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The Antarctic Sun

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What's the Dirt?

Researchers track soil movement and land erosion in the McMurdo Dry Valleys

By Peter Rejcek
Sun staff

If a tree falls in the forest and there is nobody around to hear it, does it make a sound?

Jaakko Putkonen is trying to unravel a similar mystery: If the soil in the McMurdo Dry Valleys moves but there's no one around to see it, how do you determine it is moving?

Unlike in the well-known tree riddle, determining if soil movement and landscape erosion is occurring is a measurable activity that the geologist from the University of Washington is here to study.

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Background: A dirt trap buried flush in the ground in the McMurdo Dry Valleys.

Nathan Turpen takes notes on a grid pattern while conducting fieldwork in the Arena Valley, which is part of the McMurdo Dry Valleys.

Jaakko Putkonen / Special to *The Antarctic Sun*

Greg Balco collects a rock sample Jan. 10 while conducting fieldwork in the McMurdo Dry Valleys at an area near Mount Electra.

Peter Rejcek / *The Antarctic Sun*

South Pole Skylab transition keeps sci techs on the move

By Peter Rejcek
Sun staff

Multi-tasking is one of those trendy words that has entered the lexicon in recent years. For someone like Neal Scheibe, it's a job description.

"There's days when I'm digging holes. There's days when I'm moving stuff. There's days when I'm trying to calibrate equipment. There's days when I'm troubleshooting software. There's days when I'm troubleshooting hardware," Scheibe said.

Scheibe is a research associate at the South Pole. His job for the next year is to ensure that the science projects operate smoothly throughout the 24-hour winter night. But this year he and fellow research associate Bob Melville have another ball to juggle: the transition of project equipment from the Skylab science building to the new science wing of the elevated station.

"It was a Herculean effort," Al Baker said of removing equipment associated with a dozen different science projects to the new science lab, as well as to the Atmospheric

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Quote of the Week

"The skuas may take my bread, but they'll never take my dignity!"
— McMurdo resident after skua attack.

Inside

Back home

Eric Hobday / Special to *The Antarctic Sun*

The South Pole Traverse field team pauses for a photo shortly after returning to McMurdo Station from South Pole on Jan. 14. Pictured, from left to right, are John VanVlack, Richard "Stretch" Vaitonis, Greg Feleppa, Judy Goldsberry, Tom Lyman, Brad Johnson, Russ Magsig and John Wright.

It took the traverse team less than three weeks to reach McMurdo after leaving from 90 degrees south. The traverse team, led by Wright, successfully completed a 1,600-kilometer overland trail between McMurdo and South Pole stations, creating the way for a possible future route to move cargo and fuel between the two points.

The route crosses the Ross Ice Shelf, moves up the Leverett Glacier and over the polar plateau to the South Pole. This was the fourth year of the project. The field team left McMurdo on Nov. 11 and arrived at Pole shortly before Christmas on Dec. 23. After a short respite, the crew set out from Pole on Dec. 28, finishing the round-trip journey in just over two months.

Cold, hard facts

McMurdo Dry Valleys

Why the area is special: It's the largest, relatively **ice-free** area on a continent that's 98 percent covered by ice.

Size: **4,800 square kilometers**

Average yearly precipitation: equivalent of **10 centimeters** of water

Permanent U.S. field camps: **six** (Lake Hoare, Lake Bonney, Lake Fryxell, F-6, New Harbor, Marble Point)

Largest lake: **Fryxell** at seven square kilometers

Deepest lake: **Vanda** at 75 meters

Longest river: **Onyx** at 30 kilometers

First scientific expedition: made in **1901** and led by Robert F. Scott, who coined the term "dry valleys"

Coolest name: the **Labyrinth**, a heavily eroded area in the Wright Valley

Source: www.mcmlter.org, Long Term Ecological Research project members, Geographic Names of the Antarctic

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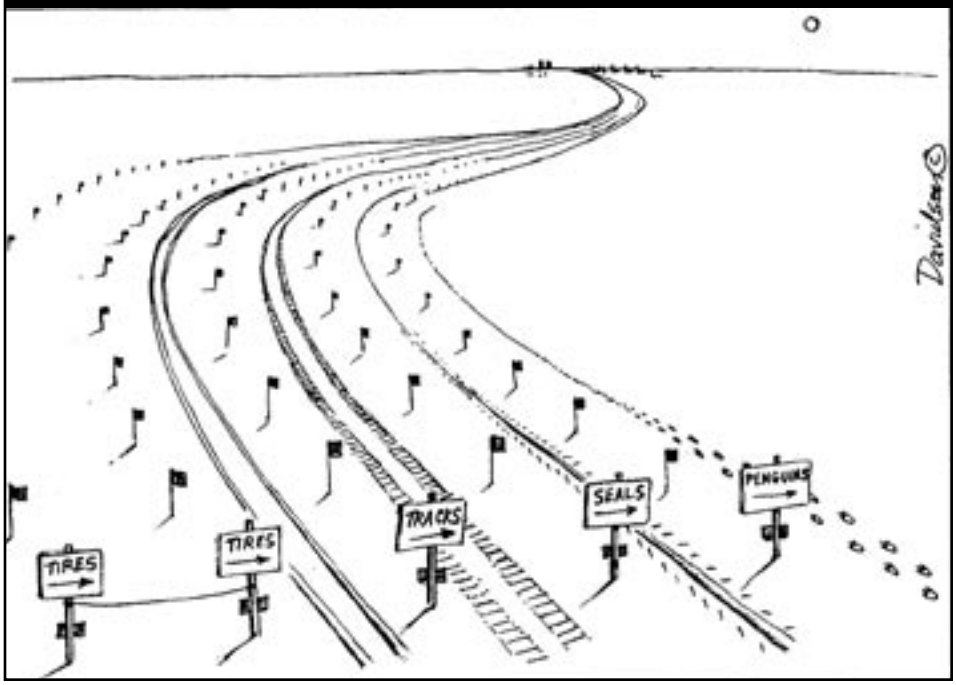
Level 1 Comix **Matt Davidson**



Meteoroids help reveal the mesosphere

By Steven Profaizer
Sun staff

Bob Dylan wasn't singing about upper atmospheric dynamics when he wrote the song, but scientists at the South Pole agree that the answer is indeed blowing in the wind.

The group is studying meteoroid remains in the atmosphere, which reveal information about the winds blowing them around 80 to 105 kilometers above the Earth.

"In order to understand the atmosphere as a whole, we have to understand how the layers of the atmosphere are coupled," said Scott Palo, principal investigator of the project and professor of aerospace engineering at the University of Colorado in Boulder. "We're trying to get our hands around the fundamental physical processes that are important to this region."

The group is using a meteor radar at the South Pole to transmit radio waves into the sky and bounce them off trails of electrons left behind by meteoroids traveling through the Earth's atmosphere.

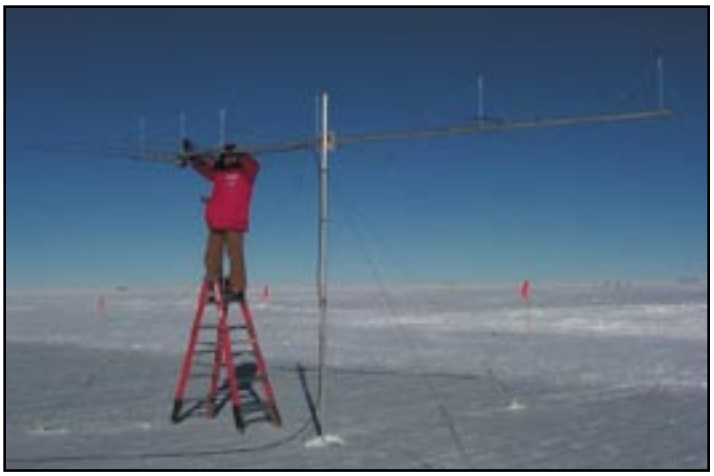
"A meteoroid will be happily flying through the vacuum of space — typically traveling about 10 to 70 kilometers per second," Palo said. "All of a sudden, it impacts the Earth's atmosphere, and the atmosphere gets increasingly more dense as it moves down in altitude."

As this meteoroid streaks toward Earth, it heats very rapidly. When the meteor can no longer take the heat, it is transformed from a solid into a trail of ions and electrons. The radar signals interact with these particles and are reflected back to the receiver.

"We have these trails of electrons left behind, and the wind in the upper atmosphere causes them to drift. It pushes them one direction or another," Palo said. "We can measure the speed at which those electrons are drifting and infer the wind speed."

The winds are a basic part of the upper atmosphere and essential to understanding its evolution, yet scientists do not know much about them.

"Very little is known about this region because it hasn't been well measured, especially in the polar regions," Palo said.



James P. Avery / Special to *The Antarctic Sun*

Nikolai Makarov works on a meteor radar antenna at the South Pole. The radar is part of a science project using meteoroid remains to study winds in the upper atmosphere.

The group is looking at the upper region of the mesosphere. This area is often referred to as the mesopause, which is the transition area between the mesosphere and the next highest layer, the thermosphere.

Until recently, scientists gave this region very little attention.

"It was referred to as the 'ignorosphere' because there weren't very many measurements made there," Palo said. "It's exciting to be working in an area where no one has made measurements before. It's all new."

The project was originally begun to complement NASA's satellite-based effort to study the upper atmosphere, which is called the Thermosphere Ionosphere Mesosphere Energetics and Dynamics satellite (TIMED).

The satellite is equipped with an instrument called TIDI, which stands for TIMED Doppler Interferometer, and measures light emission at very specific wavelengths to observe winds in the upper atmosphere.

Palo received the initial grant from the National Science Foundation to provide complementary ground-based data to what NASA was collecting from space. Both the satellite and the South Pole meteor radar went into operation in 2001.

Palo's instrument at the South Pole provides information that very few science groups are currently equipped to provide.

"There are only a handful of meteor radars around the world — maybe 15 or so," Palo said. "It's a very small community. It's one of those things where I could probably name all the people in the world who have a meteor radar."

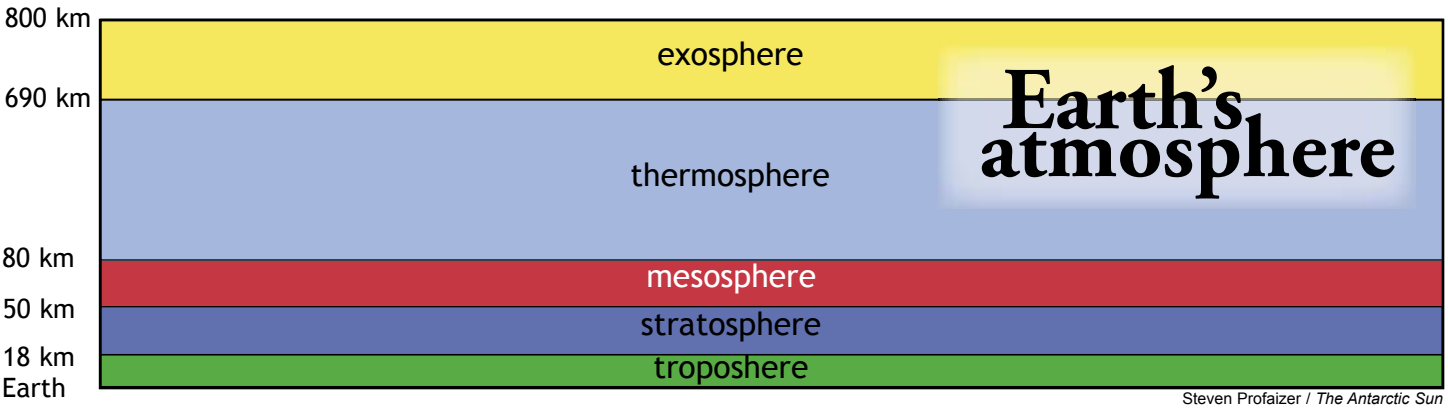
Out of that already small community, Palo said his group is one of only three or four that actually builds its own.

The team operates several other meteor radars they constructed in addition to the one at the South Pole — one in Alaska, one in Russia, and several in Colorado that are used for testing purposes. The other systems are almost identical in both design and purpose to the one at the Pole, and they provide a constant stream of data to the research team via the Internet.

The group travels to Antarctica once a year to perform maintenance and complete upgrades to the system.

"There are always things we are trying to improve," Palo said. "We always want to make the measurements better. Every year, we take incremental steps so that we have better data quality and a more reliable system. The longer it runs, the more we learn about how to make it better."

NSF-funded research in this story: Scott Palo, University of Colorado in Boulder.



Steven Profaizer / *The Antarctic Sun*

Perspectives

Skuas: Fierce foe or rugged Antarctic resident?

Seth Turer
Special to the Sun

Catharacta maccormicki. That's the scientific name of the bird that we know all too well at McMurdo Station, the skua. Yet to hear the word "skua" is to conjure up images of tenacious scavengers or bins of reusable clothing.

For many McMurdoans, the first sighting of this bird comes roughly in the middle of November, and might even be a pleasant experience. Indeed, the sight of life outside the dining hall can be a warm welcome. Not long after that first sighting, however, the skua comes to represent something quite different.

Words like "pest," "scoundrel," or "big flying jerk" come to mind.

The seasoned folks among us know what skuas are capable of, particularly if we've ever had the misfortune of carrying a food-filled blue tray back to our room. Indeed, this bird's aim is as good as the military's best strategic bombers; their temerity is that of a fearless soldier. They can swoop in on you, scoop up some fine cuisine — even through plastic wrap — and be up and away before you know it.

It's quite impressive to watch from afar. But to be a victim can make you one of the many advocates in petitioning to amend the Antarctic Treaty from protecting these scavenging masters. And masters they are! Put them in a ring against any crow, vulture or even the great bald eagle, and I'd put my money on the skua every time.

Despite the stigma of being a "winged rat," the skua has one trait that seems to be missing from the other aforementioned critters: personality. Every skua I have encountered made me want to call up Hannah Barbara or Warner Brothers to have them create a skua cartoon. Think of it: Bugs Bunny, Daffy Duck, Porky Pig and Skooey Skua. Heckel and Jeckel (Remember them? The mischievous crows?) got nothin' on the skua.

At McMurdo, we even have a standing resident skua. If you've ever walked past the dining hall loading docks, then surely you've seen him, Skua Steve/Skua Joe (the day shift and night workers in the dining hall still can't agree on the name, but since I'm on nights, Skua Steve it is).

Skua Steve is best identified by his right foot, or lack thereof. Yes, our one-legged friend can be seen day in, day out ... just sittin' on the dock, waiting for any kind of gourmet entrée on which to feast. He certainly gives a new meaning to Otis Redding's classic, "Sittin' on the Dock of the Bay!"

But Skua Steve, perhaps because of the whole missing-foot-thing, is a different sort of bird. Most others can best be seen flying high in the sky, scoping out the town, waiting for their next victim. But if you manage to get away from the bustle of MacTown, you can see the other side of the so-called "McPigeon." This is the real Antarctic side. They are birds that have tested time, toughed out condition one storms and been able to fly as far as the South Pole on rare occasions.

They have a serenity within them that reminds me of a graceful egret or swan sitting on a marsh or lake. The many times I've gone to Hut Point during these summer months, there is always a skua sitting there, relaxing and enjoying a beautiful, sunny day. I know that many would say that the birds are just conserving their energy, but I truly believe that they are reveling in the simple tranquility that we all come down here to find — the tranquility we so often lose when we are trying to fight away those pesky birds.

Seth Turer / Special to *The Antarctic Sun*

Above, a skua sits along the edge of Hut Point near McMurdo Station. The bird, which is often the only wildlife near station, is infamous for dive-bombing diners trying to bring food to their dorms. Seth Turer, at left, defends the unpopular beasts, which can weigh nearly two kilograms and have a wingspan upwards of a meter.

So why is it that we dislike these birds so much? Many people I've discussed this with have simply answered that they are threatened or annoyed by them. Annoyed by a bird? Sure, a blue jay might never shut up, a woodpecker will make a racket when you're trying to sleep. But these oddities of birds and the animal kingdom are what make nature so wonderful.

The fact that we're threatened by a bird seeking food that I believe has become conditioned or sensitive to the color blue (the same blue of our dining hall trays) seems more comical than annoying. I wonder if the skua would be the problem that it seems to be today if it were sensitive to fuchsia?

We live in a world where we are constantly trying to control our surroundings, and many come down here to escape that control. But in the end, we are the ones who are trying to control everything — in this case, a goofy looking bird that is just living in the harshest place on planet Earth.

After all, who was here first — them or us?

Seth Turer is working as a janitor during his first season at McMurdo Station.

around the continent

Photos by Rebecca Shoop / Special to *The Antarctic Sun*

Palmer Station residents have been treated to views of icebergs recently as good weather has allowed them to go boating.

PALMER

Mighty midges

By Kerry Kells
Palmer correspondent

Two cruise ships and a yacht visited Palmer Station last week. The M/V Ushuaia and the M/V Explorer II stopped by, and their passengers visited station for a quick tour. The passengers on the Ushuaia included college students in an environmental literature class from Pacific Lutheran College in Tacoma, Wash., and many European visitors. The Explorer II was a larger ship with many American, New Zealander and Australian visitors.

Richard Lee, from Miami University, gave the science lecture. He began with a slide show of Palmer Station from 1980 and 1981. At that time, Lee was working as a post-doctoral researcher with the University of Houston and traveled to the station on the research vessel, *Hero*. The photos showed a decidedly different place, with fewer buildings and with the old Navy dump sites still existing.

Lee spoke about four common Antarctic terrestrial arthropods found in the Peninsula area. These include a springtail, which can float by the hundreds in a limpet shell and has been studied extensively by the British Antarctic program; the mite, of which there are six to seven species; the tick, which feeds on penguins and other seabirds; and the midge, a flightless fly known as *Belgica antarctica*, the largest land animal and year-round inhabitant of Antarctica.

Lee's project focuses on the stress tolerances of the midge, which is the southernmost insect. This fly has four larval stages and pupates into an adult that lays eggs in egg masses. It takes two years to reach maturity. The *B. antarctica* lives in diverse microhabitats and is located only in this area of the Antarctic Peninsula. This species exhibits remarkable resistance to various environmental stresses such as cold, heat, desiccation, anoxia (lack of oxygen), and changes to pH level.

His group will define microclimate variability and environmental extremes, and then duplicate the midges' natural environmental conditions and investigate their physiological and molecular mechanisms of stress tolerance in the lab.

Marianne Kaput, a sixth-grade science teacher with the group, spoke about her part in an educational outreach program funded by the National Science Foundation. Kaput will maintain an interactive Web site and online journals, and will develop activities for elementary to high school students. She also hopes to publish some of her articles in teaching journals and plans to conduct distance-learning lessons from Palmer for 30 different classrooms.

With the winds calm and several days of sunny skies, boating allowed for some fantastic viewing of the icebergs around station. Some icebergs continue to float just off Palmer. However, we now anticipate storm activity in our near future as the winds begin to pick up speed.

SOUTH POLE

Continued progress

Tom Lohr
South Pole correspondent

Things continue to change at light speed at the Earth's southern axis.

Another string of neutrino detection modules has been deployed at IceCube, one of the world's largest science projects, moving humans a step closer to better understanding the origins of the universe.

The "graying" of the new elevated station continues at an impressive clip. The gunmetal gray siding is steadily covering the yellowish particleboard that has given the station a banana-like hue.

An ice crystal-rich atmosphere produced some of the season's most spectacular sundogs, sending Polies scrambling for their cameras to catch images of the fleeting beasts. A sundog is an atmospheric optical phenomenon associated with the reflection and refraction of sunlight by the numerous

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the week in weather

McMurdo Station
High: 40F / 5C
Low: 17F / -8C
Max. sustained wind: 30mph / 48kph
Windchill: -13F / -25C

Palmer Station
High: 45F / 7C
Low: 32F / 0C
Max. sustained wind: 37mph / 60kph
Precipitation: 7mm

South Pole Station
High: 1F / -17C
Low: -22F / -30C
Peak wind: 33mph / 53kph
Max. physio-altitude: 3,146m

Continent From page 5

small ice crystals that make up cirrus or cirrostratus clouds. They typically appear as a bright and sometimes colorful spot in the sky next to the sun.

Would-be Francis Ford Coppolas continue to roam the station late at night and on weekends, putting the final touches on entries into the renowned South Pole International Film Festival. The annual spectacle, premiering next Saturday, has become the most anticipated event of the summer, turning ordinary Antarcticans into film celebrities overnight.

The end of an era draws nearer as the South Pole continues to transition into its new digs. Veteran Polies are casting long, despondent stares at the Dome, which has housed the main South Pole infrastructure for three decades. While the new station boasts vastly increased luxury and capabilities, those with significant Ice time are slowly and sadly facing the realization that the end of the summer season will mark the closing of the venerable Dome.

Staff are gingerly removing and cataloging the historically significant paraphernalia that has found its way into the Dome over the years. Letters from heads of state, accolades, and portraits of former crews are being boxed up until their rightful place in the new station is decided.

Some historical gems have been found. A sweater worn by Adm. Richard Byrd during his landmark flight over the South Pole, and a book signed by Roald Amundsen were uncovered and are certain to hang with prestige in the elevated station.

Polies experienced a bit of the Twilight Zone on Jan. 15 with the arrival of five Britons re-enacting Capt. Robert F. Scott's 1912 push to the Pole. The team began its journey 270 kilometers from the geographical pole.

The vision of the crew, clad in early 1900s polar garb, as they pushed the final meters past the ultra-modern new station, made for a surreal sight. The Britons ensured that their endeavor mirrored Scott's in every way. Pulling a 400-kilogram sledge, all five were dressed exactly as Scott and his men were outfitted, from their rabbit-fur hats to reindeer-skin boots. The team even ate the same polar diet as Scott and his men, which they gladly let greeting Polies sample.

After the 16-day journey, the Englishmen readily agreed on one issue: they had the utmost respect for the early pioneers that braved the Antarctic elements in the name of polar exploration.

SHIPS

LMG

Compiled from reports
by Andrew Nunn
Marine Projects coordinator

We completed sampling at four more spots as part of the Long Term Ecological Research (LTER) cruise on Jan. 11.

After completing two more LTER sampling stations the next day, we made our way to the southern end of Renaud Island to drop off some sea bird researchers. They attached six transmitters and completed diet sampling on nine birds before returning to the ship. Conditions were excellent, although there was a great deal of ice in the area, and the birders only landed on two of their target islands.

On the 13th, we completed two inside stations en route to the high-density grid at Palmer Station. The following night, we met up with a Zodiac from Palmer Station to get some last-minute gear. We then began operations on the first high-density grid near Palmer. Grid operations consisted of numerous equipment deployments, including conductivity, temperature and depth casts.

By Jan. 13, we headed south from the Palmer area and completed two LTER stations that we had skipped prior to the Renaud Island operation.

NBP

Compiled from reports
by Harold "Skip" Owen
Marine Projects coordinator

We broke off the science schedule on Jan. 10 to head toward the helicopter rendezvous location near McMurdo Station. The ship got about 10 kilometers past the ice edge, where it encountered large ice floes. We put several personnel on the ice to survey a landing location. The helicopter arrived that night to deliver cargo.

The next day we continued east on the CORSACS project. CORSACS, or Controls on Ross Sea Algal Community Structure, is a project studying what controls phytoplankton dynamics. We were enjoying balmy temperatures but experienced a bit of a low trend that created some minor freezing in seawater incubators. No major problems so far, though. Clear skies and mostly moderate winds prevailed.

With a new day, the temperatures rose again. Work included the usual daily rounds of CTD and trace metal casts, and plankton tow stations every 55 kilometers, with the towed trace metal pump system in between.

We concluded our trace metal transect perpendicular to the Ross Ice Shelf on Jan. 14. The next day, we began working a slightly accelerated transect westward on CORSACS line number four. This will put us slightly ahead of the processing of each station, but we'll get back on schedule when we break off to meet the fuel tanker this evening. We anticipate eight to 10 hours on site to complete fuel transfer.

Continental Drift

If you could add a word to the Antarctic lexicon, what would it be and what would it mean?

"Shoveltastic! — Like fantastic, but in a snow removal sense. Relevant at the bottom of the planet."

Tyler Freeman, South Pole general assistant from Fairbanks, Alaska, first season

"McMurdo Twirl. It's when someone — not me, of course — is gossiping and stops to look behind them to see if the person is there."

Chrissie Penney, McMurdo recreation coordinator from Gilford, N.H., second season

"NPO for 'nasty putrid odor' in reference to the elephant seal wallows."

Brett Pickering, Palmer biologist from La Junta, Colo., ninth season

McMurdo fish may prove to be new species

By Emily Stone
Sun staff

Courtesy of Kevin Hoefling / Special to *The Antarctic Sun*

This critter was captured in the water near the McMurdo Station jetty in 15 meters of water in November 2004. It may prove to be a new species of fish.

You can count the variety of visible animals at McMurdo Station on one hand, so the idea that a new species would wander up to station might initially seem absurd. But there's a whole world living next door to us in the ocean that still yields many surprises — such as the mysterious fish found in front of the station last summer.

Paul Cziko and Kevin Hoefling spotted the fish immediately. It was a purplish-gold color against a big brown rock. And it looked like nothing the two divers had ever seen before.

Nor does it look like anything anyone has recorded seeing before. A year after the divers caught the mystery fish, they've done enough research that they're convinced it's a new species. Cziko is working on a paper to submit to a peer-reviewed journal, which, if accepted, will introduce the new species to the rest of the world.

The men saw the fish during a dive at the McMurdo Station jetty in November 2004. They were in about 15 meters of water collecting fish eggs for Art DeVries' fish biology group. They didn't have a net with them, but Hoefling was able to catch the fish in his hands and Cziko put a mesh bag around it so they could bring it to the aquarium.

They showed the fish to DeVries, who has about 40 years of experience with Antarctic fish, yet he'd never seen this type before. That's when Hoefling said he started wondering if they'd found something new.

"You just wouldn't think, 'I'm going to find a new species today,'" said Hoefling, who is a diver with the group. He is back at station this summer working as a flight line mechanic since DeVries' project isn't doing field work at McMurdo this year.

Cziko and Hoefling looked through "Fishes of the Southern Ocean," the bible of Antarctic fish species, and didn't find anything that resembled their fish. Hoefling took pictures and videotaped the fish in the aquarium. Cziko, a visiting research specialist at the University of Illinois with DeVries, planned to look into the issue back home.

He took up the project again about a month ago. With only 300 or so species of fish in the Southern Ocean, it was relatively easy to see that the fish didn't resemble much that was already cataloged, he said.

"There was only one that looked even remotely similar," Cziko said. That fish, *Cryothenia peninsulae*, had been caught during only one expedition in 1975, off the Antarctic Peninsula. About 20 fish were caught in the course of a few days.

The next step was to ask museums for samples of *Cryothenia peninsulae* to compare the known species to the mystery fish. Museums around the world collect plant and animal species to document past and present biodiversity, and to help scientists with their research.

Four samples arrived by UPS, and Cziko did a series of comparisons between the fish. He counted the scales and bones in its fins and calculated body measurement ratios, such as how big the head and fins are compared to the body.

About 90 percent of the measurements were the same between the two fish. But there were some important distinctions.

The mystery fish is much larger — 32 centimeters compared to 15 centimeters at the same life stage. The mystery fish has a large pit between its eyes, which is used to sense movement in the water around it. The pit is wider than the other species' pit and has a slight ridge in the middle. The new fish also has an unusual coal-black lining of its mouth and gills.

Cziko said he's done about 80 measurements comparing the new fish and the *Cryothenia peninsulae*. He's confident that they're in the same genus but are different species. He's hoping to write up his paper in the next month to submit to the journal *Copeia*, a publication that focuses on research about fish, amphibians and reptiles.

If the panel decides to accept Cziko's theory that the fish is a new species, he and Hoefling will get to choose a name for it. They have some ideas, but nothing they're set on yet.

They both want to pick a name that's descriptive and will help other researchers quickly identify the fish if they see it, rather than naming the fish after a person. For example, many Antarctic fish bear the name of polar explorers and scientists.

The giant *Dissostichus mawsoni* is named after Australian explorer Douglas Mawson who sailed with Ernest Shackleton and was part of the first ascent of Mount Erebus. *Trematomus bernacchii* is named after Louis Bernacchi, who was part of Robert F. Scott's 1901 foray to Ross Island. And *Pagothenia borchgrevinki* honors Norwegian Carsten Borchgrevink, the commander of the British Southern Cross Antarctic Expedition of 1898, which established the first winter station on the continent. The custom is not entirely dead, as DeVries has a fish named after him as well, the *Paraliparis devriesi*.

Cziko and Hoefling said they may focus on the pit in the fish's head, its iridescence or black gills and mouth. The genus, *Cryothenia* means "from the cold" in Greek.

The jetty where the men found the fish is a short walk from the station's main science building and is one of the most heavily fished and dived spots in all of McMurdo Sound. There were 1,701 dives at the jetty between 1989 and the end of last season, according to Dive Services Supervisor Rob Robbins, out of a total of 10,097 U.S. Antarctic Program dives in that time.

Hoefling said he has dived at the jetty hundreds of times in his six seasons diving here, so he was particularly surprised to find a new fish there. Cziko said he suspects the fish was attracted to the large, flat rocks that provide a safe place to lay eggs.

The fish's characteristics, like the fact that it's naturally buoyant, suggest that it may not spend much time on the ocean floor, making it hard for divers or trawling nets to catch it. This might explain why it hasn't been spotted before, Cziko said.

The discovery highlights how many species there may be in the oceans that we don't yet know about, Cziko said. It's impossible to fully understand human impact on ecosystems without knowing what is living in the oceans to begin with, he added.

"We still don't know everything," he said.

NSF-funded research in this story: Art DeVries, University of Illinois.

Dry Valleys film meant to inspire students

By Peter Rejcek
Sun staff

Nathan Turpen is a bit older than your average undergraduate student. But with age comes experience and focus, and he's already mapping out his future career in geology and glaciology.

The 30-year-old said if he had known about the possible careers available in science while he was back in high school, he might have gotten an earlier start.

"I was introduced to geology by happenstance," said Turpen, a student at the University of Washington in Seattle who worked in the McMurdo Dry Valleys this season with Principal Investigator Jaakko Putkonen. Putkonen is studying the processes involved with soil movement and erosion in the Dry Valleys, which has not been widely researched.

Putkonen's project, like most funded by the National Science Foundation, also involves an educational outreach component. It's a component that excites Putkonen, a researcher from the University of Washington. He's making a film of his fieldwork to show high school students back in his adopted state, particularly targeting Native American students.

"We want to show them that science can be fun," Putkonen said. His work takes him around the world, from the Antarctic to the Nepalese Himalaya.

Putkonen's fieldwork is akin to backcountry camping: The researchers spent nearly six weeks in the field, with only an occasional re-supply by helicopter from McMurdo Station. The scientists live out of tents, melt snow for water and hike upwards of 15 kilometers a day — all in a pristine environment that few people ever see or visit.

Graduate student Dan Morgan spent two field seasons with Putkonen. He said the fieldwork exposure he gets is not only vital to his own interests but also helpful to him as a teaching assistant at the University of Washington.

"To get a good handle on what's going on, you have to get out and look at it," he said, adding that the first time he ever went camping was at Joshua Tree National Park for a geology class.

Before heading into the field last month, the five-member science team did a live Web camera presentation to a couple of high schools stateside. Turpen said he was never exposed in high school to what science could offer him or what he could offer science.

"There was no physics guy telling me you should do great things," he said. "I think what Jaakko is doing is pretty phenomenal with the film."

Jaakko Putknonen / Special to *The Antarctic Sun*

Brendan O'Donnell, left, and Nathan Turpen level a Global Positioning System base station in the Arena Valley during fieldwork there this season. Both men are students under geologist Jaakko Putkonen, who is making a film of his work to inspire high school students to learn more about science.

Researchers interested in landscape erosion

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"It's such an outrageous thought, that nothing is moving here," said Putkonen, the project's principal investigator. "It's so foreign to the geological understanding of the surface processes."

Putkonen does not know whether there is significant soil movement occurring in the Dry Valleys or not. He wants an answer to that question for several reasons, but mainly because it will broaden the overall picture of landscape erosion, which is a well-documented process at the lower latitudes. Most soil movement in those areas is by water. At one extreme, he explained, is something like a monsoon that causes mudslides and radical geomorphic changes. The Himalayan Mountains are an example of this kind of process.

> "It's such an outrageous thought, that nothing is moving here."
>
> — Jaakko Putkonen, geologist

The current perception is that the Dry Valleys is at the other extreme, where erosion and soil movement seems miniscule.

"We're interested in how fast the landscape is changing, what processes are responsible for these landforms and how long does it take to make them," said Greg Balco, a geologist on the team.

This is the second and final field season for the project. Putkonen and his four team members spent nearly six weeks in the Dry Valleys. They established three primitive camps during that time in Arena Valley, the Labyrinth and near Mount Electra, where they believed liquid water would play the most minimal role in erosion and movement. They've been collecting rock samples for later lab analysis but also following up from last season on what

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Cosmogenic nuclide dating may reveal early ice influx into valleys

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Putkonen calls two low-tech methods to determine how quickly soil is moving.

The first method involved burying small, rectangle-shaped wooden boxes flush with the ground surface. They placed the dirt traps last season in areas where they believed there was a high probability to capture movement, such as at the bottom of a steep slope. The second low-tech approach involved taking photos of the ground at 17 sites.

The team returned this season to the same spots to re-photograph them. They'll compare the two pictures and see what changes may have occurred from one year to the next. They've also been following up on their 20 traps scattered across the Arena Valley and the Labyrinth, where deeply eroded dolerite gives the area a maze-like appearance. The sites were flagged and their coordinates recorded on a hand-held Global Positioning System unit.

"If something is in the box, [the soil] must have moved since I was there a year ago," Putkonen said. So far, they've found "significant amounts" of soil in the traps, according to Balco.

"We didn't know if we would observe any sediment transport," Balco said during a field visit near the Mount Electra campsite, where the team was busy collecting samples and doing reconnaissance for possible future work. The area is reminiscent of the high desert in the United States, with mesa-like features, and is about 1,400 meters above sea level. The ground is covered in sandstone and dolerite rocks of varying hues and sizes.

It's slow going over such rough ground. A typical field day can involve about a 15-kilometer roundtrip on uneven terrain, hauling large backpacks filled with supplies, equipment (including hammers and chisels) and canvas bags of rock.

The collection process itself is straightforward. Balco, for example, is on the lookout for places where he can collect samples on varying angles of slope or with different wind exposures. He makes notes, observes the surrounding landscape, picks his sample, chisels it off if necessary, photographs the site and then bags the rock.

All those heavy samples are eventually headed to the lab. That's when a third, far more high-tech process will be used, called cosmogenic nuclide dating. Cosmogenic isotopes are rare radioactive isotopes created when cosmic radiation interacts with an atomic nucleus.

Terrestrial rocks are pelted by radiation from outer space that changes the oxygen in the rock's quartz, producing a substance called beryllium-10 (Be-10). Because these cosmogenic isotopes have long half-lives (anywhere from thousands to millions of years), they are useful for dating geological features and activities. Be-10 production occurs at a steady rate. By counting the number of Be-10 atoms, scientists can determine the length the rock has been exposed at the surface. For example, if Be-10 occurs at a rate of 10 per year and there are 100,000 atoms present in a particular specimen, then the rock has been exposed for 10,000 years.

While the three techniques for collecting data seem disparate, they are related. For example, if the group collected a lot of rock and dirt in one trap, the radiation exposure in that area should be less because of the higher rate of erosion — the rock hasn't been at the surface as long as in areas where little soil movement is occurring. "These are two different ways of looking at the same problem," Putkonen said.

Putkonen's group collected about 500 kilograms of rock last season. Dating the material is a slow and meticulous process, he said, but "we seem to be getting really interesting results."

Courtesy of Jaakko Putkonen / Special to *The Antarctic Sun*

Scientist Jaakko Putkonen uses trekking poles to make his way across the rocky terrain in the McMurdo Dry Valleys.

The current understanding is that the Dry Valleys have been ice-free for about 10 million years. But if the cosmogenic nuclide dating shows the rocks have only been exposed at the surface for, say, two million years, then there might have been a more recent ice influx. Balco said the group is simply not finding rocks that have been exposed for 10 million years.

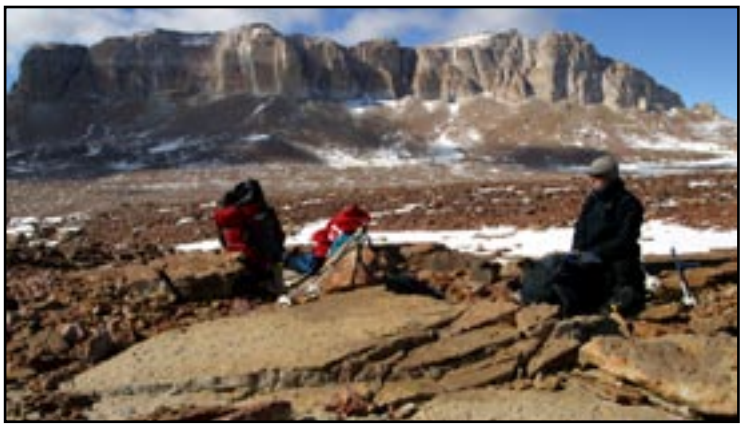
"One way to interpret the data is to say [the Dry Valleys were] ice-covered some time in the past," said Putkonen. Another possible interpretation is that the erosion rates are much higher than believed.

"What will probably turn out to be the case is that the Dry Valleys are far patchier than we think," Balco explained, meaning erosion is relatively fast in some areas and nearly non-existent in others.

Putkonen is more interested in understanding the landscape evolution and geomorphology of the Dry Valleys than just dating various rock surfaces there. If he can determine that the soil is indeed eroding and moving at appreciable rates, other questions arise, like how is it moved and where is the dirt ending up? There are places he calls "deflation hollows" where the soil is completely gone and the bedrock is exposed. How are these bald spots formed? Wind? Frost heaves?

"If I understand what the soil is doing, I can understand the more mobile part of the landscape," Putkonen said.

NSF-funded research in this story: Jaakko Putkonen, University of Washington.



Peter Rejcek / *The Antarctic Sun*

Rosemary Garofalo, who works with the Berg Field Center at McMurdo Station, takes a break from helping collect rock samples in an area of the McMurdo Dry Valleys near Mount Electra. The terrain is reminiscent of the southwest desert of the United States.

Science projects move to new station

From page 1

Research Observatory in the Clean Air Sector, a region several hundred meters upwind from the station. Baker is the science support coordinator for Raytheon Polar Services Co., and he's tasked with overseeing the transition.

The physical move involved a number of groups at the station, including science support, IT, South Pole Station Modernization personnel, and the facilities, engineering, maintenance and construction department.

"By working together as one big, happy family, a big team, we were actually able to get it moved," Baker said. "The coordination … was very interesting."

Skylab, an orange tower-like building half-buried in the snow, is now vacant and cold. Visiting scientists and the research associates, commonly referred to as science techs, are currently busy recalibrating equipment and getting projects back online. Their deadline to be fully operational is mid-February, when the last flight leaves Pole until late October.

Helping move the process along is the willingness of the scientists and others to work on projects not directly related to their research, Baker said. "It's fieldwork for other grantees. … This is unprecedented."

Outgoing meteorologist Russ Durke was also involved in some of the most difficult work in emptying Skylab, Baker added.

A couple of projects are already up and running, including a Stanford University experiment using a very low frequency beacon receiver that continuously monitors electrons from Earth's magnetosphere.

"It's very cool to see it coming up," Baker said of the new lab.

Peter Rejcek / *The Antarctic Sun*

South Pole carpenter Jason Hunter assembles a casing for researcher Steven Mende's electron precipitation all-sky camera. The camera was moved from the Skylab science building to the roof of the elevated station above the science wing.

Skylab goes cold

It was equally disheartening to see the iconic Skylab building empty out, he added. "It's really sad to leave an old [lab] with so much history."

Skylab was built in the early 1970s when the Dome and its ancillary station buildings were constructed. The four-story building housed three separate labs, Aurora, Cusp and Cosray. An archway in the back of the Dome served as the main entrance. On the third floor was a popular lounge and music room, where Polies could escape and enjoy a rare outdoor view from indoors before the elevated station was built.

Dana Hrubes is intimately familiar with Skylab. Since 2001, he's spent more than three years of his life at the Pole. Most recently, he went 26 months with only a 60-day break sandwiched between tours, and left last November. His final weeks were partly spent documenting and disassembling the Skylab's electronics racks and putting them back together in the new science area.

Hrubes said he believes the new station "will work out fine," but it's not a change he can easily digest. While the new lab is spacious, it's one large room partitioned by desks and cubicle walls. In Skylab, the science projects were squirreled away in separate labs.

"I will miss the easy access to the outside through the doors in Skylab and miss walking to Skylab from the Dome through the … ice tunnel that served as a constant reminder of where we were working," Hrubes said via e-mail. The veteran tech said he expects to spend the winter at Pole again in 2007.

"For me, it was sad to see Skylab abandoned," he added.

Al Baker / Special to *The Antarctic Sun*

Research associate Dana Hrubes sits in the empty Cusp laboratory in the Skylab science building in early November. He's spent three winters at the South Pole as a research associate, or science tech, with some of that time in Skylab. He said he's sad to see the old building go.

A new beginning

Before the summer season began, the new science wing (B2 in official terminol-

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South Pole science techs keep projects humming all year

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ogy) was merely a warehouse. The meteorological department, which occupies a corner of the room, was the first science group to move from its offices under the Dome and into the new station. Baker said while it's a busy time for the science techs, it's also an exciting one because they will be the first to leave their mark on the new science wing.

"These guys will have built their own lab," he explained, referring to how the science techs can organize and design how the new space looks. "It wasn't built by the [National Science Foundation] or some supervisor from corporate. The person working in the lab actually gets to build it from the ground up."

Scheibe and Melville, along with South Pole cryogenic technician Mark Noske, are all first-year Polies, according to Baker. That's another difference for science support this year over past seasons.

Scheibe said he believes their inexperience is good and bad. They've had to undergo a crash course in atmospheric science, along with details about the equipment they'll maintain, but they're not burdened by preconceived notions of how the lab is supposed to operate.

"I think we benefit from not knowing better," he said.

Melville, back in the lab after a long day troubleshooting equipment outside with scientist Dan Detrick, said he was surprised at how modern the new station and B2 wing are. He arrived at the beginning of the summer season, and watched the new lab grow and mature daily.

"What was most impressive is that we found everything," he said of locating equipment after Skylab was emptied.

Jack-of-all-trades

Finding good South Pole science techs is also not easy, Baker said, especially this year with the transition.

A tech must have a strong background in electronics, computers and hardware, he said. There are also less tangible elements to the job. "I need the [scientist] to feel confident that this tech is his hands and eyes and head for nine months while he's 10,000 miles away."

Researcher Dan Detrick repairs equipment in the new science lab in the elevated station.

Photos by Peter Rejcek / *The Antarctic Sun*

The science wing in the new elevated station is more spacious than the Skylab science building, with room to grow.

Hrubes, for example, built a solid reputation among the science community. Allan Weatherwax, a principal investigator on a couple of Antarctic atmospheric projects, is one of several scientists whose equipment was moved out of Skylab. He said he had asked specifically that Hrubes, with his extensive experience, assist with the initial transition.

"We joke that [Dana Hrubes] knows the instruments better than we do," Weatherwax had said during an unrelated interview earlier this season. "It was tremendously helpful to have him there."

Hrubes has a bachelor's degree in mechanical engineering from the Illinois Institute of Technology and a master's degree from MIT in aeronautics and astronautics. He also has more than 30 years of experience as a research engineer.

But, he said, at South Pole it's not always what you have on paper that counts. Techs are responsible for multiple projects, work all hours of the day and get plenty of outdoor exercise. He would walk as much as four kilometers a day between buildings in the winter, shedding quite a bit of weight along the way.

"With that many projects, there is almost always something failing that requires special attention in addition to regular daily duties," Hrubes noted. "You need to be very organized and methodical."

An electrical engineer-turned-professor, Melville's had a good initiation into what it takes to be a South Pole science tech. On a recent Friday night when most station personnel were winding down from work and getting ready for the Christmas holiday, he was suiting up in his extreme cold weather gear for a foray outside.

"I like it," he said eagerly, shrugging off the long workday. "Where I earn my money, is when something breaks."

Also an electrical engineer, Scheibe left a lucrative career in the semi-conductor industry for a chance to work at Pole. And like Melville, he seems eager for the challenge of winter, when he becomes responsible for a whole season's worth of valuable data.

"I don't think the pressure has really sunk in yet," he said. "I don't really perceive it as pressure, but as an opportunity to learn.

"I'm just living one day at a time."

Profile

'And that is all ...'

By Peter Rejcek
Sun staff

Neil Conant insists he never got good grades in school, and was ambivalent about going to college. Yet the veteran Polie has lived a life that could serve as a history lesson.

For most of the last two decades, he's made the long journey from the United States to the farthest point south on the globe. Over the years, he's met astronauts and adventurers. As one of the communications operators, his voice is as familiar to the community at the South Pole as the geodesic Dome. His trademark sign-off at the end of every all-call — "and that is all" — lends a certain importance to the most mundane announcements.

But before the Ice, there was another life: seven years on a U.S. Coast Guard ship as a Morse code operator, living in Vietnam as a civilian during the war, and spending seven years in Zaire under its strong-arm dictator Mobutu Sese Seko.

"I like the lifestyle," says the globetrotting 68-year-old during an interview in the old communications room under the South Pole Dome. At the time, it's only a few days before the operation is to be shut down and permanently moved to the new elevated station. For now, the instruments continue to gurgle and hiss in an intermittent cacophony that only Conant seems capable of understanding. During one incomprehensible belch from the radio, he interrupts the conversation to scribble notes.

For Conant, it's his briefest summer at the Pole in 17 seasons, as he was asked to work the month of December for the final transition. Normally, he stays for the full season, from late October to mid-February. Last season was supposed to be his last, but apparently he couldn't resist one more trip south.

"There aren't too many jobs that I qualify for that I like," he mused. "I found this niche."

Conant punched his ticket to see the world in 1958 when he signed up to attend radio school shortly after joining the Coast Guard. The skills he learned, like how to send and receive Morse code, would lead him far from his Massachusetts hometown for the next half-century.

The Coast Guard gig started the year before, when Conant, then 19, decided the scholarly life wasn't for him. He quit college to fulfill his military obligation, as the draft was still in effect. His first cruise took him to the northern Atlantic for three weeks.

After a shaky few days, Conant eventually found his sea legs and stuck with the Coast Guard until 1965. His tours took him from Puerto Rico to Guantanamo Bay, Cuba to Hawaii. After quitting the Coast Guard, he didn't stay beached for long: Conant signed up to be, as he found out later, the sole radio operator on a NOAA ship, the *Oceanographer*.

"That was a learning experience," he said, laughing at his initial misgivings when he found out he was the only radioman on board the ship.

The year 1969 was a watershed year in American culture and politics — Nixon took office, the Woodstock music festival was held, the first moon landing took place. It was also the year that Conant saw an ad in the *L.A. Times* for radio operators in Vietnam. He took the job.

"The war was still going on. A lot of guys were still getting killed off," he said, though added that civilians were relatively safe, especially compared to "what's going on in Iraq."

As a civilian, Conant was out of the line of fire, though he did have an occasional brush with the war while living variously in Cam Ranh Bay, Saigon and Danang. Even the tropical paradise of Cam Ranh Bay could be soiled by war, Conant said.

"Every once in a while they would fire a rocket into the Cam Ranh Bay Peninsula," he noted.

Despite the turmoil, Conant remained in Vietnam until early 1975, leaving shortly before Saigon fell to Ho Chi Minh's troops. His Vietnamese wife, Co, was able to eventually follow him to the United States. But it wasn't long before Conant was on the move again, taking a comms job with a company constructing a 1,300-kilometer-long power line in Zaire, now the Republic of the Congo.

The seven years he spent in Zaire were relatively peaceful, despite Mobutu's dictatorship. However, Conant almost packed his bags shortly after arriving when an attempt was made on Mobutu's life. The nation blamed America, and a newspaper article the next day declared, "No American would leave Zaire alive," should another plot be uncovered.

"I had only been there a couple of months," Conant said.

But persistence is another trademark of his life, and Conant stuck with the project through 1982. A couple of years later, he made his first trip to the South Pole for the 1984-85 austral summer. The next three seasons he actually spent at old Siple station before returning to Pole. He hasn't missed a season there since 1993.

Peter Rejcek / *The Antarctic Sun*

South Pole Communications Operator Neil Conant, right, mans the old comms room under the Dome just days before the operation was moved to the new elevated station. Conant estimates he's spent a solid year and a half of his life in that room over the last two decades.

"That's quite a streak," he said, estimating that he's spent a solid year and a half of his life in the comms room over the course of 17 summers. When he started, communications were still over radio teletype, or paper tape, and he would have to type out messages. There were no computers, and calls stateside were done by radio.

"That's the way it was then. Pretty primitive," Conant said. "The kids today don't realize how sweet they have it."

Tracy Sheeley, the South Pole communications supervisor, has worked with Conant for the better part of the last decade. She said it was fitting that Conant made the last all-call from the old comms room last month.

"He has a great appreciation for all things Antarctic, and always meets the expeditioners who pass through Pole," she said.

Conant says this is likely his last season, though it's a vow he's broken before. The plan is to stay in Elkins, W. Va., where Conant works part-time as a landscaper in the off-season.

He's philosophical when asked about how he feels about making the last all-call from under the Dome. The remainder of the building's interior is scheduled to be demolished over the winter.

"That's progress," he said. "Things change."

Anything else he would like to say?

Just one thing, of course: "And that is all."