

The Antarctic Sun

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

November 28, 2004

A flight down memory lane

By Kristan Hutchison
Sun staff

Though their route was the same, the crew aboard Skier 94 didn't expect any of the hat-tossing and hurrahs that greeted Richard Byrd and his flight crew after they flew to the South Pole 75 years ago.

That's the difference between being the first plane ever and the fourth plane of the day.

The ground crew fueled Skier 94 without fanfare. A team of ground mechanics heated the props and engines, added fluid to the hydraulics and ran through a maintenance checklist on the LC-130 flown for the U.S. Antarctic Program by the New York Air National Guard.

Byrd and his crew flew their Ford Tri-Motor on "a flight of discovery, and wanted to see things and record them," Byrd wrote later.

Skier 94 was a cargo mission, supporting modern discoverers, who are looking to the very edges and beginnings of our universe. But it was also a

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Photo by Kristan Hutchison / The Antarctic Sun

During a flight commemorating the original flight by Admiral Richard Byrd over the South Pole, Major Mark Doll, a pilot with the New York Air National Guard, looks out the window of an LC-130 at the area where Little America once was. The edge of the Ross Ice Shelf and the sea ice in the area where Byrd established Little America in 1928 broke off and floated away years ago.

Big bergs won't budge

By Emily Stone
Sun staff

Iceberg researcher Doug MacAyeal figured he better act fast when the enormous berg known as B15 calved off the Ross Ice Shelf in 2000. He put a "rapid response" plan into motion, received an emergency grant to study what was perhaps the world's largest iceberg, got to use a Coast Guard icebreaker for three days with two helicopters at the ready, and hurriedly put equipment on the iceberg to study it as it drifted into the Southern Ocean.

Then the iceberg did a funny thing. It just sat there. And sat there. And even though it's broken into several smaller pieces that sway and shift some, for the most part, it's still sitting there.

As of this week, it looks like it might be there a while longer. New global positioning data and satellite images indicate that B15a, which is the largest of the bergs that broke off the original B15 iceberg, may have grounded near Franklin Island, according to MacAyeal. It's too early to tell if that's truly the case. The berg could drift south again. Or, in the most alarming scenario to U.S. Antarctic Program planners, it could move farther north and close off the opening into McMurdo Sound, preventing ships from getting to the station to deliver fuel and supplies.

"This could be awesome bad news," said MacAyeal, who readily admits that he's the only person who is happy that the icebergs

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QUOTE OF THE WEEK

"It's like dating
in a bus station."

—Man to a woman at the
McMurdo Coffee House

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Antarctic medicine
gets an upgrade

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A hair-raising
Antarctic tradition

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AST/RO discovers starbursts in Milky Way

By Brien Barnett

Sun staff

Some things just take time, even a couple thousand millennia.

A team of astrophysicists using a radio telescope at South Pole Station wondered why some galaxies pumped out thousands of stars while other similar galaxies barely managed to produce two stars.

Results obtained in 2001 and 2002 using the 1.7 meter-diameter Antarctic Submillimeter Telescope and Remote Observatory, or AST/RO, at South Pole Station revealed that over 20 million years most galaxies probably experience sudden star-forming periods, or starbursts.

That conclusion — based on observations of galactic clouds at the center of the Milky Way, our home galaxy — is a significant discovery, according to Antony Stark, AST/RO's lead investigator, and one of the authors of a paper published in *The Astrophysical Journal Letters* last month.

"We've seen a kind of mechanism for starbursts," Stark said.

The mechanism that changes a galaxy from an occasional star-former to a super-producer appears to be found near the center of the galaxy when a highly dense ring of gas is drawn toward the black hole at the center.

AST/RO measured the density and temperature of that ring. Stark said scientists found that as more gas is added to the ring it can reach a critical level, become unstable and will form "a stupendously gigantic cloud."

The mass of that gas cloud that is drawn by gravitational forces toward the center of the galaxy will exceed the ability of the black hole to consume it.

"It would be like trying to fill a dog dish with a firehose," Stark said.

The remaining gas is then dense enough that thousands of stars are born in a fairly sudden, or burst-like, manner.

"What we didn't know before was that instead of happening only in some galaxies, a starburst happens once in a while to most galaxies," Stark said.

Stark predicts the next starburst in this galaxy may come within the next 10 million years. But, no worries.

At 25,000 light-years away, Earth is far enough from the center of the galaxy that the starburst won't affect or even be seen by the third rock from the Sun anytime soon. Although there is hope that with new solar systems, new Earth-like planets may also exist, the data reveal that too many of the new stars would be rushing to supernovae and exploding, thus wiping clean the slate for life.

The announcement of the discovery coincides with the beginning of the end of AST/RO, a project now in its 10th year. The telescope is housed in a once-elevated building that is becoming buried by snow and ice. But it still has a few milestones to reach before it gives way to a much larger telescope — dubbed the South Pole Telescope.

Scientists hope to get one good season for two instruments that have been shortchanged the last couple years, as well as some

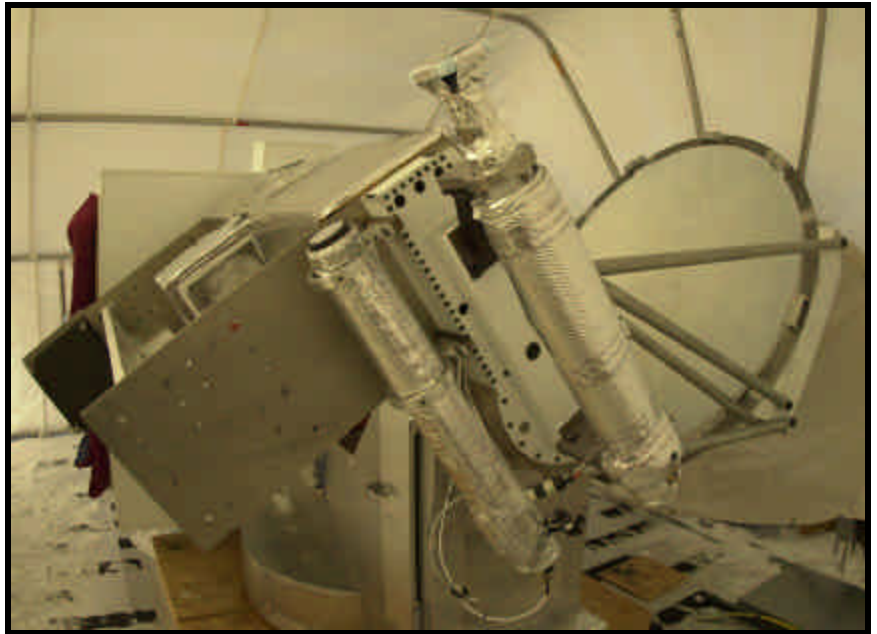


Photo by Brien Barnett / *The Antarctic Sun*

The AST/RO submillimeter radio telescope sits under its cover at South Pole Station. The telescope is in its 10th season of observation and is expected to be decommissioned next year.

baseline readings on galactic clouds as part of a three-year project to look at star-formation in the galaxy.

The first priority is to get good weather suitable for making observations, and enough helium to cool two instruments examining a specific part of the electromagnetic spectrum. The South Pole Imaging Fabry-Perot Interferometer, SPIFI, and Terahertz Receiver with NbN HEB Device, TREND, are analyzing specific, high-energy emission lines from parts of the galaxy. Last season the supply of helium expired before skies were clear enough for the telescope to get good readings. Within the last couple weeks, fresh helium tanks have been flown to Pole and the process of cooling TREND has begun.

Assisting the Spitzer Space Telescope Legacy Science Program, a collaborative project, is the second priority for the upcoming seasons. AST/RO will help by getting

baseline readings of interstellar gas clouds.

"By applying all of our current observational methods in a concentrated fashion, we may be able to make a significant advance in our understanding of star-forming regions," Stark said.

With luck, AST/RO will operate into the 2005 austral summer, contributing a year's worth of data to the three-year Spitzer project. It will focus first on the southern constellation called Chameleon.

"We'll do the best we can in one year," Stark said.

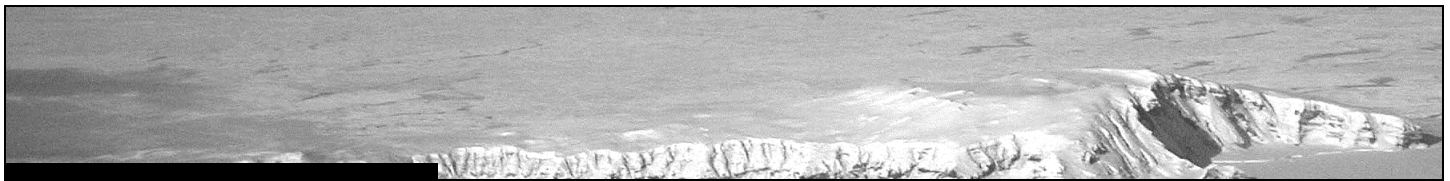
— Brenda Everitt contributed to this story.

NSF-funded research in this story: Antony Stark, Harvard-Smithsonian Center for Astrophysics, <http://cfa-www.harvard.edu/ASTRO>



"It would be like trying to fill a dog dish with a firehose."

— Antony Stark, lead scientist for the AST/RO project, on the discovery of how star bursts form



Perspectives

To Beard or not to Beard

By Bill Jirsa

I've stopped shaving. Usually this would mean an extended camping trip, a bad breakup, or unemployment, but this time it's deliberate. I haven't let a razor touch my cheeks since I left Christchurch. For some reason shaving feels anathema to my Antarctic experience.

Every guy must start a beard when he arrives here. As I looked around McMurdo as the season got into full swing, I saw many whiskery cheeks and burgeoning beards. Remnants of sideburns, mustaches, and other former facial hair configurations succumbed to the full Grizzly Adams.

My results, honestly, aren't that impressive. I'm a slow beard grower, and I'm tempted to lie about the time it's taken me to produce the paltry fuzz on my face. I'll likely concede to a goatee by Christmas: focus my follicular energy where it will produce something worth writing about. Forget the callback from John Carpenter for "The Thing" sequel.

Obviously some people have beards year round and they keep them on other continents, as well. Why am I compelled to grow a beard just because I'm in Antarctica?

When a few of us who had instituted a razor ban finally broke the silence, we couldn't clearly express what drove us. Granted, we're guys, and getting us to account for our behavior is a good way to kill a conversation. After some fruitless introspection, warmth tends to be the preferred explanation.

To bolster what I still suspected was a rationalization of our collective indolence, I e-mailed Will Silva, a (bearded) physician at Palmer Station. He couldn't cite any journals, but he did vouch for the warming properties of facial hair.

"Clearly, beards help keep your face warm in less windy cold by creating a partially dead air space," he writes. "They become even more effective once they ice up on the outside, leaving a heated dead air space next to the skin."

So it seems that the hair on a beard acts like the insulation materials in a down parka, and the crust of ice on the outside would serve like the Gore-Tex shell to keep the wind from disturbing that insulated air. Silva offered a final bit of Antarctic advice:

"For greatest effectiveness however, we must emulate the OAE's of the Heroic Age: Big beard, with lots of last night's (and last week's) dinner, breakfast, and seal fat in it."

After my exchange with Silva, I was feeling properly justified in abandoning my shave kit even though I work in the IT Department and can travel from bed to breakfast to work and back without stepping outside building 155.

Then I saw Cleve Cleavelin looking a little fuzzier than he did in the Denver office when first I met him.

"I look like an Ewok by the end of the season," he said when I commented on his hirsute face.

"Basically, I'm lazy.," he said. Okay, I thought. Here's an honest man willing to set aside the need for rationalization.

When he told me his wife didn't really dig beards, something else dawned on me. If the person you kiss won't kiss you when you're hairy, and you are going to Antarctica alone for several months, it might be a liberating release from your shaving regimen.

Then I ran into Dan Naber and Don Jeter. They have long, beautiful beards. They were returning from a year at the South Pole. These guys hadn't seen a fresh vegetable until mainbody, and they certainly hadn't shaved while they were living at 90 South.

"I worked outside everyday," Naber said. "It's definitely a warmth issue and I can feel the difference when I shave." His voice emanates from a wave of red hair that cascades over his collar. I asked why he needed to grow it so long.

"Just for fun." He speculated. "At the Pole there is no convention. No one cares what you look like. People do crazy things with their hair." (He gestured to a fellow-polie in the dining hall with a mohawk.)

Don echoed the temptation to flaunt the conformity of the lower latitudes. "It's my long lost teenage rebellion I never had. I did 24 years in the Air Force then retired and came straight to the Pole. I haven't shaved or cut my hair. Plus it keeps you warm and the chicks like it."

When I expressed incredulity on this last point, Dan assured me that not all women detest kissing a beard. "Being from Alaska, there are quite a few that go for the beards."

I asked them if they plan to stay bearded.



Photo courtesy of Bill Jirsa / Special to *The Antarctic Sun*
Bill Jirsa, a computer trainer in his first season at McMurdo Station, now has a beard.

Dan said he is heading to India, and the heat might get to him. In 30 days Don will be working at Pegasus runway, where he's pretty sure he won't shave.

Finally, Marsha Kendall overheard some of my observations about guys and our penchant for beard growing in Antarctica.

"What makes you think y'all are the only ones who stopped shaving?" she asked.

With a raised eyebrow I considered that I'd been a bit too gender-centered and perhaps under all the ECW gear there was another kind of hair revolution going on.

Looking for the Antarctic connection, I asked why she thought McMurdo had inspired the no shaving policy. "My hairy legs are about as Antarctic as your East-village hipster beard," she contested. I had visions of Bob Dylan's peach fuzz circa 1966, the kind of beard that doesn't cast a shadow. So I'm not Grizzly Adams.

I'm not sure if I've cracked the mystery of my compulsion to embrace my "mammalian tendencies" as Karen Joyce refers to it. A beard can say a lot of things: "I wish I were an Old Antarctic Explorer," "I'm virile, vigorous, and potent," or simply, "I'm letting myself go."

But there's something emphatic about the polar extremes and beards. The essence of Antarctica is wooly. It begs for the Jeremiah-Johnson-gone-native look. The history of Antarctic exploration was largely a masculine ordeal, and as the niceties of more civilized continents gave way to clubbing penguins to survive, the ritual of running a razor over one's face daily probably didn't seem so important.

In the 21st century in Antarctica, I eat fresh vegetables almost everyday. I read the New York Times online. We have lots of warm water and disposable razors. But nothing says, "Look ma, I'm freezing my butt off in Antarctica!" like the beaming smile behind an iced-up beard.

around the continent

Tom Woods performs at the South Pole Coffee House Open Mike night. The event is a popular showcase for musicians and other talented people at the station.

Photo by Tyler Regan / Special to The Antarctic Sun

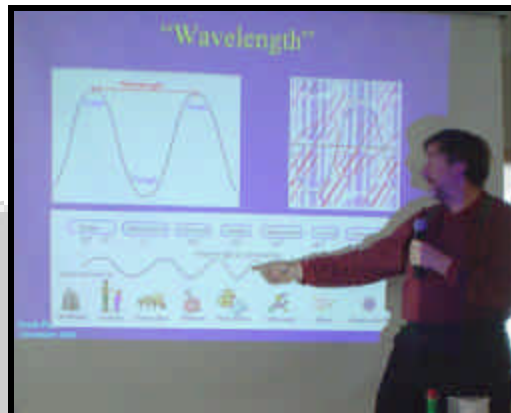


Photo by Brenda Everitt / Special to The Antarctic Sun
Antony Stark explains wavelengths of light during the South Pole Sunday Science lecture. Stark explained new discoveries made using the Antarctic Submillimeter Telescope and Remote Observatory, which he oversees at the station.

SOUTH POLE

Coffee, music and stars

By Brenda Everitt
South Pole correspondent

Life at South Pole Station is getting busier and more active as the season gets into full swing.

Science at South Pole marches on. Antony Stark presented the Sunday Science lecture, titled “Normal and Abnormal Star Formation.”

Stark is in charge of the Antarctic Submillimeter Telescope and Remote Observatory, AST/RO, facility at the South Pole.

The AST/RO group studies star formation in the Milky Way galaxy at submillimeter and near-infrared wavelengths with radio astronomy techniques. *(See related story on page 3).*

The pile of outgoing mail is gone and workout and dance classes have started in the gym.

Circuit training and weight classes are being offered in the workout room in the old dining hall.

In their off-work hours, Pole residents have organized several clubs and other

activities, including a Scrabble tournament, board game nights and band practices.

There are plans for a new South Pole Yacht Club, which will celebrate the art and lifestyle of sailing.

The Ross Island Yacht Club in McMurdo has been a long-standing organization. Now Greg Weber said it’s time for Pole to have one. He is trying to recruit people for the club.

“The motivation for the club is to have a forum for people with boating interest to get together and share stories and ideas,” Weber said. After all, we do live on a frozen ‘ocean’ 3.2km deep.”

If there is enough interest, Weber said Pole residents might build an “ice boat” at the South Pole by the end of the season.

The first Coffee House Open Mike night was a big success with a lot of participation including several bands and solo musical performances, magic tricks, jokes, and original prose selections.

A “command performance” of movies from last year’s First Annual South Pole Film Fest is eagerly anticipated, and would-be moviemakers already are planning for the 2005 festival, which will be held in mid-January.

PALMER

Plants take root in ‘estates’

By Kerry Kells
Palmer Station correspondent

Because of strong winds with gusts that reached 110kph this past week, Palmer Station now has open water. Previously blocked from reaching two sampling sites, the researchers have now managed to get to both sites during the past week. However, they are grounded again due to strong winds. The birders had set up an ambitious schedule for the islands of Torgersen, Humble, Litchfield, Cormorant and Christine, but only made it to two islands before the winds increased.

Christopher (Wally) Ruhland, co-principal investigator with Tad Day’s project, gave a science lecture based on one of his courses at Minnesota State University, Mankato, Minnesota. Titled, “Introduction to Plant Science: Photosynthesis 101,” Ruhland described a typical plant cell and the capture of solar energy in the reaction of photosynthesis.

Ruhland works with Day, principal investigator with a biology research

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the week in weather

<p>McMurdo Station High: 37F / 3C Low: 14F / -10C Max. sustained wind: 33mph / 53kph Windchill: -20F / -29C</p>	<p>Palmer Station High: 40F / 4C Low: 28F / -3C Max. sustained wind: 42mph / 67kph Melted precipitation: 7mm</p>	<p>South Pole Station High: -24F / -31C Low: -36F / -38C Peak wind: 29mph / 47kph Max. Physio-altitude: 3,304m</p>
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project that studies the plants and soil of the Peninsula. Team members this year are Sarah Strauss, David Bryant and Michell Thomey.

This is the second year at Palmer Station in the three-year project. This project examines the alterations and responses of terrestrial ecosystems to short- and long-term climate change.

The ecosystem studied includes nutrient pools, plants, litter and soils in communities dominated by vascular plants, defined as higher order plants with a vascular system for transporting water. The goal is to predict how long-term climate change will affect ecosystem productivity.

The researchers have set up an area for the soil and plant experiments behind our station called "Sun Devil Estates," a name derived from the Arizona State University mascot. They have a collection of 10- to 13-cm thick, round cores of plant and soil called microcosms.

The two plants they are studying are a short, native grass commonly called Antarctic hair grass and a moss-like plant with white flowers called Antarctic pearlwort. About 240 microcosms from last year are slowly emerging from the winter snow cover; both species were collected last year from local islands. The cores now grow in plastic pipes under manipulated environments. Three types of environments are created.

Heaters are used to increase the environmental temperatures for some of the cores, as if they were affected by global warming. Ultraviolet B absorbing filters are placed over another set of core samples to emulate different levels of ozone. Another group of cores will receive extra water to mimic greater precipitation.

When the wind speed slows and it is

safe for boating, the next step for Day's group will be to sample natural communities on a few local islands, especially Biscoe and Limitrophe islands. These islands have plots in which snow accumulation and snow melt are manipulated. Because later snow melts can exhaust the plants and cause them to perish, Day and his group will closely monitor the plots this season and next season. Their research could give a picture of increased global warming in the Antarctic Peninsula of the future.

Last Sunday, before the wind speed picked up again, the birders attempted to boat to Torgersen again but their plan was thwarted by sea ice. Maria Vernet's and Hugh Ducklow's groups were able to get to one sampling site for water column sampling. Wildlife viewing was possible directly from station as a small pod of orca whales chased seals and penguins in Arthur Harbor to our north for a couple of hours. The station now prepares for a two-day weekend to celebrate the Thanksgiving holiday.

SHIPS

Nathaniel B. Palmer

Compiled from reports by Karl Newyear

The *Nathaniel B. Palmer* battled high winds, poor visibility and heavy ice conditions for several days in the Ross Sea. On Nov. 17 the satellite images revealed the research vessel was on the edge of an impressive cyclonic storm creating hurricane-force winds out of the southeast. Heavy ice kept the waves down, but the ship couldn't progress toward its next sampling station, and for a while was actually drifting in the wrong direction, "which is rather frustrating," wrote marine projects coordinator Karl Newyear.

The ship headed east in search of



Photo by Kerry Kells / *The Antarctic Sun*
Sun Devil Estates at Palmer Station is home to plots of plant samples.

thinner ice seen on one of the satellite images and by Nov. 20 broke through into a more open area east of Cape Adare.

"The excitement was palpable as we reached the core AnSlope study area at last," Newyear wrote. The researchers were able to finally take more samples for their research of the flow of cold, dense shelf water across the continental slope and into the adjacent deep ocean. This flux is important in the formation of Antarctic bottom water and is balanced by onshore flow of warmer water from deep and surface layers.

"Despite a slowly falling barometer we've enjoyed beautiful sunny weather and views of the mountains," Newyear wrote.

Fighting the ice and stormy weather used more fuel than had been planned, so once the *NBP* no longer needed to back up and ram forward through ice, two of the ships' main engines were shut down Nov. 22 to conserve fuel.

By then, the *NBP* was in calm waters and researchers were trying an extended deployment of the Vertical Microstructure Profiler at the sill of the Drygalski Trough. The winds were light and variable and the weather was pleasant, though overcast.

Continental Drift

What interesting Antarctic fact have you learned?



Tom Woods
South Pole
utility worker,
Bozeman, Mont.,
first season

"It's the highest, driest, windiest, most remote, last place."



Bill Hance,
Palmer
Sat. Comms. tech.,
Elko, Nev.,
first season

"Leopard seals will eat almost anything, including boats."



Jonathan Graca,
McMurdo
cargo handler,
Hood River, Ore.,
second season.

"The South Pole (ice) moves about 30 feet a year."

Medical centers vital part of U.S. stations

New, roomier clinic at South Pole Station passes first big test in treating flu outbreak

By Brien Barnett
Sun staff

Dr. Christian Otto put away some papers after seeing the last of his patients for the day, his ninth day of work in a row.

The patients who visited the office that Tuesday in early November had been attended to and sent on their way. He and his wife and fellow physician Dr. Rebecca Comley had swept the floors, emptied the waste baskets, sorted and put away the laundry, tidied the instruments and turned off unneeded lights.

"It makes you appreciate a real hospital," he said, with a look that revealed how tired he was and how much he wished he could transport a full support staff to the Pole right then and there.

Otto and Comley had been swamped for more than a week as about half the station's 220 residents stopped in to report cold-like symptoms. A few were experiencing headaches, fever, muscle aches and extreme fatigue — signs of something more severe. Swab tests on two patients performed at the clinic indicated influenza, but were sent to Christchurch, New Zealand, for confirmation. They heard back several days later and weren't surprised at the news: influenza type A. People who had passed rigorous physical examinations to be at Pole had been knocked off their feet by one of the world's most common viruses.

From the day they suspected the flu, the doctors and station management were working to contain the outbreak. A high emphasis on vigorous personal hygiene and a near ban on handshakes were some of the steps taken to break the transmission of the virus around the small station. Prescription and over-the-counter drugs, such as ibuprofen, were provided to relieve the symptoms for many. The very ill were asked to remain in bed and doctors, kitchen staff and friends made arrangements to provide them meals. As of last week, the outbreak mostly had subsided.

It's not the first outbreak and it won't be the last, but what was different this time was that the new medical center at the elevated South Pole Station gave the doctors and their patients room to work and recover. It opened earlier this year.

Inside Pole Medical

The initial waiting area at the medical center is a dim entryway. It's not dark because it has to be. It's dark because it's comfortable. Light spills from the left, emanating from a room filled with cabinets, drawers, a computer, microscope and



Photo by Brien Barnett / *The Antarctic Sun*
The main examination room at the South Pole Medical Center in the elevated station has more room than when it was under the Dome. It includes a small area for dentistry.

other instruments. It's in that room — the office more or less — that the virus was tagged and bagged.

From the entryway, the view into the medical center through oval windows in the two swinging metal doors is surreal, as if one is aboard a spacecraft and about to witness an alien autopsy. Once the doors are open, fluorescent lights bring a sense of warmth to what is now obviously a functional and interchangeable set of three main rooms connected by a white tile floor. It looks clean, sterile and roomy. The latter quality is what most distinguishes the new medical center from its former boxy home under the Dome.

The high-tech monitors, defibrillator and recovery beds brought from the cramped confines of the Dome medical center, now coordinate within an institutional and functional design. A mobile lighting unit casts bright light on the examination table in the middle of the exam room.

A fourth room in the main area serves as a private examination room. With privacy an important aspect of medicine — and nowhere more important than a small, confined community — the new exam room is a blessing to the doctors and patients.

"It is a pleasure to treat patients in the new clinic," Dr. Otto wrote in an e-mail to the *Sun*. "It is an open-concept clinic that allows for easy flow and movement of

clinic equipment."

The whole experience is part of the new station experience and the maturity of the Antarctic medical system, said Ron Shemenski, the U.S. Antarctic Program's medical director based in Denver.

"There is more room for organization," Shemenski said. "The lab area is bigger ... and there is a window."

Telemedicine

Arguably the most significant advancements have been in telemedicine, which uses communication devices from telephones to satellites to help treat patients.

"Our ability to diagnose and treat a wide range of illnesses and injuries is one of our greatest assets," Dr. Otto, at South Pole station, said. "This is a consequence of both our onsite medical resources and our telehealth capabilities, which are second to none on the continent"

A contract with the University of Texas at Galveston allows Antarctic doctors to have access via a satellite link to the medical school's collective expertise of primary care physicians and specialists. The system allows a doctor at McMurdo Station, South Pole or Palmer Station to consult directly with a physician at the university hospital, either by telephone or on camera.

"Palmer Station in winter is more isolated than Pole," Shemenski said. "If we

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have to evacuate, we have to get a ship in.”

Dr. Will Silva, who is in his seventh week at Palmer Station, agreed.

“With a minimum transit time of something like eight or 10 days roundtrip that makes us feel way out on a limb,” he said.

Silva is a veteran of the program and spent several seasons at the South Pole. He said that during his first season at Pole in 1997, the idea of telemedicine was simply in the early stages. By his second tour in 2002-2003, he found the new telemedicine capability helpful.

“I made extremely good use of it during my second Pole tour,” Silva said. “It was quite a critical capability in sorting out several situations.”

Since the system was created about three years ago, Shemenski said the Galveston hospital has become an organization that knows the Ice and its unique physical demands.

“We’ve brought people here to see what it’s like,” he said.

Next year, the main network hub at Raytheon Polar Services Company headquarters in Denver will upgrade the system to accommodate four simultaneous connections. That will allow station physicians, doctors in Galveston and program managers in Denver and Washington, D.C., to discuss specific cases and Antarctic health care issues together. That should improve communication and speed service to patients, Shemenski said, especially in emergency cases that may require medical flights out of Antarctica.

“We’re always looking for tests and equipment that can extend treatment on the Ice,” he said. “We want to know when we can safely treat people and when to medevac ... without risk to patient or crew.”

Then there can be situations a polar doctor might never expect to encounter.

The summer season at McMurdo began in earnest in October. During the early days of the new season, a resident came into medical seeking treatment. The ailment turned out to be malaria. The disease usually associated with jungles instead of ice caps may have been too out of place to suspect, but the patient had recently traveled to an area where the disease was present. A blood test confirmed it.

“You don’t expect to get tropical diseases in Antarctica,” Shemenski said. “But this is a very mobile population.”

The technology of everyday emergency rooms can be found at each U.S. station. The program staffs each of the three clinics on the continent with at least one doctor. McMurdo Station has several, along with a dentist, who also visits South Pole occasionally. Aboard research vessels,



The new medical center at South Pole has room for two beds, monitors and other equipment.

Below left, the office includes a computer and microscope.

Below, the view through the door of the clinic.

Photos by Brien Barnett, *The Antarctic Sun*



emergency medical technicians offer basic medical care. Along with personnel, came improved technology. Beyond high-tech hookups, the program makes use of everyday emergency room tools, from credit-card sized swab tests to defibrillators.

“There’s been a gradual improvement, not drastic changes,” Shemenski said. “As changes became available, we began to incorporate them.”

Shemenski hires doctors based on two criteria: qualifications and experience. He said he gets a stack of letters from physicians interested in coming to the Ice, but picks from those who are in active practice with at least three to four years of experience and who have worked in demanding emergency room or similar situations. For example, both Silva and Otto have worked on the Ice in the past.

Physicians who are hired spend about two weeks training on equipment that a doctor doesn’t typically use, such as analysis tools, radiology instruments and even dentistry.

Those at McMurdo Station also train to use the pressure chamber in case underwater divers need it. But the program primarily relies upon past experience, Shemenski said.

Palmer ready

Palmer Station has the same capability for telemedicine and advanced care that Pole and McMurdo do. However, most of the cases Dr. Silva sees at the Antarctic Peninsula station are for aches, pains, lumps, strains, rashes — what Silva calls

“pretty low-grade, walk-in clinic type of stuff.”

Because of the long evacuation time by ship, the emphasis is on taking precautions and keeping safe, Silva said.

This is his return trip to the station and its revamped clinic.

“It’s really sweet to work in the new medical facility at Palmer,” Silva said. “When I was here in 1999 it was under construction and was tiny with no equipment. This facility is big enough and it is just crammed with equipment.”

McMurdo keeps pace

The McMurdo clinic sees more patients over the course of a season than any other station and has nearly outgrown its building. Shemenski said plans — though still in the preliminary stages — call for moving McMurdo’s medical clinic across the road into Building 155. That is the central building in town and the location of the kitchen, dining hall, finance and human resources department and other station services.

Two reasons to move into Building 155, Shemenski said, would be to increase clinic space while keeping essential services close to one another.

To ease the crunch in the meantime, current station doctor Gregory Zaar has brought back the use of appointments in addition to walk-in hours to manage the numbers of people seeking treatment. Shemenski said such steps will keep the medical center effective and ensure patient privacy until it can find new quarters.



Photos by Kristan Hutchison / The Antarctic Sun

The crew of a flight commemorating the first flight over the South Pole peer out the window at the open water where Little America once was.



Byrd

From page 1

flight down memory lane, following the path Byrd took to the Pole when he opened the way for Antarctic aviation and research.

“That’s the reason why we’re here and that’s the reason why they were there,” said Major Mark Doll, pilot for the flight. “The conquest of Antarctica by air, exploration, science, increasing man’s knowledge of Antarctica’s influence on the rest of the planet. That was Byrd’s goal for the expedition.”

In the cockpit, Doll and copilot Marc McKeon agreed to leave the autopilot off. They’d fly this one the old-fashioned way, trading the controls as Bernt Balchen and Harold June, Byrd’s pilot and copilot, had done. Navigator Vinnie Wilson did his part, plotting their course using coordinates Byrd jotted down during his original flight and navigating with a sextant, as Byrd had. But Wilson had the backup of navigational technology Byrd never dreamed of, as well as weather reports and maps.

“Byrd had no way of knowing what the winds are. I have that advantage,” Wilson said.

Byrd flew into uncharted territory, in a plane a tenth the weight of the modern cargo plane. The maps Wilson checked still bear Byrd’s mark in the names along the way: Mount Balchen for the pilot, June Nunatak for the copilot, and McKinley Nunatak for the aerial mapper, Ashley McKinley. Byrd had been the navigator and the expedition planner.

Takeoff

Skier 94 rumbled as the engines started, settling into a gentle vibration like the belly of a purring cat. The pilots pointed the plane onto the runway, a smoothed white surface stretching out on the sea ice. The bluish Transantarctic Mountains sped by to their right and in seconds Skier 94 was up, orange airfield buildings shrinking into toy boxes on the wide, white carpet.

Marc McKeon steered away from the southward

path that planes usually take to the Pole and instead veered east, along the edge of the Ross Ice Shelf. Byrd had come through the dark waters below with two sailing ships in 1928 and three planes in the holds — a strange overlap of ancient and modern technologies. Flight was still new and uncertain, something to be proved, and Byrd believed exploring the Antarctic by plane would further not only science, but the future of aviation.

“The idea was to get up and fly,” Doll said. “An airplane back then was a new invention. It gave them the opportunity to get up off the ground.”

The ice shelf was shaped differently then. Large chunks of ice have broken off into the sea since Byrd saw it. The massive Antarctic ice sheet constantly oozes toward the sea. The ice shelves have a natural cycle of growing and breaking to stay at equilibrium. In 2000, a slice of the Ross Ice Shelf the size of the

island of Hawaii cracked off, broke in half, and lodged at the entrance to McMurdo Sound. Several more have joined it there, diverting the normal flow of water, wind and sea ice. This logjam of island-sized bergs hid under low clouds as Skier 94 flew along the edge of the ice shelf.

As they neared the area where Byrd’s men had built a cluster of wooden buildings called Little America, Skier 94 dropped down for a closer look. A bay curved back into the ice. Wind tossed white spray along the dark water where Little America had once been. Skier 94 tipped a wing and circled. The flight crew craned forward to look.

“It’s gone.”

“Somewhere at the bottom of the South Pacific.”



Little America as it looked in 1929.

Antarctic Aviation timeline

1902, Feb. 4

Capt. Robert Scott ascended 244m/790ft over the Bay of Whales in a tethered balloon.

1912

Douglas Mawson brought the wingless body of a Vickers monoplane to Antarctica as an “air-tractor sledge” after the aircraft was damaged in Adelaide.

1928, Nov. 16

Hubert Wilkins and pilot Ben Eielson made the first Antarctic flight in an American Lockheed Vega from a 730m beach runway on Deception Island. A month later they flew 1,000km along the peninsula.



See Byrd on page 10 The Ford Tri-Motor Byrd flew over the South Pole.

1929, Nov. 28-29

Navigator Richard Byrd, pilot Bernt Balchen, copilot Harold June and photographer/aerial mapper Ashley McKinley flew over the South Pole in a Ford 4-AT trimotor. The 2,600km roundtrip flight took 18 hours 39 minutes. Byrd's expedition had also been using a Fokker Universal and a Fairchild, all on skis, to explore, survey and support field research in Antarctica.

1934

Byrd returned to Little America with a twin-engine Curtiss-Wright Condor T-32 biplane, Fokker F-14, Fairchild Pilgrim and Kellett autogiro, the predecessor to helicopters. The first autogiro flight was made Sept. 1. After making 10 flights, it crashed on Sept. 25.

1934

Lincoln Ellsworth and Bernt Balchen attempted to cross the continent in a ski-equipped Northrop Gamma, but failed.

1934

The British Graham Land Expedition used a deHavilland Fox Moth aircraft, along with a tractor and dog teams, to survey the western side of the Antarctic Peninsula. The Fox Moth could be fitted with skis or floats, depending on the situation. The first flight was Jan. 2, 1935.

1935, Nov. 23-Dec. 15

Lincoln Ellsworth and pilot Herbert Hollick-Kenyon crossed Antarctica in a Northrop Gamma 2B from Dundee Island to the Bay of Whales, about 3,400km. It took 14 days.

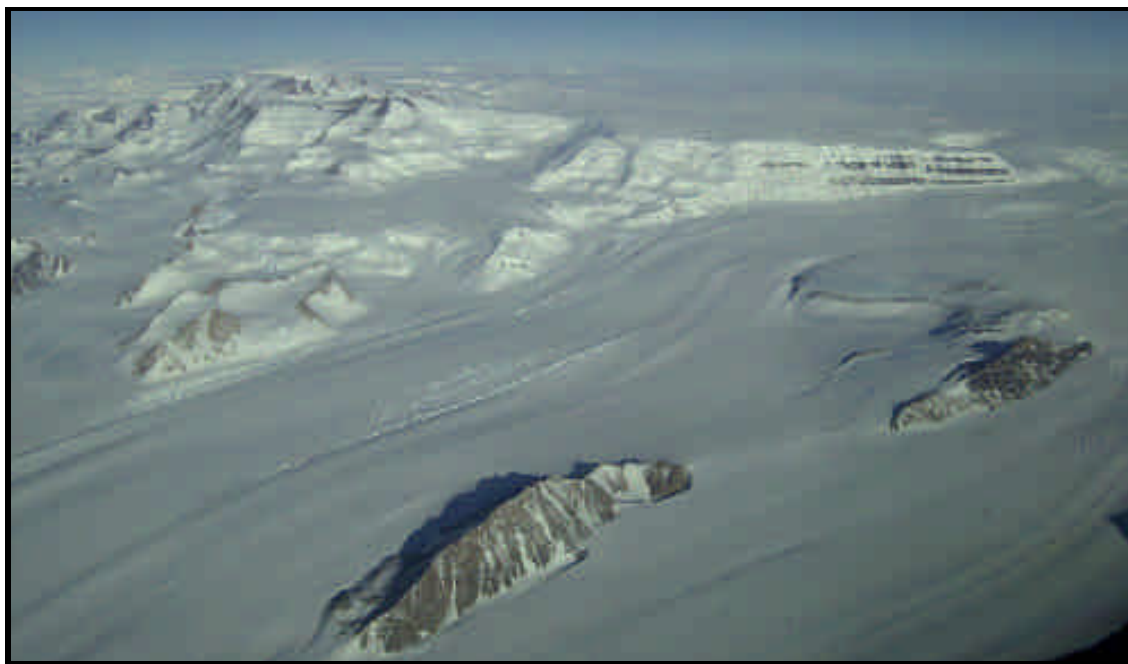


Photo by Kristan Hutchison / The Antarctic Sun

Richard Byrd named these brown ridges on the Liv Glacier the June and McKinley nunataks for the relief pilot and mapper during the first flight to the South Pole 75 years ago.

Byrd

From page 9

Skier 94 turned south at 1:30 p.m., following the ghost of the Floyd Bennett, which had lifted off at 3:29 p.m., 75 years ago. The Floyd Bennett flew so low Balchen could follow the dogsled tracks left by a geological party going to the base of the Transantarctics. From Skier 94's altitude, rising back to 5,300m, even the heavy tractors and trailers of the South Pole traverse were a mere blip on the radar screen.

Had Byrd been there to glance over the cabin of this modern machine, he would have been impressed with the amount of space inside. Even with three sled frames taking up the space of a family car, the loadmasters had room to pace in the hold. The sled frames would be used at the South Pole to pull heavy drilling equipment into place for the IceCube project, which is creating the world's largest neutrino detector by implanting instruments deep in the ice.

The Floyd Bennett had no room for extra cargo, being tightly packed with a sledge, sleeping bags, cans of gas, food and survival gear until there was scarcely room for the four men to move. Skier 94 also is a flying survival kit, with stoves, ice saws and sledgehammers tucked away in the walls. A stack of large duffel bags held extra clothing and sleeping bags for each person on board. The gear gets used a couple times a year, on average, when flights are diverted because of weather.

"It's easy to get complacent, because our planes are very reliable, very comfortable," said Doll. "But you still have to face the

harsh reality of flying over the coldest, windiest continent."

While Byrd had worn a cumbersome fur parka throughout his flight to keep warm and Balchen landed with frostbite on his nose, the Skier 94 crew sat comfortably in their flight uniforms, without coats. Instead of shouting and passing notes, as Byrd had done, they conversed comfortably through the headsets over hot coffee and microwaved pizza.

Below, sastrugi-strewn ice flashed by. Byrd compared his speed to Amundsen, who was pleased to make 40km per day, while the Floyd Bennett averaged 144km per hour. Skier 94 beat them both, clocking 480kph most of the way.

The "Hump" appeared, where the ice surface lifts from near sea level up the glaciers and the Transantarctic Mountains to the Antarctic Plateau at 2,800 meters.

For Byrd, this was the riskiest part of the flight. Without maps or knowing the height of the glaciers, he had to choose which way to go. He chose the Liv Glacier and barely made it, having to toss all their survival food through a trap door to lighten the plane and allow it to rise over the "Hump." They cleared the pass by just 150m.

"If you're shaving your performance margin that thin, you're really, really pushing it," Doll said.

Already at 5,500m, Doll looked down at the path Byrd had taken. The peaks that had been above Byrd's wingtips were low bumps and the bags of food bursting open

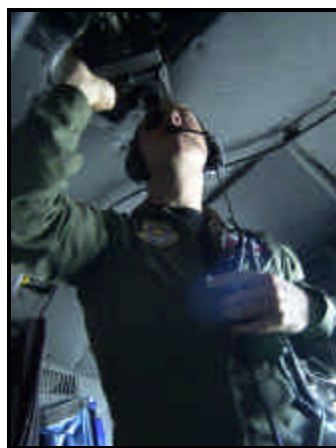


Photo by Kristan Hutchison / The Antarctic Sun
Navigator Vinnie Wilson uses a sextant, as Byrd did.

See Byrd on page 11

Pilot with a view of the past

Pilot Mark Doll didn't mind a break in his routine, even if it meant a 650km detour on the way to the South Pole.

For him, it was a once-in-a-lifetime chance to experience a piece of aviation history. As the flight started, he read navigator Richard Byrd's description of the original flight aloud to the crew over the headset. It's a story Doll has read many times before. He recently completed a paper on the development of skied aircraft and is a flight instructor for the aircraft.

Doll was born to it. His father was in the same New York Air National Guard unit for 26 years, the 109th Airlift Wing. Doll joined in 1992 and has flown to the South Pole more than 100 times since.

"It's a one-of-a-kind mission, a one-of-a-kind airplane," Doll said. "This is really the last place where airlift is somewhat unique and rare, and to be part of the crowd that gets to fly these is really a privilege."

In Antarctica, Doll is an expert at making the first landing at a site, said fixed-wing coordinator Joni English. That's allowed him to see most of Antarctica from

the air, and be the first person ever to land in some areas.

"When you do an initial put-in, you stop the airplane, open the doors, step in the snow and you're it. You're the first guy," Doll said. "That's a unique experience."

As a pilot who has often been the first to land or take off from remote sites, Doll has a special appreciation for what Bernt Balchen, the pilot on Byrd's flight, accomplished.

"He's really the one who flew the airplane and kept Byrd out of trouble," Doll said.

Flying in snow has particular challenges, Doll said. It's easy to lose all depth perception and the conditions change quickly.

"In snow, it's completely different at every camp," Doll said. "Every day changes, it can even change hourly just by the way the wind and the sun and the clouds are warming up the snow, blowing the snow or even the way the camp personnel are grooming the snow. It's always a challenge to figure out the best way to get the airplane airborne."

Doll has visited the Floyd



Photo by Kristan Hutchison / *The Antarctic Sun*
Major Mark Doll pilots an LC-130 over the site of Little America.

Bennett, the Ford Tri-Motor Byrd flew to the South Pole, several times at the Henry Ford Museum.

"It was kind of remarkable to see a plane that has been to the Pole and back sitting in a museum in Michigan," Doll said. "It's just amazing they got the airplane out and it's still very well preserved in a museum."



Photo by Mark Doll / Special to *The Antarctic Sun*
The Floyd Bennett, the Ford Tri-Motor that was the first plane to fly over the South Pole, in the Henry Ford Museum in Michigan.

equipped C-47 Que Sera Sera there.

"I kind of wonder why Byrd didn't just touch the skis down," Doll said. "If I was there, I would have been tempted to do it, just so you could come back around, take a picture of your tracks in the snow."

South Pole crews unloaded the sleds for IceCube and fuel. The fuel will help run everything on the station, from labs monitoring the air and ozone for signs of climate change to the construction equipment building the new station.

Delivery made, Skier 94 again followed Byrd's lead and, as he had written, "We put the Pole behind us and raced for home."

No hat-tossing awaited the modern crew, no triumphant ticker-tape parade, but a warm dinner at the end of a days work.

Doll will give a talk on Byrd's historic flight, including pictures from the recent commemorative flight, at 8:15 p.m. Monday in the McMurdo dining hall.

Byrd From page 10

on the ice below would have been specks.

Tossing anything was out of the question on the modern flight. A different philosophy engulfs the Antarctic now, one of environmental stewardship. Since 1959, a treaty has protected the continent. The pristine snow plateau is just as Byrd had seen it.

"A white desolation and solitude disturbed by the sound of our engines," he'd written. "The Pole lay in the center of a limitless plane. No mountains were visible."

For Byrd, that had been the end of the story: "One gets there, and that is about all there is for the telling. It is the effort to get there that counts."

Not so anymore. A collection of black spots on the horizon grew swiftly into a collection of buildings and scientific instruments. Doll landed Skier 94 smoothly on the groomed snow runway in front of the new South Pole station, something Byrd didn't consider. The first landing at the South Pole waited until 1956, when Gus Shinn landed the ski-

1938-39

"Schwabenland" expedition, a secret mission for the Third Reich, uses two Dornier Super Wal flying boats to photograph 250,000sq. km of Dronning Maud Land in Antarctica.

1939-1941

U.S. Antarctic Service Expedition under Richard Byrd established Little America III and used a Curtiss-Wright Condor and Beech Staggerwing to explore the Marie Byrd Land coast. The expedition also kept a Barkley Grew T8P-1 two-engine seaplane on the ship and a second Condor at a base on Stonington Island.

1947

Operation Highjump brought 23 aircraft, including six C-47 cargo transports. The C-47s took off from the deck of the aircraft carrier *USS Philippine Sea* on Jan. 29 and flew 960km to Little America — the first time a large transport aircraft operated on wheel-skis. The planes were used to take 70,000 aerial photographs for mapping. Byrd made a second flight over the South Pole in a C-47 on Feb. 15.

1947, Dec.

"Operation Windmill" used ship-based helicopters to put survey teams at key points along the coast.

1955, Dec. 18-20

Seabees built the first sea-ice runway at McMurdo, later named Williams Field, for a construction driver who died.

1956

C-124 entered Antarctic service.

1956, Oct. 31

Gus Shinn landed the Que Sera Sera, a C-47, at South Pole. *(Story this page)*

1956, Nov. 20

A C-124 makes the first Pole airdrop of equipment and materials to build Amundsen-Scott South Pole Station.

1957

Short gravel runway built at Marble Point, in conjunction with a feasibility study, site survey and site investigation for a conventional runway.

1957, January

A Lockheed press release announced the first flight of the wheel-ski equipped C-130 aircraft from the factory in Georgia.



Photo by Kristan Hutchison / The Antarctic Sun

An LC-130 at the South Pole.

1957, Oct. 15

Pan Am World Airways Stratocruiser, the first commercial flight, lands at McMurdo. The flight was a military charter.

1958

C-121 entered Antarctic service.

1958

First nonstop transcontinental flight, by a DHC-3 Otter.

Jan. 1960

Twelve ski-wheel C-130Ds delivered began flying in Antarctica.



Photo by Kristan Hutchison / The Antarctic Sun

The new South Pole station as seen from the cockpit of an LC-130.

First touch down at the South Pole

By Kristan Hutchison

Sun staff

Flying over the South Pole was just the beginning. Eventually, somebody had to land.

During Operation Deep Freeze in 1956, America planned to build a research station at the South Pole as part of the International Geophysical Year. According to the plan, the station would be accessed and supplied by planes, though none had ever landed there.

"We didn't really know what the surface would be like," said Gus Shinn, the first pilot to land at the Pole. "We didn't know whether we'd start little earthquakes or whether there'd be hollow areas or whether the surface would be too soft."

On Oct. 31, 1956, they decided to find out the only way they could.

"My boss just said, 'Your crew will make the South Pole flight.' The next morning at 0200 I was awakened with the message, 'South Pole flight take-off at 0800.' And that's the way it was," said Shinn, now 83, from his Florida home.

Unlike Byrd, they did little to prepare for contingencies. They didn't pack extra food or survival gear beyond the old World War II gear they were wearing.

"I was like Lindbergh. We were going from McMurdo to Pole and back to McMurdo. I didn't give any thought that we'd have any trouble at all," Shinn said. "No one was prepared for any real problems."

The attitude matched the plane's name, Que Sera Sera, Spanish for "what will be, will be."

The C-47 took off with 16 jet-assisted take-off (JATO) bottles attached to the bottom to help it take off at the South Pole. It flew up the Beardmore Glacier, climbing from sea level to 3,000m.

At the pole, they circled, searching out the best place to land. Without a groomed runway, the empty plateau was scattered with frozen waves of sastrugi. Shinn aligned the Que Sera Sera with the sastrugi and

eased it down.

"It was a normal landing," he said. "The surface was very firm."

The shock was stepping out into -58C. All the cameras froze except one the navigator kept tucked under his clothes.

The crew spent 50 minutes on the ice, which turned out to be too long. The skis had frozen to the surface. Shinn fired three JATO bottles, but nothing happened. He tried again, this time with the remaining JATO bottles, and the plane staggered into the thin air.

The plane had difficulty with the altitude, about 3,000m above sea level, and the extreme cold. The flight instruments were sluggish. To top it off, between the blast of ice crystals outside and frost on the windshield, the pilots' visibility was zero.

"All these problems were unexpected, so we were really lucky to get away with it," Shinn said. "You wouldn't do that now. You know better."

They made it back anyway, for a roundtrip of 13.8 hours including the stop at the Pole and another to refuel at Beardmore Glacier. The lesson learned was to wait for warmer weather. The next landing at the Pole wasn't until November 20, when the temperature was up to -40C.

"That's really what laid the groundwork for what we do today," said pilot Major Mark Doll, who flies LC-130s for the U.S. Antarctic Program.

Many more flights followed as the station was built and supplied. Shinn landed at the Pole 17 more times over two years.

"It became quite easy. We got so we could fly a roundtrip without having to stop for fuel," Shinn said.

Shinn still visits the Que Sera Sera sometimes, at the Naval Aviation Museum near his home in Pensacola, Fla. The plane lost a wing and a rudder in Hurricane Ivan in September.

"It's like visiting a cemetery," Shinn said. "It's old and it's decrepit and the cockpit is chock-a-block with old instrumentation. I wonder how I ever got in and flew it."



Photo by Kristan Hutchison/ The Antarctic Sun

Loading sleds on the Williams Field Seance Runway at McMurdo Station into an LC-130 for IceCube, an astrophysics project at the South Pole.

Planes make Pole science possible

By Kristan Hutchison
Sun staff

Before aviation could really take off in Antarctica, the planes needed to improve.

Richard Byrd flew to the South Pole in a plane made of corrugated aluminum, with wooden skis attached to the bottom.

"There was no insulation. It was just a loud, noisy, cold, drafty airplane," said Major Mark Doll, an LC-130 pilot for the Antarctic program. "Those airplanes back then were very lightweight, fragile by our standpoint."

For the time, just 26 years after the Wright brothers first lifted off at Kitty Hawk, the Ford Tri-Motor was an advanced aircraft. But its top speed was the same as the slowest speed for modern LC-130s and it barely gained enough elevation to climb to the Antarctic Plateau.

"They did a good job with that old Tri-Motor Ford," said Gus Shinn, a pilot who came down with the next generation of planes, the C-47 "Gooney Birds," also called DC-3 Dakotas by civilian airlines.

In the 18 years since Byrd's first flight, aviation advanced enough to allow for the first large-scale aerial expedition to Antarctica, Operation Highjump. The C-47s the Navy brought down were the first large transport aircraft to operate on wheel-skis. The ski position could only be changed by moving a pin on the outside, but the C-47s had a larger cargo capacity, longer range and internal heating.

"It was a huge leap in technology," said Doll.

In 1947, Shinn and Byrd rode down with the planes on the aircraft carrier *USS Philippine Sea* and walked the decks together, but never spoke about the first South Pole flight. They were both more interested in the flight at hand, the first attempt to launch C-47s off an aircraft carrier.

"We didn't know whether we'd get off the deck or not," Shinn said from his home in

Florida.

Byrd was in the first plane to take off the deck on Jan. 25, 1947, and Shinn followed soon after.

Shinn flew C-47s again eight years later, as part of the U.S. science program's Operation Deep Freeze during the International Geophysical Year. He was the first to land at the South Pole and the ability to fly there made it possible to build Amundsen-Scott South Pole Station. South Pole and McMurdo stations have operated ever since, relying on the regular flow of flights all summer.

"We depended on those flights for our mail or our freshies. We hated to see a flight turn back with mail on it," said Billy-Ace Baker, who was a radioman at McMurdo Station for 14 seasons, from 1962 to 1980. "We also hated to see a flight come in if it didn't have mail on it."

There were still a lot of risks involved. The C-47s were stretched beyond their limits, and carrying so much weight that occasionally the landing gear collapsed, Shinn said. The white-on-white Antarctic landscape can also fool the eyes, causing pilots to lose depth perception and fly into the ground. In early years, the planes did aerial surveys, trying to fill in the blank areas on maps without flying into the mountains they were mapping.

"It was a unique time," Shinn said. "We lost a lot of airplanes and we lost some people and I hope we learned."

At that time, many science parties had to traverse to their research sites. That took a lot of time, limited how far they could go, how long they could spend in the field and was sometimes dangerous, said Billy-Ace Baker.

"It was weeks," Baker said. "Things happened, but they did it."

The plane that became the standard for the U.S. Antarctic Program, the LC-130, appeared

1962

Turbine helicopters (UH-1) entered Antarctic service.

1966

USAF began C-141 flights to McMurdo.

1967, June 18

First winter flight to McMurdo by Lan C-130. A second one was flown on Sept. 2. The "Winfly" became a regularly scheduled event.

1967, Dec. 2

Last C-47 flight, from Hallett Station to McMurdo.

1973

Inertial navigation system introduced, which gives precise position, distance, speed, track, heading and course deviation.

1973

DHC-6s used by U.S. Antarctic Program.

1979 Nov. 28

Air NZ DC-10 crashed on Erebus, killing 257. The tragedy disrupted plans to commemorate the 50th anniversary of Byrd's flight over the South Pole.
(Message on page 17)

1987

DC-4 flew to Patriot Hills.

1989, Oct

C-5 flew from Christchurch to McMurdo.

early 1990s

GPS, global positioning system, came into use, providing bearing, track, ground speed, distance, estimated time to destination or waypoint, and course deviation.



See Planes on page 14

THEN & NOW



Model	Ford Tri-Motor	DHC-6	LC-130
Nickname	Tin Goose	Twin Otter	Hercules
Year introduced	1926	1965	1958
Maximum weight	6,803kg/15,000lbs	5,670kg/12,500lbs	70,307kg/155,000lbs
Length	15.3m/50ft 3in	16m/52ft	30m/97ft 9 in
Wingspan	22.55m/74 ft	20m/65ft	40m/132ft 7in
Cargo capacity	n/a	11cum/384 cu ft	107cum/3,782cuft
Power	2 x 222hp, 1 x 525hp	2 x 1,240hp	4 x 4,590hp
Cruising speed	145kph/90mph	248kph/154mph	462kph/287mph
Maximum speed	259kph/161mph	296kph/184mph	602kph/374mph
Range	1,700km/1100miles*	1,448km/900miles	3,379km/2,100miles
Maximum altitude	3,700m/12,000ft*	7,620m/25,000ft^	10,700m/35,000ft^
Passenger capacity	8	19	94
Roundtrip flight to Pole	18 hrs. 39 min.	9 hrs.	6 hrs.

* as Byrd's plane, the *Floyd Bennett*, was configured ^with oxygen

Planes From page 13

2004, Nov. 17

A routine cargo flight to the South Pole diverted 650km off-course to follow the route taken by Richard Byrd 75 years ago, making the trip in a third the time with fuel to spare to keep Amundsen-Scott South Pole Station running

Timeline sources:

Mark Doll; Billy-Ace Baker; Gus Shinn; Notes on Antarctic Aviation by Malcolm Mellor, CRREL; Readers Digest Antarctica; Polar Aviation edited by Lt. Co. C.V. Glines; Antarctica An Encyclopedia by John Stewart; Moments of Terror by David Burke; Gateway to the Ice by Tony Phillips; 20 Years on the Ice edited by Billy Blackwelder; Americans in the Antarctic 1775 to 1948 by Kenneth Bertrand; US Army Report of Operation Highjump edited by Paul Siple.

on the ice runway in 1959. The LC-130 is the largest plane to be fitted with retractable ski-wheels, and probably will remain so, according to a report by Malcolm Mellor of the Cold Regions Research and Engineering Lab, who called it the basic workhorse of Antarctica. The Navy flew them for the Antarctic program until 1999, when the mission was turned over to the New York Air National Guard.

"The big progress was made when the LC-130s came in," Shinn said. "It's amazing what you're doing down there now."

The LC-130 can carry about 12,700kg of fuel and cargo to the South Pole, nearly twice the total weight of Byrd's *Floyd Bennett*.

"In combat, you can put more on this aircraft," said loadmaster Randy Powell. "But the penguins are not rebelling."

Now the LC-130 can take researchers to otherwise unreachable sites, like the Pine Island glacier where aerial geophysical surveys by smaller Twin Otter planes will allow glaciologists to map the base of the ice field. That's just one of the 22 science groups being served this season in the deep field, said Joni English, fixed-wing coordinator.

LC-130s will probably remain the mainstay of the fleet, since skis for a larger plane would be cumbersome, Doll said. There also isn't much demand for large planes on skis. Greenland and Antarctica are the only places with large enough expanses of open snow to operate the LC-130s. Doll guesses the next improvements will come in other areas, like runway construction and weather forecasting. Significant progress in those areas has already made flying safer and more reliable, including the ability to compact snow into a solid pavement at Pegasus Runway. The hard surface allows wheeled planes, including large cargo planes, to land at the runway for more of the

season.

But no technology will remove the basic challenge of polar flying — the weather. Even with the advances in weather forecasting, a couple LC-130 flights each year run into unexpected storms as they approach McMurdo, forcing them to divert.

"The environment we fly in today is the same as they flew in back then. We have better training and better equipment, but we're still performing the same mission," Doll said.

The flying season is still limited by the temperature. The hydraulic fluid thickens below -50C. The fuel gels at -58C.

The cold, dry weather also causes constant maintenance problems as seals contract and crack, causing leaks, said Chief Master Sergeant Dave Willoughby, superintendent of maintenance. The six LC-130s fly about 3,000 hours in each six-month season, and the maintenance crews see the wear and tear.

"In a short period of time, we do an awful lot of flying," Willoughby said. "That wreaks havoc with the equipment and people both."

The maintenance crews have to fix the planes outside in the same weather.

"You can't work very well without gloves," said Master Sergeant Chuck Shannon. "That's what slows everything down a little. Nothing seems to move easy in the cold — equipment or people."

The next improvement in Antarctic transportation may bring the U.S. Antarctic Program full circle, back to the ground. Now the South Pole traverse is testing the concept that cargo could be hauled to the Pole by tractors reliably enough to free-up more LC-130 flights for other needs.

"The surface traverse that they're working on is probably going to be the next big step, frankly," Doll said.



Photo courtesy of Doug MacAyeal / Special to *The Antarctic Sun*

Elizabeth Traver and Mac McKeel set up a seismometer and solar panels on the giant iceberg C16, with the slope of Mount Erebus in the background. Doug MacAyeal's group of scientists put equipment on the icebergs that will help them track where the bergs drift.

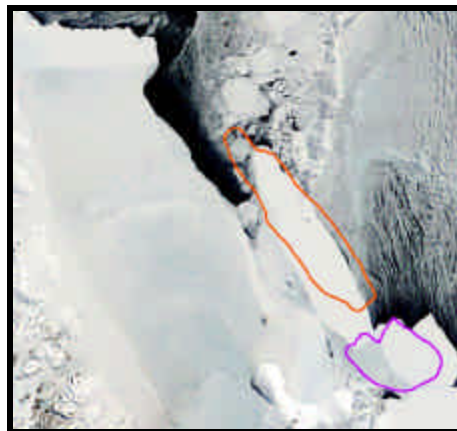
Bergs From page 1

are sticking around. This gives him and his team more time to collect data on the movement and characteristics of giant icebergs. In the meantime, the icebergs are helping to cause a buildup in the sea ice near McMurdo station. The icebergs have also damaged penguin colonies nearby, and may be affecting the seal populations as well.

MacAyeal, a professor of Geophysical Sciences at the University of Chicago, left McMurdo Station last week after working six weeks to put instruments on the various icebergs. He and his team now have seven GPS and weather monitoring stations, and four seismometers in the field. They hope to learn more about what causes icebergs to calve; how and why they drift (or don't drift, as the case may be); study what happens when the icebergs warm; and learn why they are producing previously unknown tremors that are picked up on seismometers as far away as Tahiti.

Situation here

Massive icebergs are part of the natural cycle of the Ross Ice Shelf. The shelf pushes forward toward the sea, and large icebergs must calve off every 50 or 100 years. Otherwise the shelf would reach to New Zealand by now, MacAyeal said.



Satellite image by Jessica Walker / Special to *The Antarctic Sun*
The colored overlay shows B15a and B15j as they were on Nov. 23, superimposed over the berg's positions on Nov. 9.

B15 broke off the Ross Ice Shelf along with the smaller, but still enormous, C16 in March 2000. When the full B15 calved, it was nearly 10,850-square kilometers, or roughly the size of Jamaica, and was the biggest recorded iceberg in the world. B15a, the largest intact piece, is more than 3,000-square kilometers.

This is the first time scientists have been so well positioned to study giant bergs, because these ones are hanging out so close to a large station.

B15a moved 32km north between Nov. 13 and Nov. 23, according to the most recent data MacAyeal had. But the shift north isn't the most interesting change. The giant berg also rotated counterclockwise about 18 degrees. This means that it's now on the west side of Franklin Island for the first time. While it was east of the island, it was blocked from moving much farther north.

If B15a moves in precisely the right way through a gauntlet between Franklin Island and nearby shoals — which MacAyeal says is unlikely — it could keep moving north right up to the Drygalski Ice Tongue and effectively block off the opening to McMurdo Sound.

"It's like the key has turned and can fit in the door," he said.

MacAyeal said it's more likely that B15a has gone as far north as it's going to go for now and that its north end is grounded on a shoal. This leaves room for ships to get into McMurdo Sound this year.

The bigger problems could come next year, MacAyeal said. The bergs have been acting like a breakwater, blocking the normal wind and water currents from sweeping into McMurdo Sound with their full force, so the sea ice has been building up each year

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Photo by Emily Stone / The Antarctic Sun

The edge of B15a as seen from a helicopter flying over C16. B15a is the largest of the bergs that split off the massive B15, which calved into the Ross Sea in 2000.

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instead of breaking up. The grounding of B15a will only compound this, MacAyeal said. National Science Foundation officials hope the bergs will float away and stop causing problems.

"I don't think it's going to go away," MacAyeal said.

This is not the iceberg's northernmost journey. It's been farther before, but on the east side of Franklin Island. MacAyeal said that at a pace of more than three kilometers a day, this was one of the iceberg's fastest periods. The other two were during the major May storm that swept through McMurdo and after a 2002 earthquake in Peru.

The secret life of icebergs

When MacAyeal raced out to B15 in 2000 to put instruments on it, he thought he'd quickly learn what makes icebergs drift north and what happens to



Photo courtesy of Doug MacAyeal / Special to The Antarctic Sun

From left, graduate student Kelly Brunt, scientist Doug MacAyeal and graduate student Marianne Okal put a seismometer in place inside a snow vault to learn more about why the iceberg is creating tremors.

them along the way. Instead, he's learned a lot about why icebergs don't move.

The strong winds that rip across the continent come from the south, so he figured the bergs would be pushed north. It turns out the icebergs are sensitive to tiny dips in the level of the ocean.

The ocean is like a golf ball with little dimples caused by changes in barometric pressure. There is a dimple just off Ross Island where the bergs are sitting. MacAyeal said that as little as a 25mm slope change over 100km would be enough to counter the effects of wind on a giant berg.

"The icebergs say I'd rather fall into this little dimple and I don't care what the winds are because I'm so big," MacAyeal said.

The winds won't be able to move the icebergs until they've broken up into smaller pieces, he said.

MacAyeal and his team have put GPS and weather monitors on many of the icebergs to be ready when they do move.

One of the things he's most interested in is how the bergs react to warmer weather.

"I think a little piece of Antarctica drifting north would tell us what would happen here if it gets warmer," MacAyeal said.

Scientists got a glimpse of this in July from satellite and space station pictures of two icebergs off the coast of South Georgia Island. One of the icebergs collected meltwater in ponds on top, while the other was at an angle that allowed the meltwater to run off into the ocean. The one with the ponds suddenly shattered. The other stayed intact.

Glaciologists think that water filled in surface cracks in the iceberg. Because water is denser than ice, it acted like a steel wedge and eventually shattered the iceberg. This could have caused the similar, spectacular disintegrations of ice shelves along the Antarctic Peninsula, such as the 3,000-square kilometers of the Larsen B Ice Shelf that shattered in 2002.

Tracking the icebergs as they melt could have a side benefit, MacAyeal said. There is a huge shortage of fresh water in

Mystery Tremors

The giant icebergs sitting at the edge of McMurdo Sound aren't just floating around idly. It turns out they're making music together.

Or at least what sounds like music on a seismometer. Seismometers in Tahiti started picking up unusual tremors in 2000, at the same time that seismometers on Mount Erebus started picking up equally unusual signals. Iceberg researcher Doug MacAyeal and the seismologists have now determined that the tremors are coming from the icebergs when they bash against each other.

In order to learn more, MacAyeal's team put seismometers on three of the icebergs and on the "baby tooth" that is getting ready to calve off the Ross Ice Shelf. This will help them understand what's happening inside the bergs. MacAyeal said the friction between two bergs as they slide against each other might be causing one to resonate like a cello that has a bow drawn across it.

the world. Perhaps these melting bergs could somehow be harvested for their water. To make his point, MacAyeal calculated that if B15 were sold on the freshwater market in the arid Middle East, it would garner \$320 billion. Of course, getting it there would be a problem.

MacAyeal wants to get a glimpse not just of an iceberg's death, but also its birth.

A "baby tooth," as MacAyeal calls it, is sticking out at the edge of the Ross Ice Shelf. It's the only part that didn't fall off when B15 and C16 calved, and should be the next to go. The scientists, with help from mountaineers and equipment experts on station, put GPS and weather monitors on the piece, hoping to learn what causes the shelf to calve and create an iceberg — whether it is a storm, an earthquake, a tsunami, or something else they haven't thought of. The team also positioned a camera to look into the large rift in the ice where it will calve, which they will be able to monitor online.

The scientists had a successful six-week visit this season and were able to put all their instruments into place. They will return next year to continue their work. The instruments should last about 10 years — plenty of time to record the drifting of the bergs, as long as they start drifting.

"We'll have a whole armada of icebergs that are prepared to be observed as they drift north," MacAyeal said. "We hope they don't just sit here for 10 years."

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

Erebus and the icebergs

By Emily Stone
Sun staff

The Mount Erebus volcanologists thought it was curious when their instruments started picking up continuous ground vibrations, called harmonic tremors, in 2000. These types of tremors are usually associated with highly active volcanoes, and are rarely observed at Erebus.

A Crary Lab technician at McMurdo Station suggested that perhaps the tremors had something to do with the enormous icebergs that had fallen into the Ross Sea earlier that year.

"We said, 'ah, that's a stupid idea,'" said Phil Kyle of the New Mexico Institute of Mining and Technology. Now, he wishes he could remember which tech said that, so he could apologize. It turns out the guy was right.

Scientists now believe the large B15 and C16 icebergs, and the smaller ones they have since broken into, could be having a pronounced effect on Erebus.

Erebus used to have small eruptions two to six times a day, fairly consistently since 1984, Kyle said.

"Then those little eruptions more or less stopped," he said.

The harmonic tremors started at about the same time.

The scientists speculate that when the bergs hit Ross Island or crash into each other they create

vibrations. Those vibrations mobilize the gas inside Erebus' magma and force it out the crater in small bubbles.

Richard Aster, another of the Erebus scientists, explained that Erebus' eruptions are caused by huge gas bubbles that reach the surface and then explode.

"You have to have the ability to grow these large bubbles," he said. The icebergs are largely suppressing this.

Iceberg researcher Doug MacAyeal likens the bergs' action to burping a baby to prevent a bigger "eruption." Kyle compares it to tapping the side of a glass of soda or champagne and watching the bubbles float to the surface.

Aster demonstrated on a computer what the harmonic tremors sound like when a recording of the ground's motion is played at an increased speed. They resemble whale calls, or sometimes the pings of submarines, punctuated with occasional short, horn-like blasts. What's causing these noises in the icebergs remains largely a mystery, the men said.

No one has studied this type of interaction between volcanoes and icebergs before, they said.

They were lucky, Kyle said, that they set up six new, highly sophisticated seismometers on Erebus three years ago.

"We had this whole network of seismometers to study Erebus," he said. "The irony of the whole thing is that all we've done is monitored the icebergs."

NSF-funded research in this article. Phil Kyle, New Mexico Institute of Mining and Technology, <http://www.ees.nmt.edu/Geop/Erebus/erebus.html>



Iceberg C-16 extending back toward Ross Island.

Photo by Emily Stone / The Antarctic Sun

Message from the director on the anniversary of Air New Zealand crash:

To our friends, hosts, and colleagues in New Zealand:

Antarctica is often called the "Harsh Continent." At their worst, its conditions are unimaginably severe. Even at best they can stress both body and mind.

In the face of such unrelenting hardship, what keeps those who work there safe and secure — and adds immeasurably to their peace of mind — are the bonds between people and among nations in the face of common adversity. Perhaps nowhere else in the Antarctic are those bonds forged so closely as between the Americans at McMurdo Station and their Kiwi neighbors "over the hill" at Scott Base.

Twenty-five years ago this month, on November 28, an Air New Zealand DC-10 crashed on nearby Mount Erebus. None of the 257 passengers and crew aboard survived the crash.

The tragedy resonates through the years for the families of the passengers and crew, for all those on Ross Island who responded to that terrible event, and even for the New Zealander who has no personal connection.

We wish them all some measure of peace from the passage of time.

The thoughts of the men and women of the U.S. Antarctic Program are with all who gather to commemorate this tragedy and all who reflect alone on its aftermath. Americans, and New

Zealanders, too, who still work in Antarctica, have very personal memories of those heart-wrenching days and weeks in 1979.

I am equally sure that many at McMurdo Station on November 28 will pause to look over at Mount Erebus, with a plume of volcanic steam rising skyward from its peak, and reflect on the loss.

Like you and like them, we have not forgotten. My thoughts are with you.

*Statement by Dr. Karl A. Erb
Director
National Science Foundation's
Office of Polar Programs*

Profile Mapping out a new life

By Kristan Hutchison
Sun staff

From rock to ice, from mapmaker to glaciologist, from support staff to Ph.D. candidate, Kelly Brunt has made the switch.

She took the familiar flight to McMurdo Station in October, but someone else was sitting at the desk on the second floor of the Crary Lab where Brunt had worked for four years as the Geographical Information Systems specialist.

One of the best parts of her job had been working with scientists from all disciplines who needed something mapped. That's how she met Doug MacAyeal, a glaciologist studying the massive icebergs loitering at the entrance to McMurdo Sound. She started tracking the icebergs' movements for him in 2000.

"Kelly has lots of initiative and during the years when she was the GIS person she would sort of anticipate what the next question would be," MacAyeal said. "I immediately realized she was someone, like so many people here, who had a lot of self-starting ability."

MacAyeal asked Brunt if she'd considered going back to school for a Ph.D., but she was too involved in her job at that time.

For the next two years she continued to help MacAyeal and other researchers. She created a bathymetric map of the area around the icebergs to help determine if they were likely to ground and mapped the drifting of the Ross Ice Shelf for the South Pole traverse. She wanted to go beyond plotting points and start to understand the phenomenon she was watching.

"I was watching the icebergs day-to-day more than anybody else. Did I understand what the heck was going on? No," Brunt said. "It's pretty much like the guy that stands guard over the parking lot, sees all the cars coming in the parking lot, sees all the people coming into that parking lot, but he doesn't understand what goes on in the parking lot."

The icebergs were going nowhere, and after a while Brunt felt that she was too. As she was looking around for something new, MacAyeal called again.

"He said, 'hey, I just got more funding and I need a grad student. What do you think now?'"

After visiting him at the University of Chicago, Brunt quit her full-time position with Raytheon Polar Services in Denver and moved to the Windy City.

"I want to keep using gray matter and I think this is the way to do it," said Brunt, who came to McMurdo as MacAyeal's graduate student this season. She quickly made herself an essential member of the team, MacAyeal said.

At one point MacAyeal had the wrong coordinates for a new iceberg. Brunt caught the mistake and fixed it the night before they were supposed to fly there. Brunt was in charge of tracking the details of their field work. She also became the morale leader for the team.

"She was the one who would always ask, 'Are you OK?'" MacAyeal said, and made sure that everyone on the team was. Once she earns her degree, which she hopes to do in four years,



Photo courtesy of Doug MacAyeal / Special to *The Antarctic Sun*
Kelly Brunt working on an iceberg this season. Brunt spent four years as the mapping expert at McMurdo Station before deciding to join the scientists in the field as a graduate student.

MacAyeal expects her to become an excellent teacher and field researcher.

"She's born to this," he said.

Brunt already has an undergraduate degree in geology from Syracuse University and a masters in geophysics and paleomagnetism from the University of Montana. Before coming to Antarctica, she worked for three years in Anchorage, Alaska, doing GIS and aeromagnetic work for the U.S. Geological Survey.

Despite all her hard work, Brunt may be best known at McMurdo for her birthday. No matter what the date, when Brunt walks into a room there's a chance people will chime into a chorus of "Happy Birthday."

The joke started her second season, on her actual birthday, Oct. 26. Her co-worker, Chuck Watkins, started the song in the dining hall at just the right moment to get everyone singing. People returning their dishes turned around to sing. Diners at the back of the room stood. As the short song echoed off the walls, Brunt grew redder and redder. Watkins thought it was so funny he prompted the singing several times the same week in the Coffee House, then expanded to other locations.

Since then, Brunt's been sung to more times than she can remember, at meetings, meals, and once by an entire section of sports fans at Coors Field in Denver.

She no longer blushes, but it still brings a laugh, which is akin to breathing for Brunt.

"Most people have to rev up to a smile. My system idles on laughter," Brunt said.

She tends to get other people laughing, too. In past years she performed as a member of the McMurdo improvisational theater group and in the Women's Soiree.

"This is such a safe, coddling community it makes stuff like that easier," Brunt said.

It was in the Soiree three years ago that she went on stage alone, with a guitar, and kept the audience entertained for 10 minutes just talking about her hometown in Connecticut.

"Most people just remember the guitar and that I didn't play it," Brunt jokes.

Though she now has a condo on the south side of Chicago, she still wears her Hartford Whalers hat and considers Connecticut home.

"I'm finding as I get a little bit older, the more you travel the more you see and the more you see of the world the more you learn about yourself," Brunt said. "Once you learn about yourself, typically what that brings you back to is the people who mean the most to you, and for me that's family."

When the iceberg B15 first broke and filled the news, she took umbrage that her home state was used as a size comparison. The next time a big iceberg breaks off, she hopes to be qualified to defend her state against those who would compare it to a floating piece of ice.

"Connecticut is bigger than the bergs," she said. "If I don't defend it, who will?"