

# The Antarctic Sun

December 4, 2005



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



Photos by Emily Stone / The Antarctic Sun

Mike Waszkiewicz holds the ice coring drill while Karl Kreutz takes out an ice core from the Clark Glacier in the McMurdo Dry Valleys. Kreutz is looking at the area's climate history over the past 2,000 years.

## Getting to the Core

### Ice samples reveal 2,000 years of climate history

By Emily Stone

*Sun staff*

The five tents sitting on the white expanse of the Clark Glacier look more like a winter camping site than a scientific field camp. Skis stick out of the snow. A pot on the propane stove holds melted snow to make tea. An MP3 player pipes music into the cozy dining tent.

The camp's real purpose becomes clear inside the largest of the tents, where an ice-coring drill hums away, taking a 160-meter sample from deep inside the glacier.

Principal investigator Karl Kreutz will use the ice core to study the climate of the McMurdo Dry Valleys over the last 2,000 years. He'll compare that to climate data from different spots around the world during the same

See ICE on page 8



This orange tent, which sits on the empty expanse of the Clark Glacier, houses the group's three-meter-long ice-coring drill.

## Antarctica not just another name

By Peter Rejcek

*Sun staff*

When Bill Fraser made his first visit to Palmer Station for the 1974-75 field season, the island that now bears his name didn't even "exist." Its land mass was hidden by glacial ice streaming off nearby Anvers Island.

But during the last 15 years or so, the ice has melted back, exposing Fraser Island as a distinct land mass. Ironically, the timing corresponded with Fraser's own shift in

research toward the ecological consequences of climate warming in the western Antarctic Peninsula region.

"So, while it is indeed an honor to have an island named after me, I tend to see Fraser Island in a broader context: positive proof of the tremendous changes our planet is undergoing in the face of climate warming," said Fraser, a principal investigator for the seabird component of the Palmer Long Term

See GEOGRAPHIC on page 10

### Quote of the Week

"It looks a lot like Kansas."

— Man describing the vast flatness of the West Antarctic Ice Sheet.

### Inside

Atmosphere is heady stuff

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Trio from same town

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## The beginning of an era



U.S. Navy photo courtesy of the National Science Foundation

*Cargo is offloaded from a ship moored in McMurdo Sound and is destined for Ross Island in this Dec. 1955 photo. This month marks the 50th anniversary of the arrival of the Operation Deep Freeze ships at McMurdo Sound. The goal that year was to build an airfield at McMurdo to serve the planes that would fly to the South Pole to start building a station there. Another group of Navy men built the Little America V station on the Ross Ice Shelf, which was originally intended to be the main U.S. scientific station on the continent. In all, 1,800 men came to Antarctica as part of Operation Deep Freeze I.*

## Cold, hard facts

### GETTING AROUND

Total vehicles at each station:

McMurdo: **250**

South Pole: **32**

Palmer: **6**

McMurdo vehicles include:

Snowmobiles: **105**

Bulldozers: **26**

Vans: **21**

Forklifts: **19**

Tractors: **17**

PistenBullys: **16**

Cranes: **6**

Dump trucks: **6**

Fire engines: **2**

Hagglunds: **2**

Ambulances: **2**

*Source: vehicle maintenance facility and mechanical equipment center*

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### Level 1 Comix

Matt Davidson





# Scientists keep eyes on upper atmosphere

By Steven Profaizer

*Sun staff*

Breathe in. Blow a bubble. Watch a storm.

All this happens in the troposphere, the first 8 to 10 kilometers above sea level where our lives take place. It contains the air we breathe and the weather we see.

But our atmosphere extends above the clouds, above the jumbo jets, even above the ozone layer.

The atmosphere extends about 800 kilometers above the planet's surface. While most of this region is far out of reach, it is nonetheless an essential part of the Earth's atmospheric structure and affects everything living hundreds of kilometers below on a daily basis.

A team of scientists at the South Pole, led by Gulamabas Sivjee of the Embry Riddle Aeronautical University, is studying the regions of the atmosphere called the mesosphere and thermosphere — specifically the area located between about 80 and 300 kilometers above the planet's surface. That is the area that enables long-distance radio communication and allows us to walk outside without being bombarded with high-energy protons hurled out by the sun.

"A lot of people don't realize how the atmosphere is connected together," said Irfan Azeem, a member of the science team. "What happens at one level often affects the others."

The group studies the upper atmosphere to better understand its physical nature and chemical structure. The project's core goals lie in its examination of aurora-causing charged particles and of the atmosphere's dynamics in the study area.

The sun spits out high-energy protons and electrons. From the ground, interactions of these charged particles with the upper atmosphere appear as the *aurora borealis* and *aurora australis*, or the Northern and Southern lights.

Part of the team's mission is to match up the different types of particles with the auroras they create, Azeem said. Equipped with this information, engineers can improve current safety designs of space shuttles and satellites.

"This study allows us to better understand the environment spacecrafts fly in," Azeem said. "If we can detect and identify these particles, we can better know what high-energy particles spacecrafts will face. We need to take this information into account when designing them."

To conduct their studies, the scientists use a complex suite of four instruments to gather information about very faint emissions from atomic and molecular particles in the upper atmosphere. "The reason we have different instruments is that we are using them to look at different pieces of the information," Azeem said. "We are basically tuning our instruments for different regions of the spectrum we are looking at."

The group's other main focus is the dynamics of this region of the atmosphere. Part of this research includes studying energy-carrying waves traveling through the atmosphere.

"If you drop a stone in a pond, you get ripples. Similar tiny ripples appear in the atmosphere," Azeem said. "The waves permeate from the lower atmosphere and transfer energy from one place to another."

One of the mechanisms for creating such waves is air flowing over mountains. The energy and air flow formed as the air is pushed up over a mountain continues upward into the upper atmosphere, Azeem said.

By understanding the mechanics of these waves, the scientists hope to help others better guide the trajectory of satellites, rockets and space shuttles.

The program also helps to support NASA's Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) satellite.

TIMED is NASA's satellite-based effort to study the same regions of the atmosphere that Azeem's group studies from the South Pole. The scientists provide ground-based information to fill in any gaps in the satellite's data.

*NSF-funded research in this story:*

*Gulamabas Sivjee, Embry Riddle Aeronautical University, <http://www.sprl.db.erau.edu/>*

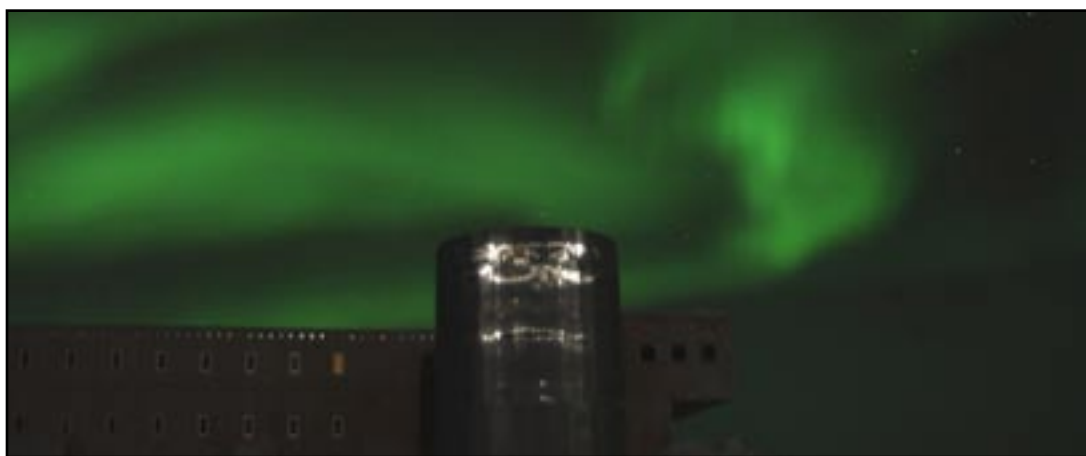
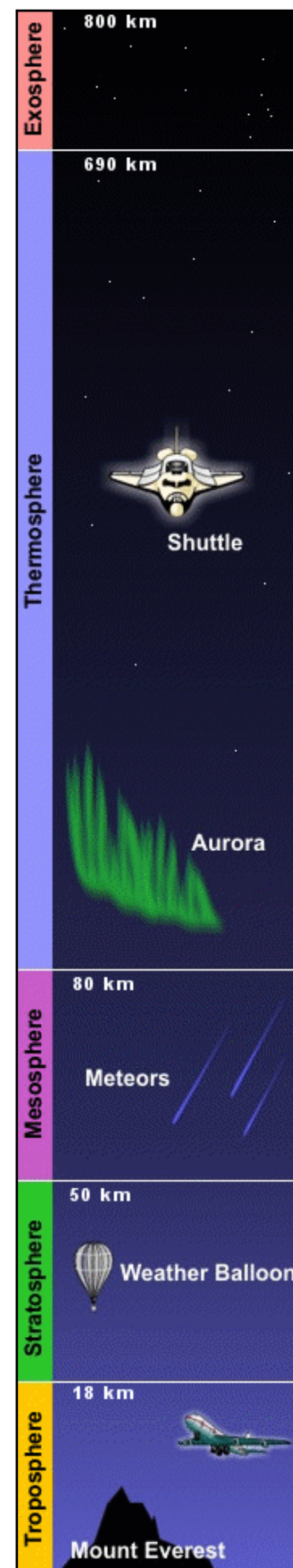


Photo courtesy of the National Science Foundation

*Mid-day aurora australis hang in the sky over the new station at South Pole Station. Scientists are studying the high-energy protons and electrons that cause the phenomena.*

Graphic courtesy of NOAA



## Perspectives Perspectives

# Learning to dive under the Antarctic ice

By Steve Clabuesch

*Special to the Sun*

I suppose the seed for diving under the ice was planted at the University of California-Santa Barbara during a freshman seminar. Dr. Michael Neushul related his experience of diving in Antarctica as a graduate student at the Scripps Institute of Oceanography. He was recruited as the algae expert and did several dives wearing the equipment of the day (late 1950s) — double-hose regulator and wetsuit. It sounded like a fantastic adventure, and I filed it away as something that I'd like to do someday.

At that point, I'd been diving several years but never intended it to be my vocation. It was just something to do with my friends. It did end up becoming my job 20 years later — not by plan, just by coincidence. In 1990, I began teaching scuba diving at the University of California-Santa Cruz in the physical education department. This evolved from a part-time assistant position to my current position of diving safety officer (DSO) for UCSC.

This July, Christian McDonald, the DSO for Scripps, received an e-mail from Rob Robbins, the Antarctic diving supervisor, who was helping Sam Bowser find a diver for his project. Sam studies single-celled organisms in McMurdo Sound and needed another diver to collect samples. Christian asked if I'd be interested. Several e-mails and phone interviews later, it looked like I would be part of the team. My immediate supervisors allowed me to leave my job for 10 weeks, but only this once. A seed planted 27 years ago was coming to fruition.



Photo by Claire Beynon / Special to The Antarctic Sun

*Steve Clabuesch prepares for a dive.*

Sam, Rob and diver Henry Kaiser used videos, photos and their own stories to prepare me for Antarctic diving. The dive hole is a vertical tunnel through the ice and would be at least four-and-a-half meters thick and about two meters in diameter. Once you pass through the bottom of the hole, the water is dark, and, of course, cold. From my cave diving experience and seawater system maintenance dives, the entrance hole, overhead environment and low-light conditions were all familiar. The equipment set-up was very similar to cave diving gear. There would be no currents or ocean swells to contend with, and the visibility would be upwards of 30 meters, not the three meters I'm used to.

So really the only thing that was going to be brand new was the water temperature — I had no idea how cold negative 3 degrees Celsius was. (The water gets below "normal" freezing temperatures because fresh water freezes before salt water.) The answer: it is cold, especially on your fingers and toes.

Normally I wear a wetsuit when I dive, so I broke out my drysuit in preparation for my dives here. But my drysuit did not have attached gloves to keep my hands completely dry. I figured I could learn to use those when I got to the Antarctic — how different could it be? I found out it would be very different.



Photo by Steve Clabuesch / Special to The Antarctic Sun

*Steve Clabuesch took this picture of Neal Pollock during a dive at the ice wall at New Harbor, where Clabuesch is working this summer.*

I did my first couple of dives with Rob near McMurdo Station. Beforehand, Rob sat me down and explained how to gear up, how to care for the gear (most notably keeping fresh water away from the gear so it does not freeze), what could go wrong and how to respond, and safety precautions to be taken on every dive. It all seemed pretty straightforward, although the possibility of gear freezing or failing to operate properly was a new concept to me.

In some ways I felt like I was learning to dive all over again here. The bulk of the dry gloves and the slow numbness that creeps into your fingers turn your hands into paddles. You need to learn to use these paddles to do your work and handle any problems that may arise. Slowly I became more comfortable with the limited dexterity. I have great respect for Rob and the divers I work with. They make diving under the ice look easy, cold hands and all. I appreciate all the assistance they have given me.

My first views under the ice were surreal — very much like a large cave but with "sky lights" where the light could pass through the ice. The "ceiling" seemed to glow. And the water was so still and clear. You could see as far as the beam of your light could reach. The animals present were colorful, plentiful and larger than I expected — how any living thing can live in water below freezing is pretty amazing.

I just finished working for a month and a half at New Harbor, across the sound from McMurdo Station, collecting samples and documenting what we are doing with video and photographs. I become more comfortable using my numb hands but was still stunned each time I dropped into the hole and emerged below the ice and saw the world that is beneath the frozen sea.

It was 27 years ago this month that I sat in that freshman seminar. Funny how things work out.

*Steve Clabuesch recently spent six weeks as a diver at New Harbor.*



# around the continent



Photos by Zee Evans / Special to *The Antarctic Sun*

*The M/S National Geographic Endeavour visits Palmer Station to help bring some of Palmer's workers back to South America so they could return home after the Laurence M. Gould was unable to get through the ice to the station. Tour ships are a regular sight at Palmer Station, the only U.S. station that is accessible by water year-round.*

## PALMER

### Cruising to station

By Kerry Kells

*Palmer Correspondent*

After the *Laurence M. Gould* was unable to reach Palmer in mid-November, alternate arrangements were made to transport the northbound and southbound passengers. Two tour ships were enlisted to carry our remaining outgoing workers off station. While the ships were here, their passengers were given tours of Palmer Station.

On Nov. 23, the *M/S National Geographic Endeavour* cruise and expedition ship arrived and its 100 passengers were given a tour, a chance to shop in our store and a reception in the dining hall. The remaining three Palmer people who were waiting to redeploy left on the *Endeavour* for the trip back to Ushuaia, Argentina, and

then on to Punta Arenas, Chile.

On Nov. 27, just after our Thanksgiving holiday, the *M/V Clipper Adventurer* returned to station with five southbound passengers from the *LMG*. We welcomed our new arrivals to Palmer. They were four members of science groups and our new maintenance specialist. We gave tours to the 88 passengers from the *Clipper Adventurer*, including a group from the Audubon Society. It seems the cruise ships are arriving early this season!

With the open water around station, sampling has begun in strength. This includes the microbes and phytoplankton sampling at Stations E and B by Maria Vernet's group, the bacteria sampling by Hugh Ducklow's team, and sampling of the volatile sulfur compounds DMS by Patricia Matrai's researchers.

The "birders," as the sea bird researchers are known, continue to visit Torgersen, Humble, Litchfield, Cormorant and

Christine islands throughout the week. They're doing census work and weighing the Adélie penguins on the islands. Landgon Quetin has begun krill collection and acoustic counts along the transects on the water. And Tad Day's terrestrial ecosystems group has visited its sites for samples of the local plants.

We celebrated our Thanksgiving holiday with community-made pies and a delicious assortment of food from our two cooks. The community pulled together and made 33 pies including pumpkin, apple, cherry, blueberry, chocolate cream and tiramisu. Just enough pies for the 36 people we had on station for Thanksgiving! The celebration was a great success.

Although the ice came back the next day, open water has reappeared and sampling is again possible. We are now preparing for the arrival of the *LMG* to welcome more new arrivals, the marine staff and ship's crew.

**See CONTINENT on page 6**

### the week in weather

#### McMurdo Station

High: 33F / 1C

Low: 15F / -10C

Max. sustained wind: 31mph / 50kph

Windchill: -13F / -25C

#### Palmer Station

High: 37F / 3C

Low: 25F / -4C

Max. sustained wind: 36mph / 58kph

Precipitation: 3mm

#### South Pole Station

High: -26F / -32C

Low: -37F / -38C

Peak wind: 24mph / 39kph

Max. Physio-altitude: 3,243m

# Continent From page 5

## SOUTH POLE

### High frequency radio up

By Katie Hess

*South Pole correspondent*

A big hand to the South Pole dining hall staff and volunteers who helped to make this Thanksgiving holiday memorable, delicious and filling!

Despite the energy used in preparing and devouring a delicious Thanksgiving feast, much science and construction continues at the South Pole Station.

Communications manager Tracy Sheeley made history with the first high frequency (HF) digital transmission to McMurdo from the new elevated station operations center on Nov. 28. Setting up the new HF system was hard work for many people, including communications experts, and the riggers who spent many cold hours on those antennae. Final transition to the new station is getting closer.

The IceCube site set-up is nearly complete and the drillers are currently assembling the "rodwell" system that will melt snow for hot water drilling. Plumbing this 3.2-kilometer hose must be done very carefully so as not to end up with a pipe of ice.

Several people continued the retrograde of the Antarctic Submillimeter Telescope and Remote Observatory this week. AST/RO, operational since January 1995, collected data through the end of the 2005 winter season.

Sad though we will be to see a science project go, more telescopes are popping up in the dark sector all the time. Equipment testing for the new Background Imaging of

Cosmic Extragalactic Polarization (BICEP) telescope is taking place this week, and preparations for the 10 Meter Telescope are on-going. Building the footers for the latter telescope facility will take place very soon.

For those eagerly awaiting the color change to the front of the new station to "gun-metal gray," hold on a little longer. The siding project is currently delayed while materials to help limit heat loss are procured.

And when they aren't hard at work, Polies can find many other activities to do with their boundless creativity.

Filmmakers are warming up their cameras, writing scripts, and brainstorming some quirky shots for the third annual South Pole International Film Festival. The festival is an all-station activity that has really taken off. Those of us who are not filmmakers might still be in a movie. If we're in no way involved in creating a film, then we still can't wait to see the world premiere!

Additionally, casting for a Tom "Pi" Piwowarski adaptation of J.D. Salinger's "Just Before the War with the Eskimos" is commencing this week. Pi is a member of the IceCube construction team.

Dancing classes have started, and the South Pole Art Show will take place Dec. 11. A popular movie, "The Red Tent," depicting Roald Amundsen's adventures to the North Pole, was recently screened.

## SHIPS

### NBP

Compiled from reports by Alice Doyle  
*Marine Projects coordinator*

Just when we thought the polynya was on its way, the temperature dropped

severely on Nov. 21, and ice began to form again!

We deployed instruments the day before in minimal ice conditions. Unfortunately, the buoy from the instruments became trapped in the ice overnight, which made the recovery interesting. After a bit of fancy maneuvering, we got everything onboard safely.

The cold temperatures, high winds and increased ice throughout the day made the usual operations more difficult. Interestingly, the phytoplankton bloom's fluorescence continued to increase even in these winter-like conditions.

The next day started at 2 a.m. and was chockablock full of operations. The cold and winds made operations a bit more difficult than usual. Fluorescence continued to increase. The bloom is under way.

We stayed at this site one more day. It's amazing to see the difference in water clarity. At the last site we could see the conductivity, temperature and depth (CTD) in the water down to 15 meters. Now, we are lucky to see it at three meters.

We celebrated Thanksgiving at a new study area. There was more open water than before, but still quite a bit of new ice.

Temperatures rose as we began our second day at this station on the 26th. The winds and the fast-moving ice made operations a bit trickier. As the day wore on, the amount of ice in the area decreased. Could the true polynya be near?

What a transformation the next day! We were in open water as far as the eye could see. The polynya is here. We continued with our standard station work. It was great to not have to worry about the instruments getting lost in the ice.

### LMG

Compiled from reports  
by Stephanie Suhr

*Marine Projects coordinator*

We had a hectic port call with remarkably smooth operations thanks to everyone's hard work, and despite the repairs on the ship's engines and a number of cargo issues. We started out toward Palmer Station on Nov. 28 at more than 19 kph and very calm seas.

A meeting was held with all principal investigators to discuss operations and finalize the cruise set-up at Palmer Station, including cargo operations, alignment of the transducer mount, and calibration of the new Biosonics sonar. Around lunch, the exchange of a water pump and a leaking fuel line required slowing down to about 13 kph for several hours.

We were back up at 19 kph at 4 p.m. The weather remained calm the next day, and the ship made good steady speed between 19 and 20 kph. After a sunny morning, it clouded over before lunch. The crew expected to reach Palmer on Dec. 1.



Photo by BK Grant / Special to The Antarctic Sun

*Workers at the South Pole bring cable from the radio frequency building to the new high frequency towers.*

## IT'S A SMALL WORLD AFTER ALL

# Ohio firefighters come from same department

By Peter Rejcek  
*Sun staff*

The chance that three firefighters from the same Ohio department would be chosen to work a season at the world's southernmost station seemed impossible.

But Bill May, Sean Powers and Josh Hartbarger, volunteers with the Whitehouse Fire Department near Toledo, are all officers this season with the McMurdo Station.

"We were just amazed," May said of the serendipitous hiring of the Whitehouse firefighters. An assistant fire chief back home, May is one of two captains this season with the Antarctic Fire Department. "To have all three of us come, it was absolutely rare."

"I didn't honestly think all of us would be [hired together]," he added.

Whitehouse, with a population of about 2,700, is part farm town, part bedroom community, according to May. With a roster of about 36 volunteers, the Whitehouse Fire Department is smaller than McMurdo's, which is a full-time department with 44 firefighters during the summer season.

"I don't think we've ever had three from the same station before," said Antarctic Fire Chief Sharon DiGiacomo. In the last eight years, DiGiacomo said she recalls hiring two firefighters from the same stateside station perhaps two or three times. In an average year, the Antarctic Fire Department gets about 250 applications, she said.

A fellow Whitehouse firefighter who came down nearly a decade ago, first planted the idea to apply for firefighting jobs in Antarctica, according to Powers, a McMurdo lieutenant. It started out as something of a lark with the three men, wondering if indeed they might all get jobs here. However, it wouldn't have been a deal-breaker for any one of the firefighters had the others not made the cut.

"We all wanted to come down together, but if one of us didn't get hired, the other ones would have understood," said Hartbarger, the youngest of the three at 24 years old. He's also a lieutenant with the department here.

Like many U.S. Antarctic Program participants, the firefighters applied because they wanted the opportunity to travel and go to a place where few have tread. But their summer season at McMurdo also represents a first for all three — their first stint with a full-time fire department.

"The fire service is the fire service no matter where you're at," observed May, the veteran of the trio, with 34 years at Whitehouse. He also serves as a village councilman. Hartbarger has been with the department for about five years, but also works at his father's company in nearby Maumee. A full-time EMT, Powers, 27, has been a volunteer at Whitehouse for almost 10 years.

The two younger firefighters say they would like to join full-time fire departments back home, but the opportunities are few



Photo by Peter Rejcek / The Antarctic Sun

Sean Powers, Bill May and Josh Hartbarger, from left, are three of 44 firefighters at the McMurdo Fire Department. The trio serve in the same volunteer department back in Whitehouse, Ohio. This is the first time three firefighters from the same department have worked at McMurdo at the same time, according to Chief Sharon DiGiacomo.

and far between. They hope their experience here will help.

"They'll have a leg up when they get back," said May, whose son and grandson also volunteer at Whitehouse.

In the United States, volunteer firefighters account for 73 percent of the country's one million firefighters, and two-thirds of the fire departments are volunteer-based, according to the National Volunteer Fire Council.

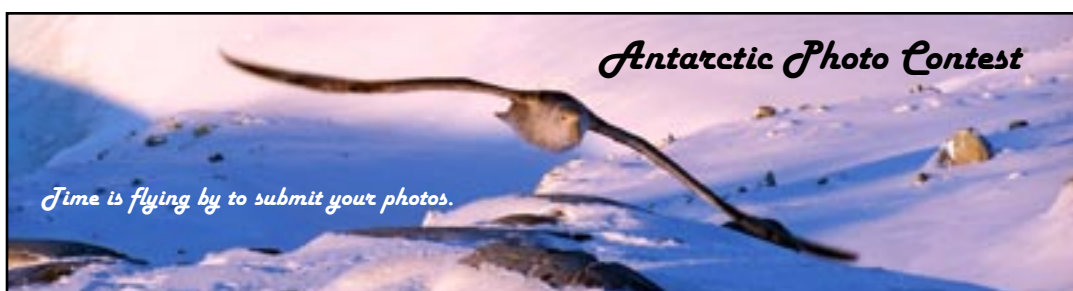
Powers joined the Whitehouse department after high school, saying he "had no reason not to ... I love it." He's currently working to get all of the certifications needed for full-time employment, though all three firefighters already have extensive training through their own department. They spent about 10 days in Salt Lake City training in aircraft emergency and rescue procedures before deploying to Antarctica.

None of the men say they are particularly homesick, thanks to a busy work schedule and a plethora of after-work recreational opportunities. There's also the camaraderie at the firehouse to fall back on, Hartbarger said.

"It's amazing," he said. "Everybody gets along. It's a true family. We are three small members out of a very large team. That's the best experience out of this."

May said he is eager to see his wife again and celebrate his 25th wedding anniversary when he gets home. All the firefighters anticipate a long stretch of recounting their adventures with family and friends — something else they're looking forward to when they redeploy.

"You want to return there with a bunch of thoughts and things that you'll have for the rest of your life," May said.



## Antarctic Photo Contest

*Time is flying by to submit your photos.*

Deadline is Dec. 11.

Submit your photos to  
[antarcticsunsubmissions@usap.gov](mailto:antarcticsunsubmissions@usap.gov)

Categories: People,  
Scenic, Wildlife and  
Other.





Photos by Emily Stone / The Antarctic Sun

Karl Kreutz, above, carefully measures each section of a 160-meter ice core after it comes out of the drill. He then places the pieces in a plastic bag, below, and labels where it came from in the sequence, and which end is up.



The five-person team's living and dining tents on the Clark Glacier in the McMurdo Dry Valleys.

# Ice cores help determine climate patterns in Valleys

## From page 1

time period. This will help scientists better understand how changes in one region affect the climate in another, with the ultimate goal being to use information about the past to help predict climate changes in the future.

"You can really start to study how these regional climate patterns evolve," said Kreutz, of the University of Maine. "It would tell you something about how these different regions are connected."

Kreutz, two students and two drillers took the Clark Glacier core and a 140-meter core from the Upper Victoria Glacier this season. Last year, they took a core from the Commonwealth Glacier, as well as another core from the Clark Glacier. They will combine the information they retrieve from the cores to put together a picture of how the climate has changed there in the past two millennia, a time period known as the late Holocene era. He can date the different layers in the cores to within at least five years.

The ice cores will actually go back four or five thousand years, but that shorter time period is the focus for two reasons, Kreutz explained. The major factors that affect climate on a large scale — like the Earth's orbit around the sun or the number of volcanoes on the planet — have stayed constant over the last 2,000 years, which rules out blaming them for climate change.

There's also a lot of climate data from around the world for the late Holocene era from tree rings, lake sediment cores, farm records and diaries. This means that although there are still holes in the history of the Southern Hemisphere, regional climate data is fairly complete for the Northern Hemisphere. For example, it's known that there was a "Little Ice Age" in Europe between 1300 and 1850, Kreutz said. But it's unclear if there was a similar change in Antarctica. Determining this will shed light on whether the climates in Antarctica and Europe are connected and whether they influence each other.

The data will also help verify the computer models that scientists use to try to predict future changes. They test these models by trying to project backward in

time and seeing if their models can recreate what happened in the past. The data from the cores helps them know if their models are accurate.

Kreutz will analyze two components of the core to determine what the temperature and atmospheric circulation patterns were in the Dry Valleys. The group looks at "proxy records" for climate, meaning they measure things that are influenced by temperature and not the temperature itself. One test will look at the dust in the core to figure out which way the winds were blowing at a given point. The other looks at isotopes in the ice, which indicate what the relative temperature was at the time.

The chemical composition of the dust indicates where the dominant winds were coming from. If the winds were coming from the east off the Ross Sea, they would have deposited a noticeable amount of sea salt in the snow. Westerly winds would have carried dust from the valley floors that has a different chemistry. Changes in the wind patterns affect temperatures in the Dry Valleys by bringing air from different regions.

The isotope analysis looks at the oxygen molecules in the ice. There are eight protons and eight neutrons in 99.9 percent of oxygen. But every now and then a couple extra neutrons will show up in a molecule. Kreutz will measure the ratio of the standard oxygen molecules to the ones with 10 neutrons.

The extra neutrons make the molecules heavier, which makes them harder to transport in the air. When it's cold, there isn't as much energy in the air to support the heavy molecules. The warmer it is, Kreutz said, "the more of the heavy little guys make it down here."

Kreutz's group has been testing these techniques — chemical analysis and dust composition measurements — in snow pits. They've dug pits at each of their coring sites, as well as on other glaciers in the area. They dig a two-meter-deep pit with another hole just behind it so that sun can shine in through one of the walls. Inside the pit, that wall is lit up so it's easy to tell one year from another.

**See RESEARCHERS on page 9**





# Researchers looking for 'Holy Grail' of cores

From page 8

Kreutz demonstrates the "finger test" against the wall. Winter snow is more dense, making it difficult to push through. The summer snow is more airy and his finger easily pokes into it. One solid layer plus one lighter layer equals one full year.

"It ends up being like a tree ring," he said. "You can just count back in time."

A weather station atop the Clark Glacier pit has been recording the weather and snow accumulation there for the past year. By cross referencing the weather data, the information about exactly when the snow fell, and the chemistry analysis of the dust and isotopes in that snow, the group has determined that their tests do show relative warming and cooling.

Kreutz will analyze the cores from this season when he returns to Maine.

Inside the big, orange tent, drillers Terry Gacke and Mike Waszkiewicz retrieve the core about half a meter at a time. The three-meter-long drill is lowered into the hole on a long cable. Gacke stops it at the right level, then starts the drill spinning. The drill's outer tube uses springs to anchor into the wall of the hole so it doesn't rotate.

The inner tube spins to create the core. The men then pull the drill back up. Once it's clear of the hole, they rotate the tube 90 degrees so that it's parallel to the ground.

They then carry the inner tube outside where Kreutz waits at a table and they empty out its contents. Kreutz slips each section into a clear, plastic bag, labels the top and marks where it fits in the sequence. He staples the bag closed and stores the cores in a nearby pit until they can be shipped by helicopter back to McMurdo Station. He is often helped by students Bruce Williamson and Toby Burdet.

Kreutz holds up his latest core, which is about half a meter long. There are countless air bubbles inside, which are thousands of years old. Every now and then you can see bits of brown dust trapped in there, and can make out

the slightly different colors of the summer and winter layers as well.

"You're looking for one smooth chunk of ice," Gacke said, referring to the core's exterior.

"The Holy Grail," Kreutz added.

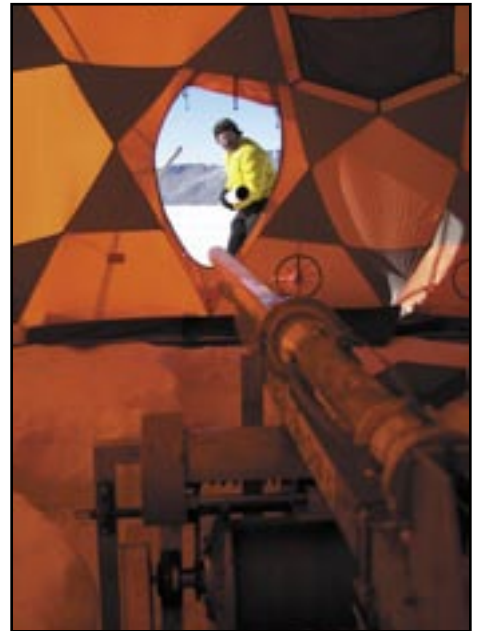
*NSF-funded research in this story: Karl Kreutz, University of Maine; <http://climatechange.umaine.edu>*

**"It ends up being like a tree ring. You can just count back in time."**

— Karl Kreutz,  
Earth Sciences professor



*The core sections are stored in an open pit in the snow before being flown back to McMurdo Station.*



*Driller Terry Gacke, above, removes the inner tube of the drill, which holds the ice core, to deliver it to Kreutz. Below, Gacke operates the ice-coring drill inside the group's tent.*



*Karl Kreutz holds up a new section of the ice core. Inside, thousands of tiny air bubbles hold ancient gas that was trapped in the ice as it froze. The group will analyze the chemistry of the ice and the dust particles trapped inside back at the University of Maine.*



Photos by Emily Stone / The Antarctic Sun

# Geography named after regular people, wizards

## From page 1

Ecological Research Project. Fraser has done research in Antarctica during 25 of the past 30 years.

It seems that just about every name on the continent has a story behind it, though few perhaps so poignant. In fact, at last count, there were 13,730 such stories — the number of official Antarctic feature names recognized by the United States. The names cover islands, glaciers, capes, lakes, summits, mountain ranges and myriad other geographic features splashed across the 14 million square kilometers that make up the continent.

Features are named after things and people, literary characters and unusual characteristics, the famous and not so famous, including long-time scientists and program employees.

Rob Robbins can see the hill that bears his name from McMurdo Station. It rises 1,140 meters near the Blue Glacier on Scott Coast. His name was submitted to the U.S. Board on Geographic Names in 1999 to commemorate his 20 consecutive years with the U.S. Antarctic Program.

"I'm very thrilled to have the geographical feature named in my honor," said Robbins, science diving coordinator in his 27th year with the program. "I love Antarctica and have made the program my career. To be immortalized in this way is very meaningful to me. I love the fact that I can see Robbins Hill from McMurdo."

South Pole Area Director BK Grant, who once upon a time started with the U.S. Antarctic Program as a general assistant, has her name pinned to a valley between Communication Heights and Mount Ash in the Darwin Mountains.

"I think it's pretty amazing really, and always figured that even though my parents never got any grandchildren out of me, they at least got a valley," Grant said, celebrating 15 years with the program.

And Walker Cirque, a glacier-filled basin on the west side of the terminus of McCleary Glacier in the Cook Mountains, is named after Carlton Walker, the facilities, engineering, maintenance and construction manager at South Pole Station.

Walker, better known as C-Note, learned of the honor with several others, including Grant, during a presentation at South Pole. Feb. 5, 2003 is the official date of the designation by the U.S. Board



Photo courtesy of the National Science Foundation

*Palmer Station sits on Anvers Island off the Antarctic Peninsula. The island is named after a province in Belgium. It's one of more than 13,000 geographic features on and around Antarctica named after some thing, place, person or even literary character.*

on Geographic Names.

"It's not really something I think about, but it's cool to have a place that has my name on it, on the continent where I have spent a lot of the last 15 years," Walker said via e-mail from Pole.

Fraser, Robbins, Grant and Walker rub shoulders with notables like Nathaniel Brown Palmer, one of the first people to spy the continent 185 years ago while looking for seal colonies.

Palmer lent his name to an archipelago (among other features) off the western coast of the Antarctic Peninsula. Incidentally, until 1964, the peninsula also bore his name (at least in American geography books), but an agreement between the American and

available online at <http://geonames.usgs.gov/stategaz/index.html>. An interactive version is at <http://geonames.usgs.gov/antform.html>. The gazette lists each individual feature, along with its latitude and longitude, and a brief history behind its naming.

Labeling every nook and cranny throughout the continent is not as simple as drawing names out of a hat or flinging darts at a board. The Advisory Committee on Antarctic Names has established a comprehensive policy, which bases decisions on the priority of the application, its appropriateness, and the extent to which usage has become established. (For those seeking a taste of immortality, the full policy and online applications are at <http://geonames.usgs.gov/antex.html>.)

The committee meets quarterly and passes its recommendations on to the U.S. Board of Geographic Names, according to Lou Yost, the committee secretary and chief of the U.S. Geological Survey's geographic names office.

Yost said the committee reviews up to 70 applications at each meeting. "It varies. It depends on how much mapping is going on."

If the U.S. Geological Survey is mapping an area, he explained, as many as 30 or 40 new features, like summits or glaciers, may need naming. Applications contain requests for the committee either to honor a deserving individual with a specific feature or to choose an unnamed feature for someone

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**"To be immortalized in this way is very meaningful to me. I love the fact that I can see Robbins Hill from McMurdo."**

**— Rob Robbins,  
long-time Antarctic worker**

British governments re-designated the continent's most recognizable feature. The southern half is Palmer Land and the northern half is Graham Land, after a British naval officer, Sir James R.G. Graham.

*Geographic Names of the Antarctic* is a compendium of these features produced by the U.S. Board on Geographic Names with the help of the Advisory Committee on Antarctic Names. Last published in 1995, a more updated, downloadable version is



# International gazetteer contains more than 35,000 geo names

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without a specific geographic connection.

Features are generally named after people and things like ships, or what the advisory board calls personal and non-personal names. Some places are named after organizations that have sponsored or supported Antarctic endeavors, like the Royal Society Range, the mountains along the western shore of McMurdo Sound. (The policy does discourage corporate sponsorships, so it's unlikely we'll see the Wal-Mart Ice Tongue any time soon.)

Other names are transplants from the Old World, like Anvers Island, the mountainous spit of land where Palmer Station sits. Anvers is also the name of a Belgian province.

Then there are the whimsical monikers, like Gandalf Ridge, located along Scott Coast west of McMurdo Station. Geologist Philip Kyle, who examined the ridge in December 1977, suggested the name because of the ridge's very hard volcanic rock. Gandalf is the name of the crusty wizard in J.R.R. Tolkien's literary magnum opus, "Lord of the Rings." (Incidentally, the Kyle Hills on Ross Island honor Kyle, who has studied Mount Erebus for some three decades.)

Yost said there are still plenty of newly mapped features that need names, and he doesn't expect they'll run out any time soon. "It's a big continent," he said. "We still have features in the United States that don't have names."

## What's the point of Punta?

Of course, with a score of countries operating around the continent at any one time, America isn't the only country labeling Antarctic geography. An international effort

is underway to assemble a comprehensive database of names from all countries. The *Composite Gazetteer of Antarctica* currently tops out at a staggering 35,359 names, corresponding to 17,739 features. The names included in the database are those south of 60 degrees south latitude, regarded as the political border of Antarctica.

The Scientific Committee on Antarctic Research (SCAR), an inter-disciplinary committee of the International Council for Science, is behind the gazetteer. SCAR initiates, promotes and coordinates high-quality international scientific research in the Antarctic region.

"The aim of the SCAR Gazetteer is to list all place names in the Antarctic, regardless of origin, so that anyone can refer to it when proposing new names. This should help to avoid duplication and also make it quite clear to which feature any name refers," explained Peter Clarkson, who recently retired from SCAR as executive secretary, but serves as an Antarctic consultant.

The SCAR effort does not replace national gazettes but serves as a database for all names officially approved by each country's national naming authority, according to Clarkson and Yost.

The SCAR Gazetteer ([www3.pnra.it/LUOGHI\\_ANT/SCAR\\_GAZE](http://www3.pnra.it/LUOGHI_ANT/SCAR_GAZE)) lists all names in their original language. It does not translate names, but does print ones already translated in other gazetteers. For example, the United Kingdom gazetteer lists Cheal Point while the Argentine gazetteer lists Punta Cheal. Cheal Point is at the southwest extremity of Coronation Island in the South Orkney Islands.

"SCAR lists both," Clarkson said, adding that the database has operational signifi-

## Name that nunatak

*Other U.S. Antarctic Program participants with geographic features named after them are included below. This list is by no means exhaustive.*

Ainley Peak is named for David Ainley, penguin and skua researcher.

DeVries Glacier is named for Art DeVries, long-time biologist at McMurdo Station.

Joyce Peak is named for Karen Joyce, who has worked in computer science support for 15 years.

Kennedy Ridge is named for Nadene Kennedy, NSF's polar coordination specialist.

Krall Crags is a pair of summits named for Sarah Krall, who has worked in the program for over 15 years.

Lettau Peak is named for Bernhard Lettau, ocean and climate sciences program manager at the Office of Polar Programs.

Mount Bresnahan is named for Dave Bresnahan, one of the NSF representatives at McMurdo Station.

Palais Glacier is a glacier named after Julie Palais, field researcher in Antarctica and NSF polar glaciology program manager. Palais Bluff also bears her name.

Scanniello Peak is named after Jeff Scanniello, surveyor at McMurdo and South Pole stations.

Mount Sutherland, west of Mount Terror on Ross Island, is named after Al Sutherland, who has been with the program for 16 years.

cance, especially between countries.

"If an Argentine tells an American vessel to meet him at Punta Cheal, the navigating officer can see straightaway that this is Cheal Point and so arrive at the correct place," he said. "That example is obvious enough, but if the Argentine said he was on Isla 25 de Mayo, the navigating officer may be at a complete loss to equate that with King George Island."

## Continental Drift What was your first impression stepping off the plane/boat?



**"I was impressed with the amount and diversity of life (both terrestrial and oceanic) that can survive in such harsh conditions."**

Matthew Krna,  
Palmer research tech  
from Kansas City, Mo.,  
first season



**"There's no oxygen here."**

Elissa Gramlingis,  
South Pole general  
assistant from Grand  
Marais, Minn.,  
first season



**"It's not as cold as Chicago."**

Shawn Corkery,  
McMurdo recreation  
materials person  
from Chicago, Ill.,  
second season

# Profile Photographing the unknown

By Steven Profaizer

*Sun staff*

The exploration of the Earth is not yet over.

There are places that remain unknown. There are locations where no human has likely ever stepped. And there are wonders in the world that have yet to be photographed.

"I want to keep going to places that are blank areas on the map," said photographer George Steinmetz, who is here as part of the National Science Foundation's Antarctic Artists and Writers Program. "Whether remote places in Siberia or parts of the Australian Outback, I think there are a lot of places that have yet to be properly explored. I don't think the world is all known or all mapped. I don't buy into that."

One set of blank areas are the uninviting and arid lands of the Earth's deserts. Antarctica is another stop on Steinmetz's worldwide journey to photograph them all.

"I want to produce the mother of all books on the world's deserts," Steinmetz said. "Antarctica is the world's largest desert, but most people don't perceive it that way."

His interest in the project arose while taking photos for a *National Geographic* story on the Sahara Desert about eight years ago. After 13 photographic voyages into deserts — areas that get less than 10 centimeters of precipitation a year — he stands about four trips and three years away from his goal.

"When you concentrate on one thing for a long period of time, it becomes bigger than yourself," Steinmetz said. "There is a force to be had from sticking with an idea."

Steinmetz is a regular contributor to *National Geographic* and has completed 16 major photo essays for the publication, including three cover stories.

He also works for a number of other leading publications. The photos he produces during this trip are already slated to appear in the *Smithsonian Magazine*, *WashingtonPost.com*, the Italian photography magazine *Focus*, and *GEO*, the German equivalent of *National Geographic*.

Part of what inspired his desert project was his use of a microlight aircraft, essentially a paraglider with a large fan on the back, during the original Sahara photo shoot. This allows him to slowly fly low over desert landscapes, giving him a different view of the world than traditional aerial photography can offer, Steinmetz said.

He decided against using the microlight in Antarctica primarily because of the cold and the ever-present wind on the continent. Steinmetz is instead photographing Antarctic landscape from helicopters, in addition to doing a lot of work on the ground. He said he has had to adapt to the lack of complete



Photo by George Steinmetz / Special to *The Antarctic Sun*

*Top, an 18-meter fumarole puffs steam on Mount Erebus Oct. 27. This is one of George Steinmetz's favorite photos from his time in Antarctica. He has spent two months in and around McMurdo Station as part of the National Science Foundation's Antarctic Artists and Writers Program.*



Photo by Lars Abromeit / Special to *The Antarctic Sun*

*Left, George Steinmetz stands at Fang Glacier camp on Mount Erebus Nov. 29.*

control when taking pictures from the air.

"There is a wonderful fleet with wonderful pilots here," Steinmetz said. "But it is just not the same as piloting your own aircraft and being able to go when and where you want to go."

Steinmetz has been to most of the world's deserts now, yet he hasn't found the subject at all repetitive. Every location has its own distinctive features and its own share of surprises, he said.

The big surprise in Antarctica for Steinmetz is the many forms of ice. The colors and shapes created by the ice have been the subject of many of his photographs.

Another one of his favorite Antarctic subjects has proven to be the McMurdo Dry Valleys. Along with their beauty, he has learned to respect the timeless way the area is preserved. Regulations keep human impact at a minimum, so most of the area remains untouched.

"It's like a library of time," Steinmetz said. "And you want to be careful not to mess up the card catalog."

The Dry Valleys' pristine beauty also comes laced with unique photographic challenges.

"It's tough being in a place like the Dry Valleys where there is no frame of reference

for distance," Steinmetz said. "You could take a picture of something and not be able to tell if it's from five feet or 5,000 feet."

While in the field, Steinmetz often works alongside scientists, and he said he feels right at home in McMurdo's culture of scientific research. While he makes his living as a freelance photographer, he holds a degree in geophysics from Stanford University.

Steinmetz has been able to capture a number of images he is very pleased with, including one of his favorites on Mount Erebus.

"One wonderful, still evening, at about one in the morning, when the sun was just about to set, I got a really special image of a huge, 60-foot fumarole puffing out steam with a tiny person at the bottom for perspective," Steinmetz said.

Although some of his best photographs have already jumped out at him, he said living in Antarctica can make it hard to recognize the wonder of the place.

"A lot of things I take down here will make more sense to me when I get home," Steinmetz said. "You get desensitized to the special environment. You see rock and ice in so many fantastic forms that you may not be able to understand how special it is until you get some distance from it."