogs," Morris said. Sundogs, also known as parhelions, are bright spots of light seen around the sun. The term is also used to describe solar halos, which are light reflected off ice crystals. They are only produced in clouds cold enough to be frozen — meaning they happen in Antarctic and artic regions more than other places.

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days left before the drill team was scheduled to leave the South Pole. They worked 12-hour shifts until the hole was complete Jan. 27 and began packing away the equipment.

"The drillers in particular, those guys were working really, really hard and they were up against quite a few hurdles," said Ryan Bay, a post-doctoral fellow from University of California Berkeley who was at the South Pole working on the IceCube project. "It was a tough season, but there was a payoff in the end."

Most of the drill crew will return for the next summer season, when the goal is to finish 10 more holes. The successful hole took 58 hours, making it twice as fast as the AMANDA holes. But with 79 holes to go the drill team needs more speed.

"We're looking at ways to improve the speed and I definitely think it's doable," Cherwinka said.

Though IceCube will take at least five years more to complete, the first string of optical detectors is already working alongside AMANDA's 19 holes. If IceCube drilling stays on schedule it will take over as the world's largest neutrino telescope next season. It was already dubbed the world's weirdest telescope.

"Nobody who built a new instrument like this could predict what they will actually do with it," Halzen said. "And what they do with it later is always much more interesting than what they promised."

~ Winter quilters aren't quitters ~

By Kristan Hutchison
Sun staff

For some, the best way to get through an Antarctic winter is a stitch at a time.

During the past five winters, a few people at McMurdo Station have spent their afterwork hours sewing a quilt together and then auctioning it for charity. They gather with needles and thread, in a modern version of the traditional quilting bees.

The idea began the winter of 2001 when Paula Holmes, an experienced quilter, began teaching Caprice Teske the basics. Other women became interested and soon there were a total of eight women working on the first charity quilt.

"The original idea was to get together and learn to quilt, something like the other craft gatherings on station," said Lorie Poole, who has worked on four of the five quilt projects. When the question of what to do with the finished quilt came up, they decided to raffle it for a charity.

"Each quilt since has been so beautiful that the quilt group has gained notoriety and has become a tradition," Poole said. The quilters now have a donated Husqvarna-Viking sewing machine, which is set up in an empty dorm room along with an ironing board.

This year Poole and Christine Gamble-Powell organized the quilting project, first teaching people who were new to quilting.

"It's very gratifying to teach the quilting techniques, then see what everyone creates," Gamble-Powell said. "I think this is one of the best parts of the project – seeing how people interpret the theme and how they catch on to the techniques."

This year the theme is "winter snowflakes." Each quilter chose fabrics for their square from a collection people have brought down over the years and used it to appliqué a unique snowflake on a darker background. In past years the quilts have had familiar images from around McMurdo, including penguins, the Chapel of the Snows and Observation Hill.

"Anything can be duplicated in fabric – it's like an artist using paint to paint a picture," said Gamble-Powell.

"This year we encouraged the use of bright colors, a departure from the traditional 'white' snowflake idea."

Renee Magyar created her square from a photograph of an actual snowflake, recreating the image in pastel fabrics.

Photo courtesy of Christine Gamble-Powell / Special to The Antarctic Sun

Scott Fowler works on his quilt patch.

"I really like seeing the finished product and how the very different designs and styles all end up complementing each other," Magyar said.

Of the 24 who first showed interest this year, 14 people stuck with it, including one man.

"It was fun to get together with everyone," said Scott Fowler, a maintenance specialist in FEMC who learned to sew this winter, starting with threading a needle. "I screamed a few times."

Luckily, he had plenty of more experienced seamstresses to guide him.

"All the women were great, since I was the only guy," Fowler said.

Erika Neal joined because she thought it would be fun to learn to quilt.

"It's been great and I feel confident enough to maybe try and make my own one day," she said.

The completed quilt top is a snowstorm of multi-colored flakes falling across a deep blue background that resembles the starry winter skies.

"The squares look great together on the quilt, but they still have a lot of individual expression," said Jennifer Kemper.

Now the quilters gather three or four at a time after work, to hand-stitch the top layer to the batting and backing. The quilt will be raffled at the end of winter and the money raised – usually about $2,000 – goes to a charity chosen by the quilters. In the past the money has been given to Cholmondeley Children's Home in Christchurch, Alzheimers, Multiple Sclerosis, and AIDS groups in the U.S., and "Naturaleza," a charity that helps cultures around the world become self-sustaining.

Other people meet to sew, knit or do other handicrafts over the winter, but the quilters are unique because of the time it takes to create a full-sized quilt.

"It's a time commitment of many months," said Gamble-Powell, "but the sense of pride and accomplishment is well worth the effort."

Christine Gamble-Powell assisted with this story.

Jen Kemper and Christine Gamble-Powell pin the finished top to the batting and backing for this winter's quilt. With the theme "winter snowflakes," the quilters created a warm and colorful snowstorm.

Photos by K. Borley / Special to The Antarctic Sun

Left, RPSC Marine Science Technician, Eric Hutt (left) and University of Maine biologist Bruce Sidell (right) prepare to deploy a baited fish trap off the stern of the Laurence M. Gould in Dallmann Bay. Below, Bruce Sidell on the back deck of the Gould.

Photo by Kathleen Gavahan / Special to The Antarctic Sun

Some like it cold

By Kristan Hutchison
Sun staff

Spending 14 million years below freezing does strange things to a creature.

In the case of some Antarctic fish, their blood turned white.

Nineteenth century sealers and whalers called the strange white-blooded fish they caught in Antarctic waters "devil fish" or "icefish." The 16 species of channichthyid icefish are the only adult vertebrates known to lack hemoglobin, the protein that makes blood red and carries oxygen. The lack of hemoglobin reduces the ability of blood to carry oxygen to less than 10 percent of normal, like the difference between having a shopping cart or having to carry all your groceries in your hands.

After 14 years studying how and why the channichthyid icefish evolved as they did, University of Maine biologist Bruce Sidell believes the loss of hemoglobin was less an adaptation than an evolutionary mistake. The icefish appear to have succeeded despite the loss, perhaps because there are so few competitors in the Antarctic. The cold water is also oxygen-rich, making it easier for the icefish to get enough oxygen, even without hemoglobin.

The icefish compensated for their evolutionary handicap in other ways – with larger hearts pumping more blood through more blood vessels than their red-blooded brethren.

Sidell and biologist Joe Eastman used a technique during a research cruise last year to fill a fish's blood vessels with a bright yellow latex, allowing them to see and study the intricate network. In doing so, they discovered dramatic differences between red-blooded fish and those without hemoglobin. Jody Wujcik, a graduate student from the University of Maine, continued the work in Palmer this season.

"That has led to our recognizing this as a really interesting system to examine and identify the factors that control the process of vascular growth and regeneration," Sidell said. "That process is probably fairly similar in all animals."

As a researcher, Sidell is interested in understanding the process, but medical clinicians see potential applications if Sidell's research brings a better understanding of what controls the growth of blood vessels. If doctors could slow or stop the growth of blood vessels to tumors it could be another tool in fighting tumors.

Sidell thinks the critical molecule triggering the growth of blood vessels might be nitric oxide, the same chemical that relaxes the coronary arteries of heart patients when they take nitroglycerine. Most animals produce nitric oxide, but it quickly interacts with oxy-hemoglobin or oxy-myoglobin, giving it a short lifespan in the body.

Since icefish don't have hemoglobin, Sidell hypothesizes the nitric oxide has less to interact with and builds to a higher concentration. Six of the icefish species also don't produce myoglobin, a protein that binds and stores oxygen in heart muscle until it's needed within the cell.

Sidell now hypothesizes the build up of nitric oxide could trigger the dense growth of blood vessels and another adaptation he and his coworkers have found - the increase of mitochondria in the cells.

In Antarctic fish, mitochondria often make up about 35 percent of the volume of a cell, much denser than in other fish. Mitochondria convert nutrients into energy, so having more makes it easier for the icefish to use the little oxygen they get efficiently.

Kimberly Borley, another University of Maine graduate student, has been working on the molecular biology of factors in pathways leading to the increase in blood vessels and mitochondria.

One way to test whether it is the nitric oxide will be to give the fish a medication to repress nitric oxide. The medication would be delivered at a constant level through an osmotic pump in the fish's belly, a technique Sidell tested on several fish this season in Palmer.

"I'm pleased to say that as of right now this animal looks perfectly happy in the tank," Sidell said in May. "He's swimming around with an osmotic pump in his belly."

An Italian researcher, Filippo Garofalo from the University of Calabria, came down with Sidell to test the effects of changing nitric oxide levels on the hearts of white-hearted and red-hearted icefish.

Another modification within the icefish cells appears to be a protein involved in the relaxation of muscles. The protein, called parvalbumin, appears to have been

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Shaldril From page 1

"Shaldril's designed to go into difficult areas, where there are very exciting science problems to be solved," said Anderson, lead scientist for Shaldril. "We could go to every bay and fjord, and just drill away. We've proven that."

The cruise from March 31 to April 24 was the first opportunity to test the drill as it's configured on the National Science Foundation research vessel *Nathaniel B. Palmer*. The *NBP* wasn't originally designed as a drilling platform, but it is ice-strengthened, allowing it to go into areas the drilling ships can't. The *NBP* would need to hold a precise location for several days while carrying a load three times heavier than normal.

Photo by Mike Watson / Special to The Antarctic Sun

Drilling through the night, Shaldril floods the back deck of the Nathaniel B. Palmer with light.

"We had a serious question as to whether or not the ship could maneuver, and especially in the kinds of winds and ice conditions you have in Antarctica," said Anderson. "That was the big question we set out to solve this year."

The question was answered at their first drill site - Maxwell Bay in the South Shetland Islands, where the ship was sheltered from the wind and ice. For four days of drilling the *NBP* held to a single spot, using a new Doppler positioning system to keep from moving more than two meters in any direction. The ship maneuvered better than expected, allowing the drill team to produce a 110-meter hole and recover more than 80 percent of the core from it.

"It was just phenomenal," Anderson said. "So we basically proved in the first few days, that, yeah, we can drill holes; piece of cake."

They still had to contend with the Antarctic winter. After the first hole, the ship went through 20 days of stormy weather, with winds blowing to 120kph and ice forming around them.

"Obviously under those conditions it's virtually impossible to do anything," Anderson said.

But even the bad weather was a useful test of Shaldril's limits. The crew found the ship could hold a position in winds up to 64kph.

"That's pretty darn good. That's about twice what we'd hoped for," Anderson said.

Though the shakedown cruise took place in the Antarctic winter, Shaldril is intended for use in the summer and its first full test will be during a cruise in February 2006 to the James Ross Basin in the northwest Weddell Sea.

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More drills ready

Another drilling project, this one based on the ice shelf, will do final site survey work at the two drilling sites near McMurdo Station in the 2005/2006 season.

Then the multinational Antarctic Drilling program, ANDRILL, can drill through the ice and into the sediment record below in October 2006. A hot water drill will penetrate through about 170 meters of ice in the McMurdo Ice Shelf near Williams Field.

The first site camp, constructed from 13 converted insulated shipping containers, was shipped down in January. A new drill rig, built in Brisbane, Australia, and a drilling platform built in Christchurch, New Zealand, are being integrated before testing and shipping to McMurdo.

"Things are ticking along," said project manager Jim Cowie. "We're on schedule for getting the rest of the gear down on the resupply ship in January 2006 so that drilling can begin in October that year."

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modified to work better at cold temperatures. Sidell has been working with biophysicist Timothy Moerland at Florida State University to figure out exactly what the changes in the parvalbumin's structure are that allow it to function better in the cold.

In 2003 another of Sidell's graduate students, Jamie Hendrickson, was able to collect, clone and sequence the parvalbumin gene. The gene has been inserted into bacterial cultures which are now producing icefish parvalbumin protein in his lab at the University of Maine. By comparing the gene sequences for the icefish parvalbumin with mammal parvalbumin, Sidell will identify which amino acids differ. Then Sidell and Moerland can selectively change just one amino acid in the sequence at a time, testing each one to see how the modified parvalbumin functions. This technique should allow them to pinpoint which amino acids in the gene sequence are responsible for the adaptation.

"Essentially this will give us an idea of what the design rules are for making a protein that will function well at cold temperatures," Sidell said.

Despite any evolutionary handicaps, the icefish is so well-adapted to the cold that it overheats in water warmer than minus 0.5C. For Sidell that means fishing in the Antarctic winter. In the summer the aquarium at Palmer Station gets too warm to keep the icefish alive for very long. Even in the winter, 10 to 15 percent of the fish Sidell catches die in the first few days after they are captured.

"They are fairly delicate animals and you lose some to attrition in the first few days of capture," said Sidell.

This year Sidell was at Palmer Station from late April to early June, taking several short fishing trips on the *Laurence M. Gould* to catch the fish with 18-foot nets and traps. Some fish can be caught in traps near Palmer Station, but the closest place to catch the icefish is in Dallmann Bay, about nine hours by boat from Palmer. With help from the *Gould* crew and workers from Palmer Station, they fished round the clock, hauling in several hundred specimens.

NSF-funded research in this story:
Bruce Sidell, University of Maine

Photo by K. Mar / Special to The Antarctic Sun

Graduate student Jody Wujcik performs a procedure in which a latex compound is used to replace the blood of an icefish, enabling measurements of blood vessels.

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That core will target rare sediment records in an area thought to be the last refuge for plants and animals as glaciers were covering the rest of the continent 20 million to 30 million years ago. Seymour Island has been a Rosetta stone for paleontologists, who've brought back fragments of marsupials, invertebrates and pollen from the island. The fossil records found on the island only go to the Eocene, 34 million to 55 million years ago, when the continent began to glaciate.

"Just when things are starting to get interesting, and the continent's starting to ice over and the climate's really starting to get severe, the stratigraphic record just dips right out into the ocean," Anderson said.

Shaldril should be able to reach those submerged records, providing a fossil record from the period of the most profound change in Antarctica. The drill cut through about six inches of granite during a drilling test on the winter cruise, proving it could pierce the glacial till to reach older sediment buried below.

The April test-drilling also revealed a couple challenges to be solved before the next cruise. When the drill tried to pierce the glacial sediment, it was repeatedly clogged by fist-sized cobbles. The rocks caught in the bit and blocked the flow of mud and water. The Seacore drillers plan to bring a solid rod next time to clear the blockages. Then the drill should be able to cut through the hard glacial deposits to reach older sediments beneath.

"It's going to open up a lot of potential research for a lot of people who have just been waiting for this type of rig to be available," said Patricia Manley, a geologist from Middlebury College working with Anderson on the project. "Especially those who want to be tying into material that's below this last glacial outwash."

More than a test

The 100-meter core was more than a test of the drill. Another principal investigator on the project, Woody Wise of Florida State University used micropaleontology to approximate the age of the strata, which provides a record of the last 10,000 years from the south Shetland area.

"Personally I think that 100-meter core made the entire cruise worthwhile," Anderson said. "There's some really interesting changes in that core; it's going to really reveal some interesting things."

The most interesting revelations may be about climate change on the Antarctic Peninsula to the south. Gene Domack, Amy Levanter and other scientists have looked at the Holocene record along the Antarctic Peninsula, trying to understand whether a recent warming trend is part of a natural cycle. They've found climate on the Antarctic Peninsula is not nearly as stable as thought 10 years ago, but the evidence is very subtle.

Photo by A. Injac / Special to The Antarctic Sun

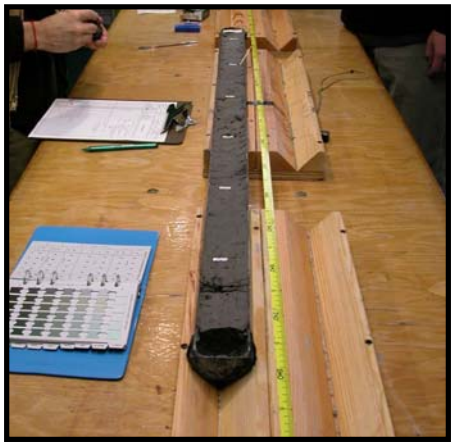

Photo by Ashley Lowe / Special to The Antarctic Sun

Above, Drilling Superintendent Andy Frazer demonstrates how to use the sampling tools. Right, a section of sediment core collected on the Shaldril cruise.

Anderson expects more dramatic evidence from the new Maxwell Bay core, which would support the findings from the peninsula. The South Shetland Islands are like the tropics of Antarctica, with lichens, moss and other vegetation, and may provide a sedimentary record of the most extreme temperature fluctuations in the Antarctic Peninsula region.

The Maxwell Bay sediment core is a grayish-green mix of clay, silt and fossilized sealife. Julia Wellner, a postdoctorate researcher working with Anderson, is radiocarbon dating pieces of shell pulled from the core. Graduate student Steve Bohaty from the University of California Santa Cruz used remnants of a silica-shelled algae, called diatoms, to determine the sediment core is younger than 140,000 years old. Changes in the diatom species and distribution through the sediment core also may indicate long-term variations in sea ice conditions and sea surface temperature.

At the same time, Manley is looking at the grain size, water content and other physical properties of the sediment providing clues to the climate at that time.

"If we're looking at any kind of climate variability in the Holocene, it should be recorded in this core," Manley said.

Shorter cores were also collected in Hubert Sound and Lapeyrere Bay. The three cores run a transect from subpolar to polar, and range from east of the peninsula to west. One of Manley's students will compare the cores looking for climate variations from one location to the next.

"It's really looking at the climate in a geographic sense," Manley said.

Refrigerated in plastic tubes, the 7.5cm diameter cores were shipped to the Antarctic Research Facility in Tallahassee, Fla., where they are made available to other scientists.

All this is just a start. Anderson spent 15 years doing seismic stratigraphic studies to find the best places to drill and has accumulated a list of drill sites that would take five years to accomplish. His target areas include the Ross Sea, Southern Weddell Sea and along the Antarctic Peninsula. Now that Shaldril has opened the door, he expects many more scientists will come forward with their own proposals for other areas to drill, ushering a wave of new discoveries.

"You do need a technological shift sometimes to really foster a new age of discovery," said Anderson. "I'm very optimistic, much more so than I was two months ago. I think Shaldril's going to foster a lot of interest and there's going to be a lot of proposal pressure from people that want to go down and drill some different age strata and test some very important problems."

NSF-funded research in this story:
John Anderson, Rice University,
www.shaldril.rice.edu and
www.arf.fsu.edu/shaldril.cfm

Dome From page 1

fire station, medical, and the greenhouse - have already moved into the new South Pole station, which is scheduled for completion in 2007. The weight room and fresh foods storage were taken out in Jan. 2004.

"The dome looks big and empty now," said Brien Barnett, a winter prep cook at the Pole and former Sun staffer. "There's this gigantic hole to your right."

While the dome no longer has a use at the South Pole, it still has a place in the memories of most people who have been to the Pole, particularly Naval Mobile Construction Battalion 71. This battalion of Seabees was formed in 1966 and assigned to build the dome a few years later. The dome replaced the original South Pole station erected on the snow surface during the austral summer of 1956-57. By 1970 the modular structures were buried under 6m of snow. The weight of snow from above was causing the buildings to crack.

"You knew that it was beginning to creep in on you. In fact, out in the passageway you could see the walls were actually kind of bulging in because of the weight of the snow," said John Perry, the officer in charge of the battalion shoring up the old station as plans were being made to build the dome. He then spent two years overseeing the dome construction from Washington, D.C.

"It was a unique project and a unique structure that we took down there and that was constructed," Perry said. "Those of us that had been involved in the program certainly felt that we just kinda didn't want to see it dissembled and thrown for scrap. We thought it would be nice if we could bring that back and put it on display somewhere where people could see it."

But scrap was the most likely fate of the dome several years ago when Larry Anderson heard a presentation about the new station at an engineering conference in Seattle. Anderson, who had been involved with the Dome construction as a Naval Civil Engineer Corps officer with NMCB71, asked the presenter what was to be done with the dome he'd helped build. The answer was kind of a shrug.

"I said golly, wouldn't it be cool if they were able to get this really important significant part of the history of both the Naval Civil Engineer Corp, the Seabees and the National Science Foundation preserved," Anderson said. "To me it's really kind of an iconic kind of thing. When you opened National Geographic for a long time that was what you'd see about the Antarctic - the dome."

Anderson had known for a couple of years that the Seabees were planning to rebuild their Port Hueneme museum and he suggested they include the dome. Hilderbrand and the other Seabees liked the idea. After negotiations, the NSF agreed to it in concept.

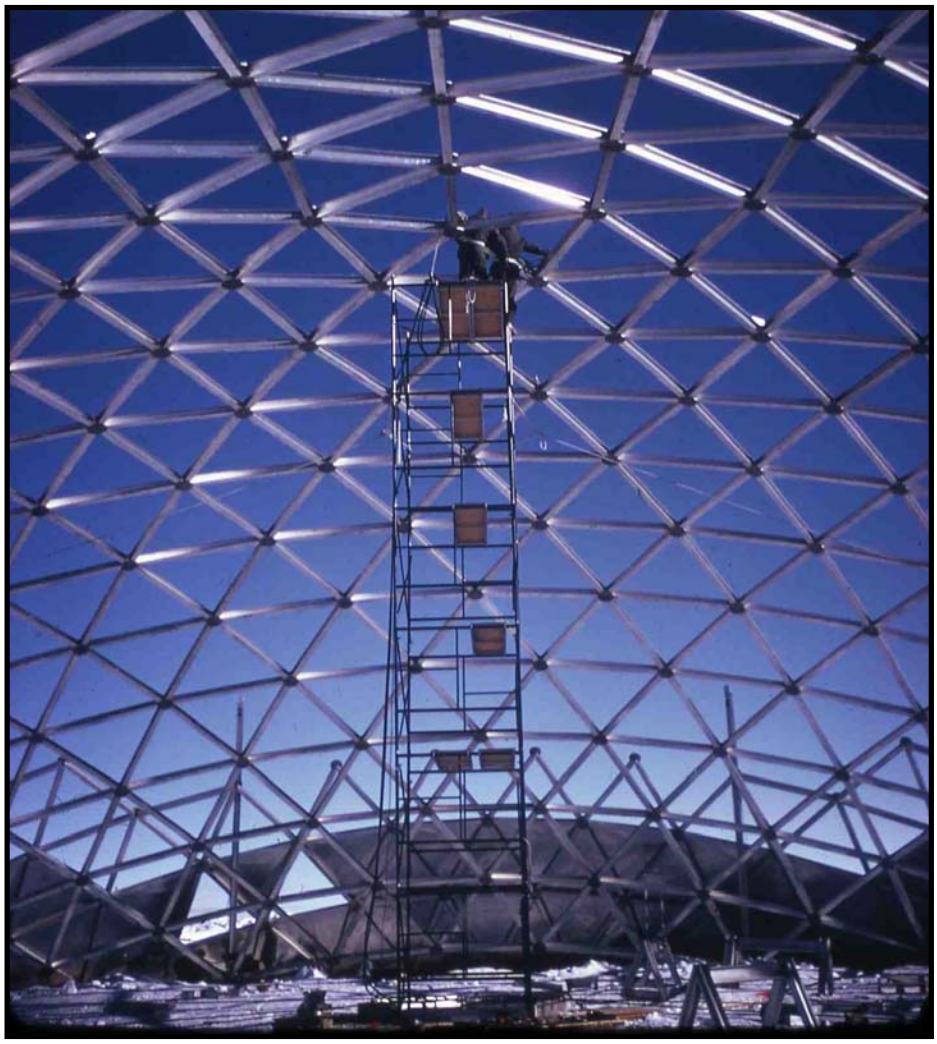

Photo by Lee Mattis / Special to The Antarctic Sun

The Navy Construction Battalion (Seabees) work to erect the South Pole dome during the austral summer 1972-1973.

In February, a representative from the Seabees and an engineer involved in the original construction of the dome visited the South Pole to assess whether the dome could be reassembled in California.

"This was like the ultimate, going back to see a structure that I had worked on over 30 years ago, and it's still functioning, it's still performing," said Lee Mattis, who was last at the South Pole in 1973 as a 28-year old engineer for Temcor. "The dome itself is in pretty good shape."

Two decades later, Mattis still has the original color-coded schematics for putting together the dome. He said the disassembly, shipment and reassembly of the dome should not be a problem.

"It's an erector set," Mattis said. "All the parts, they have color codes on them and they're also metal stamped, so there's really no problem with identifying the parts or having to worry about it."

To take apart the dome, workers will start from the top down, taking off the panels and the structural members. The dome has 1448 I-beam struts with 84 bolts at each of 490 connection points, Mattis said. The triangular openings created by the strut framework are covered by 904 thin panels.

"There's a fair amount of labor involved in doing that" said Mattis, who estimates it will take a month of work depending on the number of people and equipment. There's talk of having a Seabee team help take down the dome, possibly as early as the 2007-2008 season.

Many of the retired Seabees who put up the dome would like to help take it down, or reassemble it in California. The men have strong memories of their months at the South Pole more than 30 years ago.

"When I look back on it, I'm real proud," said Jim Heckman, a Seabee steelworker on the Dome for three seasons. "A lot of people are interested in the Antarctic and you hear

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Beginning of the end of the Dome

By Brien Barnett
Special to The Antarctic Sun

The decision to reduce the South Pole station footprint by dismantling the historic dome and the buildings beneath it has been made, so George Prehn's crew of six carpenters and helpers have been moving quickly to make it happen.

But it hasn't been without a little sentiment. Prehn, the demolition crew foreman saw to that, telling his crews about the history of the buildings and showing them - in reverse - how construction standards had changed over the years or were specially adapted to Pole as shown by the pieces they removed from the four buildings they took apart this year.

Before the demolition began, the dome was a crowded place, filled with three main buildings, several smaller buildings and many storage boxes and racks.

In late-February, the demolition crew went to work, starting with "90 South", the old bar above the old dining hall. Prehn employed his standard demolition technique, taught to him at an early age by his father, a house remover.

The Seabees originally built the dome. The current plan is to salvage representative pieces of the buildings to be sent to the Seabee Museum at Port Hueneme, California. The interior of each building has been filmed to document the structure and floor plan for possible reconstruction.

Many of the sentimental pieces of the bar and dining hall were packaged and prepared for shipment to the museum. Once that was complete, the building came down quickly, leaving 260sqm of bare snow and ice where the dining hall had been. Slated for eight weeks, the crew was finished in six.

Demolition crews take apart the old greenhouse. Above, George Prehn hangs a sign "Bar is closed. Destruction personnel only" on the smoking lounge under the dome.

Photos courtesy of George Prehn / Special to The Antarctic Sun

"What was impressing for me was hearing how hollow it was in the dome when that building came down," Prehn said.

The emptiness created a feeling that something was out of place for those walking past that point as they entered the dome. The space was quickly filled with stuff as storage is always at a premium on this station.

"I sent a couple pictures (of the spot with bare snow) to people who had been here before and they said they shed a few tears," Prehn said. "I don't get attached to things like that, but I understand it."

After the old dining hall and bar, the crew focused on the greenhouse and the fire equipment shack. The gear for the firefighters was moved to the back of the old power plant and the fire shack was dismantled, adding to the space at the entrance to the dome. The greenhouse had been replaced by the new "growth chamber" inside the elevated station and was not needed. By removing the old greenhouse, the station was able to conserve power and water that were cycling through the greenhouse system for no use.

Once those small buildings were finished, the now-experienced crew turned on the old bio-med building under an arch next to the dome. Literally tons of things were removed as it had turned into a storage unit in the past few years. Many items were put into the open-air storage berms or were absorbed elsewhere.

The demolition is complete for this year, finishing several weeks ahead of schedule. Prehn and his crew are now helping complete the work list on the new elevated station. Most of the work done there so far this year has been in several berthing wings and the new communications area. All work scheduled for this winter on the new station is expected to be finished in time for summer.

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a lot of people talk about things they've seen on TV or articles they've read. It's just kind of neat to be able to tell them, yeah, I helped build it."

When he arrived at the South Pole in 1971, the temperature was -61C. The cold and elevation made it difficult to work, and every half-hour the men had to retreat into a hut to warm up. They worked 12-hour shifts, with a half-day off on Sunday. Lumber would break because the moisture inside it froze. They couldn't pick up a wrench or any other metal object barehanded or it would freeze to their flesh. The hydraulic riveting equipment, called Huck machines, stalled at -10C, Perry said.

The temperature never rose above freezing, but there were days in December when the wind paused and the sun reflected off the aluminum, allowing the Seabees working on the outside of the dome to take off their jackets. Inside, the dome got darker and darker as the triangular panels were put in place, said Bill Slayman, another ex-Seabee. Their breath condensed on the inside of the dome and snowed down.

Photo by Bob Nyden / Special to The Antarctic Sun

Seabees built the Last Chance Saloon from packing crates.

"So much of what went on down in Antarctic was so different, the kinds of challenges you face down there," Hilderbrand said. "There are so many things that are different, your nails freeze and when you try to drive them they shatter."

They were more isolated than workers at the Pole today. The only way to communicate with people back home was over the ham radio, said Heckman, who became a ham radio operator because of his time at the Pole. Anderson recalls courting the woman who is now his wife through ham radio phone patches.

"Contact was always kind of sketchy," Anderson said. "The 'I love you; over' was out there for all the world to see."

The challenges and isolation developed a strong camaraderie among the young men. They used packing crates to build a hangout – the Last Chance Saloon. With a false front and a hitching post, it looked like a stop on the Pony Express. The sign for the saloon now

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Photo by John Perry / Special to The Antarctic Sun

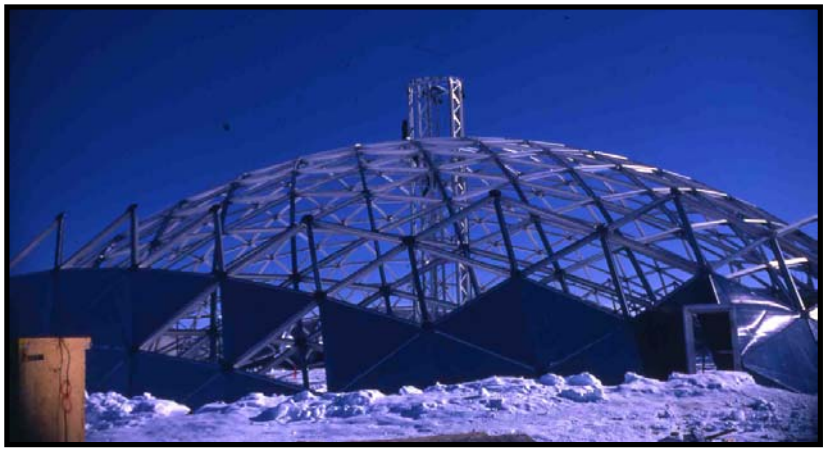


Photo by Lee Mattis / Special to The Antarctic Sun

Right, a Seabee installs aluminum panels on the completed dome frame during the austral summer 1972-73. Panels are pulled up through triangular openings of the dome frame.
Above, the top half of the frame waits inside the bottom half to be lifted into place.

Dome From page 21

hangs in the Seabee Museum at Port Hueneme, along with a piece of plywood with the names of all the Seabees who helped build the dome.

On their Sunday afternoons off the Seabees played ping-pong, watched movies (Star Trek and Mission Impossible), and occasionally played football, using bottled oxygen to help them overcome the thinner atmosphere. Bob Clancy remembers another Seabee bringing down golf clubs and a golf ball painted orange so he could tee off at the South Pole. They even had a dance on Sadie Hawkins Day.

"Half the guys were guys and half the guys were gals," Clancy said. "They drew it out of a hat. My date was Frank. I remember him, about 300 pounds and a mean-looking Italian with a mophead."

In 1974 the dome was finished. The Seabees all wrote their names and address on the last piece with permanent marker.

"Probably it's been wore off, with the sun and weather," said Bill Slayman. "We thought, well, nobody else will see them."

None of them thought then the dome would someday be taken down.

Reassembling the dome will be easier in Port Hueneme, where the average temperature ranges from 13 to 24C. They will also be able to assemble the dome in the standard manner, hanging it from a central tower as the pieces are added from the top down. When the dome was originally set up at the South Pole, the tower couldn't be used because it was too large to ship in an LC130. Instead, a smaller tower was used to build the top half of the dome, while the bottom half was built from the bottom up. Then the tower was broken down into 10 stanchions, which were used to lift the top half and mate it with the bottom.

Mattis designed the assembly system, and said an error in his calculations almost halted the dome construction. As they were lifting the top section with hand winches they discovered it couldn't fit through the base.

"That was a hairy time," Mattis said.

The Seabees solved the problem by using cable hand winches to temporarily pull the base open wider, allowing the top to slip through.

"The Seabees are quite good at stuff like that, working with things that all of a sudden didn't go according to plan," Mattis said.

At the time, Mattis and the Seabees assumed the dome they were building would stay at the South Pole forever, even though its expected useful life was only 15 years. Most previous stations, including the one they were replacing, were eventually buried under snow and left there. Even with regular efforts to excavate it, the bottom 5m of the dome are covered with snow.

"The assumption was it will be there forever, but now they have to take it out anyway, so there's no added cost to the NSF."

The dome would have been shipped to Port Hueneme anyway, because all waste from the South Pole and McMurdo Station goes there. When the dome arrives it will probably be stored until it can be reassembled as part of the museum, Hilderbrand said. There are still many issues to work out, including where to put the dome and how much of it to assemble.

"We don't know if the Navy will give enough space to put up the entire dome," Hilderbrand said. "In the meantime, let's work on getting the dome out and make sure it's stored and everything in such a fashion that we know how to reassemble it."

Though the dome is structurally sound, it's not watertight. Since there's no precipitation at the South Pole, it didn't need to be. However, being built completely of aluminum with stainless steel fasteners, it won't corrode.

"We're not going to try to use it to make it weather-tight or anything like that," Hilderbrand said. "That would be a horrendous expense. The thing wasn't designed to be weather-tight."

Some of the exterior panels will be left off to let in natural light, but the panels covering at least the bottom 3m will be installed to keep kids from climbing on it.

"If you put up just the frame, you have the world's largest jungle gym," Hilderbrand said.

The 1,860-square-meter space under the dome will be large enough to display bulldozers and other heavy equipment the Seabees frequently used.

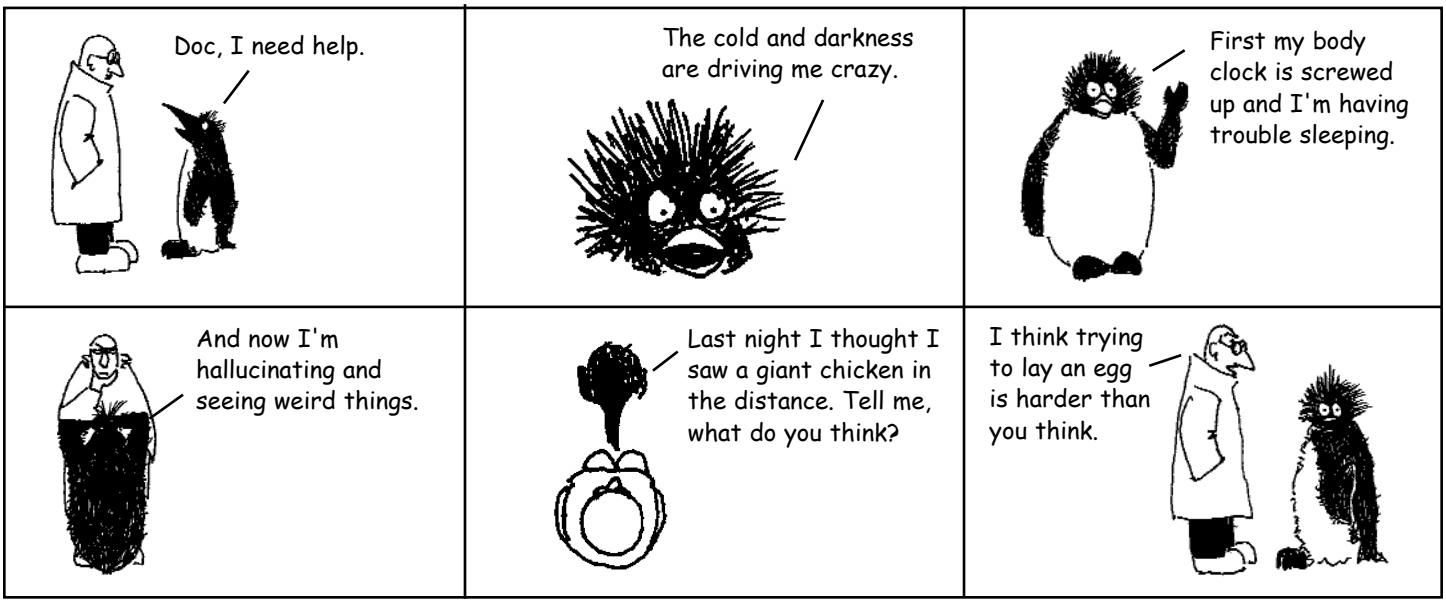
"Just the sheer size of it is going to impress a lot of people," Hilderbrand said.

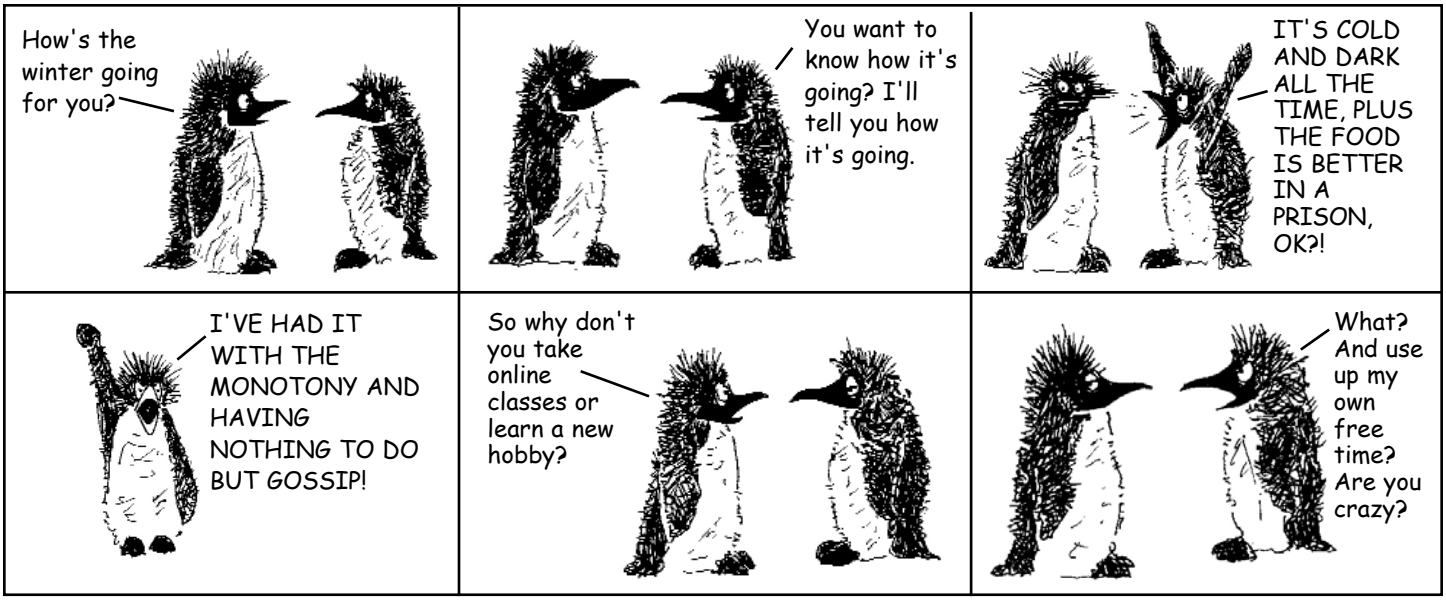
The existing Seabee museum is two Quonset huts 180m inside the Naval Base. It used to have 25,000 to 30,000 visitors a year before heightened security made it difficult for most people to access. When the new museum is built outside the naval base, 75,000 to 100,000 visitors are expected each year. For the dome, that will be more visitors every year than have visited the Pole in three decades.

"I'm glad they're going to do something with it," Slayman said. "Especially if it's going to come back to the states. It'll be something maybe I can go see again. I didn't think I'd ever probably see it again."

Ross Island Chronicles

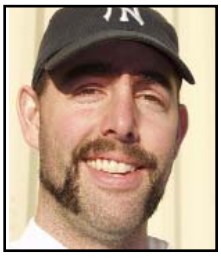
By Chico





Continental Drift

What's the best aspect of winter?



"It's not summer."

Devon Morgante,
Sous chef from Sebastopol, Calif., 3 seasons

"The single idea of watching my breath and hearing it come out of my mouth."

Gabriel Schneck,
Pole powerplant technician from Niantic, Conn. 1 winter

"The long sunrises and sunsets. The colors are spectacular!"

Glenn Grant,
Palmer Station Science Technician from Port Townsend, Wash. 5 winters

Profile Making bad jokes and good choices

By Kristan Hutchison
Sun staff

The first time Bill Henriksen saw an advertisement for jobs in Antarctica he thought it would be an interesting, but stupid, thing to do.

Now he's overseeing a community of 86 at the South Pole, a role that is part small-town mayor, part boss and part peacekeeper. Short of a medical emergency, nobody can leave or arrive at the isolated station from mid-February to early November.

It tends to bring out the best, and the strangest, in people.

"People's behaviors during the winter are so completely weird and entertaining," Henriksen said. "Everybody's quirky."

Including Henriksen, known for telling bad jokes during meetings.

"Pick any station meeting and he'll have one," said South Pole Area Director BK Grant. "You have to laugh because they're so bad."

Henriksen's laid-back management style and bad jokes are well-suited to the extreme isolation, said Grant, who works with him at the Pole during the summer and from Denver in the winter. Henriksen keeps things in perspective in the middle of winter, when the isolation can make small problems seem like crisises and true crisis appear insurmountable.

"He's good at separating the wheat from the chaff, so to speak," she said.

Henriksen is no stranger to living in remote areas. He spent many of his formative years in small Native villages in Alaska, where his parents were the only teachers. Often he was in the minority, he and his sisters being the only white kids in the community. That taught him how to get along.

Henriksen first saw an advertisement for Antarctic work in 1990. At the time he was recently divorced and living in Maine with his kids, ages 6 and 10.

"I was looking at an ITT advertisement in the Portland paper for engineers in Antarctica saying 'Wow, that would be a really interesting thing to do,'" Henriksen said. "Then I looked back at it and said, 'Wow, that would be a really stupid thing to do if I want to keep my kids.'"

Eight years later he was working for RSA Engineering in Anchorage as an engineer when the Navy hired the firm to provide a licensed engineer for the Title II inspector position at South Pole. Henriksen was sent to the South Pole during the summer of 1998-99.

"After that first summer I vowed I would never do a full year," Henriksen said.

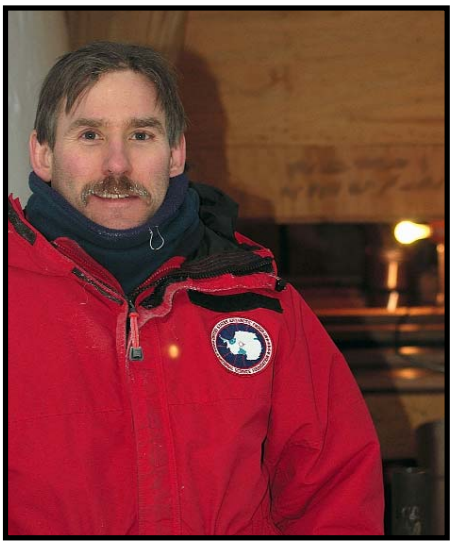


Photo courtesy of Bill Henriksen / Special to The Antarctic Sun

Station manager Bill Henriksen in one of the South Pole tunnels.

A year contract would mean nearly two years of winter darkness, going from the Alaskan winter to the Antarctic winter and back to the Alaskan winter. But once more he ended up doing what he'd said he wouldn't. When the engineer who was supposed to be the winter inspector at the Pole couldn't pass the physical, Henriksen was asked if he was interested and he jumped at the opportunity. "By that time I'd figured out that I could take some serious vacation time in the Southern Hemisphere after the Austral winter and wouldn't have to come directly back to the Alaskan winter," Henriksen said.

"I kind of joke about it. I was in the perfect job. I wasn't a grantee. I wasn't Navy or RPSC," Henriksen said. "The only place I had to report to was Anchorage."

His neutral position and easygoing demeanor drew people needing to talk. There were plenty that winter, especially after an Australian researcher died at the Pole in May. Henriksen developed a perspective on the station and ended up arbitrating a dispute between two cooks. He also found he liked the camaraderie of the South Pole in winter, where people talk about things they never would at home and it's easy to make close friendships with people you'd never meet in the larger world.

"He was very effective and obviously was able to bridge gaps that existed, and gain confidence and trust," Grant said. "He proved himself to be a good listener and a good mediator during that winter, and those were all good skills."

At the end of the winter, Henriksen talked to the managers and mentioned he might have an interest in being station manager some point down the road when it would not interfere with the Title II position.

Two years later he had a call from Grant, asking if he was still interested in being station manager. It would mean leaving his wife behind for almost a year, quitting his engineering job and taking a pay cut.

"I basically told her there was no way in Hell I could do it," Henriksen said, since he had just committed to being the Title II inspector for Winfly in McMurdo and Pole for the summer.

After 45 minutes of conversation she asked him to sleep on it over the weekend.

"I wasn't really ready to take no for an answer," Grant said.

She was right to wait. By Monday, after talking it over with his wife and his boss, Henriksen had changed his mind.

The winter of 2003 turned out to be another exciting one at the South Pole, with a medical evacuation in September. Usually there are no flights to the Pole until November because of the temperature, which at that time was around -80F outside. The Polies spent several days preparing the skyway and warming up fuel for the plane.

Leaving the Ice after that winter, Henriksen experienced some culture shock. In a grocery store in Hawaii he was overwhelmed by the number of people and shelves full of consumer goods and had to leave the store. When he'd try to describe his experiences in Antarctica with friends, he couldn't.

"You can't explain the intricate details, the things that are funny," Henriksen said. "I found I could tell a story from winter and it would fall flat."

This winter is Henriksen's third at the South Pole, his second as station manager and the first time his wife, Janet Arin, also got a job at the Pole.

"It's a good time to do it," he said at the beginning of the season.

The kids are grown. Their home in Anchorage is rented. And, at 45 years old, he realizes he won't be able to pass the required physical exams forever.

"When I get too old and feeble to do this any more, I'll look for one of those city engineering jobs in a small town in Alaska," he said.

But for the moment he enjoys the challenges that come up at the Pole and the quirky personalities of people that chose to spend the winter there. And at least there, people laugh at his jokes.