

The Antarctic Sun

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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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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.

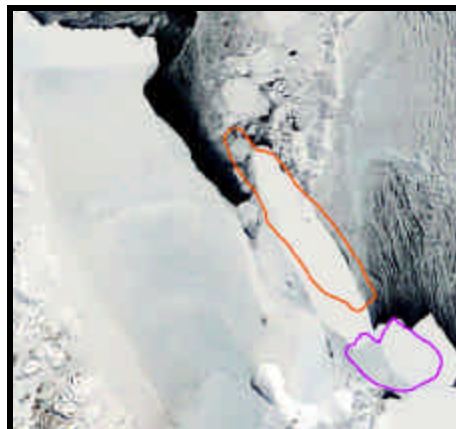
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are sticking around. This gives him and his team more time to collect data on the movement and characteristics of giant icebergs. In the meantime, the icebergs are helping to cause a buildup in the sea ice near McMurdo station. The icebergs have also 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/Geopl/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?"