

The Antarctic Sun



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January 16, 2005

Bye plane

Russians retrieve their plane

By Kristan Hutchison

Sun staff

Russia sent a big plane to pick up the little one this week.

Artur Chilingarov, Deputy chairman of the Russian State Duma, returned to Antarctica to retrieve the biplane he had left there three years ago. He came with a group of mechanics and media on an Ilyushin 76 cargo plane, under the auspices of the Russian polar program.

“We were sorry we couldn’t return the same year,” Chilingarov said through an interpreter.

Chilingarov had been aboard the Antonov 3T biplane when it originally flew from Patriot Hills to South Pole in January 2002. After landing at the Pole, the biplane had a problem when the pilot tried to restart it and had to be left behind.

Chilingarov was waiting at Pegasus ice runway when the biplane landed Tuesday after its 6 1/2 hour flight from the Pole. A strong tailwind helped the plane during the flight, allowing it to complete the journey without refueling. The Antonov 3T biplane landed at McMurdo the same way it originally had at the South Pole, showing off first by circling the runway and tipping its wings at the small cluster of watchers below.

After celebratory hugs and photos, the Russian

See Biplane on page 10



Photo by Kristan Hutchison / The Antarctic Sun

Politician and polar explorer Artur Chilingarov, center, welcomes the pilot of the Antonov 3T biplane after its flight from South Pole to McMurdo Station while Michael Orkin, from the independent Russian station NTV, films the moment.

Stinky water sets standard

By Kristan Hutchison

Sun staff

Green-hued and putrid, Pony Lake water is setting a new standard.

The shallow lake in the middle of the Cape Royds penguin rookery is thick with microbes and nothing else. That makes it ideal for determining the role those microbes play in cycling carbon through the environment and how they may react to climate changes.

Water from Pony Lake soon will be used by scientists around the world as the perfect example of microbially-produced dissolved organic matter. This will establish the standards for the International Humic Standards Society, which provides scientists with samples of organic substances.

No such standard exists for lake water, partially because lakes in other locations have so much organic carbon washing in from plants

along the shoreline that it is difficult to separate what comes from microbes in the lake. Scientists are interested in carbon because it is the basic building block of life on Earth.

There is a finite amount of carbon in the world. More cannot be created, so what exists must be recycled. Since life depends on the constant cycling of carbon, scientists try to understand the cycle and what could throw it off balance. But it is like trying to trace the threads of a spider web.

“If you look at the rest of the world, all the organic carbon in these streams and lakes and oceans and everything else has some form of influence from higher plants, trees and grass. Even oceans have that influence. You have a hard time escaping that,” said Yu-Ping Chin, a biochemist from Ohio State University. “The beauty of Antarctica is that the ponds and lakes and

See Pony Lake on page 9

QUOTE OF THE WEEK

“No sympathy, just paperwork.”

— Comment after a worker was told to fill out a safety report about a problem with a vehicle

INSIDE

Environmental monitoring

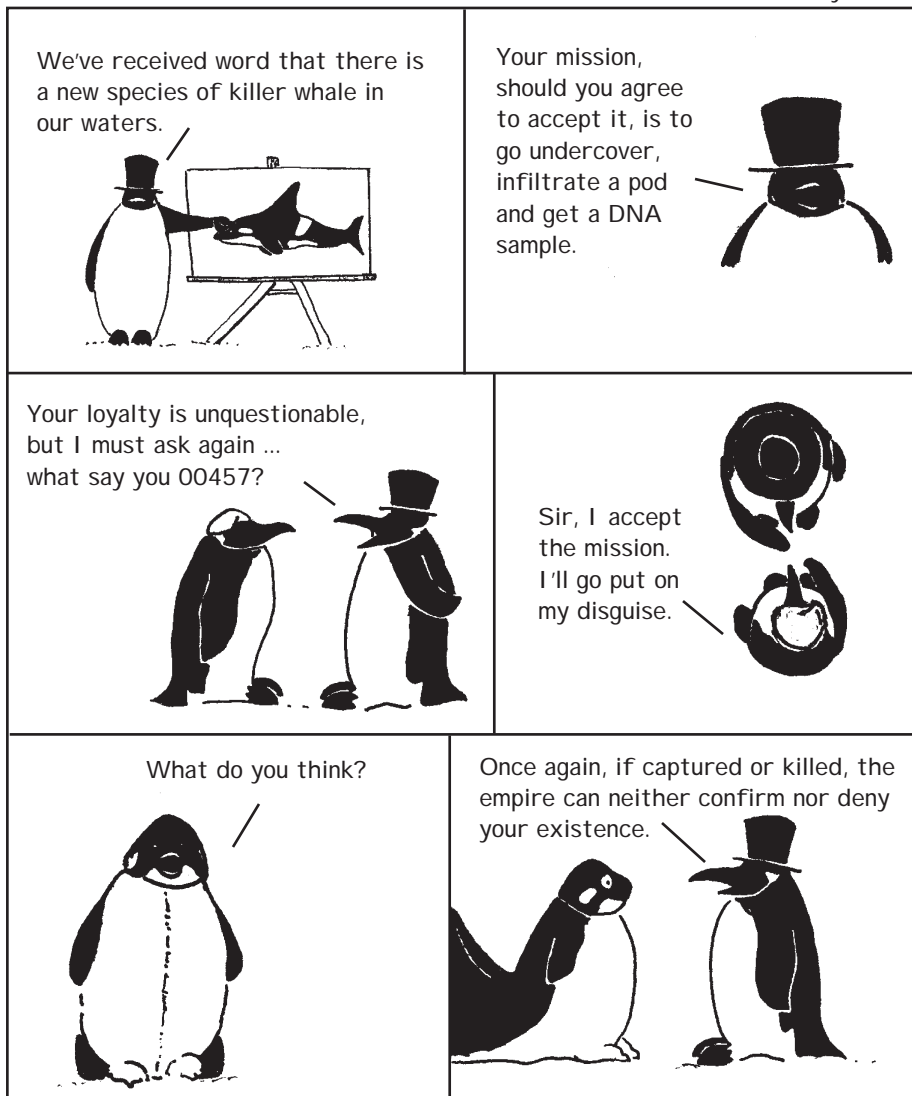
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Emigre thinks beyond borders

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Ross Island Chronicles

By Chico



Cold, hard facts

2005 Icebreakers

Ship:	<i>Polar Star</i>	<i>Krasin</i>
Management:	USCG	Commercial
Commissioned:	1976	1976
Length Overall:	121m	135m
Beam:	25m	26m
Draft:	8.5m	11m
Shaft horsepower:	up to 75,000	41,400
Displacement in metric tons:	13,405	20,240
Russian class:	LL1	LL2
Maximum open water speed:	33kph	36kph
Icebreaking capability:		
Continuous:	1.8m	1.8m
Backing and ramming:	6.4m	similar
Cargo:	400 tons	limited

Primary sources: Krasin: <http://www.fesco.ru/eng/fleet/vessels/icebreak/krasin.html>;
Polar Star: <http://www.uscg.mil/datasheet/icepolr.htm>

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The slippery slope below the ice

Glaciologist studies the dynamics of ice streams draining into the Ross Ice Shelf

By Kristan Hutchison
Sun staff

The future of waterfront homes in California and Florida may depend on what glaciologists find below the Antarctic ice.

Slawek Tulaczyk is studying what controls the flow of the West Antarctic Ice Sheet, which could raise sea levels about 5m if it were to slip into the ocean and melt. Glaciologists have been considering the possibility since the 1970s.

Most of the ice movement occurs in channels of faster moving ice, called ice streams, which are up to 100km wide and hundreds of kilometers long.

Tulaczyk refers to a map by Ian Joughin of the University of Washington, where the streams are colored to

show their velocity—red for thousands of meters a year, blue for hundreds, green for ten.

“Thanks to Ian’s work, when I look at Antarctica I don’t see snow; I don’t see white; I see rainbow colors,” said Tulaczyk, who came to the continent for the first time in November after studying it from afar for 10 years.

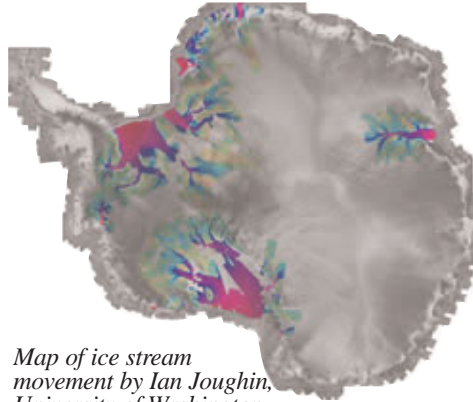
Tulaczyk is most interested in what is below the white snow anyway, at the base of the ice. Conditions at the base determine whether the ice is moving and at what speed.

Tulaczyk compares it to the ocean. The top is relatively flat and covered with waves, in this case frozen. But at the base the ground rises and falls into trenches, ridges, hills and valleys.

In this hidden landscape, water fills subglacial lakes and streams run uphill, seemingly defying gravity. These unseen currents lubricate the fast flow of ice streams toward the sea, potentially raising global sea levels enough to flood cities and change shorelines.

“For me the real continent is below the ice,” Tulaczyk said. “It’s like thinking about another planet, only I’m standing on it.”

This season he finally stood on the Kamb Ice Stream, where he set out eight continuously recording GPS instruments and a few hundred stakes to mark the ice movement. Tulaczyk’s colleague, Bob Jacobel, made radar surveys to check how much water is at the base of the ice.



Map of ice stream movement by Ian Joughin, University of Washington.

“For me the real continent is below the ice. ... It’s like thinking about another planet, only I’m standing on it.”

—Slawek Tulaczyk, glaciologist

Water at the bottom of the ice lubricates it and allows it to slip smoothly over the sediments below. If the water freezes, the ice sticks and stalls. The difference between freezing and thawing is a matter of delicate balance, with heat sources provided by geothermal heat from the Earth and the friction of the ice moving, like the warmth from rubbing hands together.

“In order to stop the ice stream, you have to change the friction at the bottom,” Tulaczyk said.

Once an ice stream starts slowing for some reason, it is caught into a cycle. With less movement, there is less friction, meaning less heat. The water at the base cools and the ice slows even more. Eventually it will stop, Tulaczyk said.

That’s what has happened to the Kamb Ice Stream, and may be happening soon to the Whillans Ice Stream. Both used to flow into the Ross Ice Shelf. The Kamb has stopped while the Whillans is slowing down, which has the effect of damming tributaries to a river.

“If you take into account these two events, the ice shelf is getting 20 to 30 percent less ice than it did in the past,” Tulaczyk said.

If all the ice streams flowing into the Ross Ice Shelf stopped, the ice shelf would cease to exist, much like a river drying up. But before that, the lack of flow could theoretically cause the Ross Ice Shelf to break up, Tulaczyk said. That could prompt the ice streams to begin flowing again, because they would no longer be

held back by the ice shelf. A similar phenomenon occurred after the Larsen B ice shelf broke up in 2002; the glaciers feeding it surged forward.

The rapid breakup of the Larsen B ice shelf put about 2,000 cubic kilometers of ice into the ocean, roughly equivalent to all the snow that lands on the continent in a year.

“It’s basically a big pulse of freshwater going into the ocean,” Tulaczyk said.

If it were to restart, the Kamb ice stream alone could contribute up to a half millimeter a year to global sea level. Recent models run by the team of glaciologists Tulaczyk works

with indicate that if all the ice shelves were to disintegrate like the Larson B, the influx of fresh water would slow currents in the

Southern Ocean about 30 percent, Tulaczyk said.

Defying gravity

While water drives the ice above, the ice also drives the water below. Rather than simply finding a consistently downward path through the terrain, as water does elsewhere, water under the ice is squeezed by the weight above it. If it faces a hillside with a slope less than 10 times the top slope of the ice above, the water will run uphill as it moves toward points of decreasing pressure.

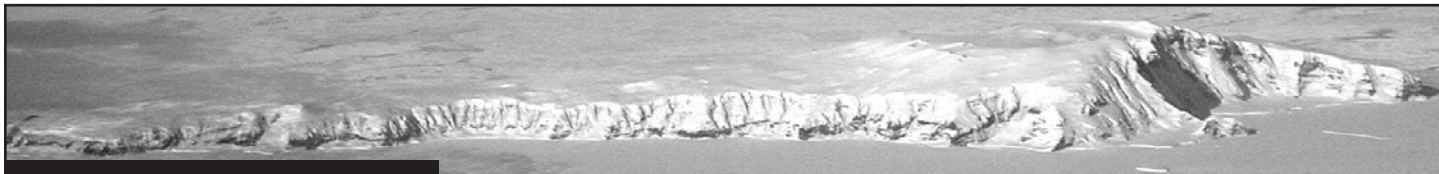
“The water is driven more by the slope on the surface than the slope below,” Tulaczyk said.

Along the way, the water can get caught in depressions, creating pools and lakes. Eventually these fill up and the water floods out into the next valley.

“We’ve found evidence that water does not flow in some boring, uniform fashion,” Tulaczyk said. “It’s basically making jumps from one lake basin to another, like a frog.”

Part of his study on the Kamb Ice Stream was monitoring a subglacial lake to try to catch an entire fill and flood cycle. Though the one he watched is small, just 5km across, he said the same theory may apply to larger lakes like Vostok.

NSF-funded research in this story: Slawek M. Tulaczyk, University of California, Santa Cruz, Earth Sciences.



Perspectives Perspectives

Travel guide: French Polynesia on \$360 a Day

By Allen Berggren

On my last trip home from the Ice, I opted for the round-the-world ticket. This opened up the possibility of making a stop in French Polynesia for some advance R&R on my return to the Ice this season. I had wanted to see Tahiti ever since I saw “Mutiny on the Bounty.” Who wouldn’t? I’ve also never been too fond of the 12-hour, non-stop flight from LA to Auckland, so why not take a break on the way?

I had five days, enough for a quick look at Tahiti and its neighboring island, Moorea. I even had the chance to learn a few new words of French. For example, the French word for computer is “ordinateur.” “Mon ordinateur a été volé de ma chambre d’hotel,” means “My computer has been stolen from my hotel room.” And it was, the day after I arrived. My airline ticket and contact numbers were in the same bag, so those were gone too, along with my romantic vision of French Polynesia.

The flight from LA arrived in Papeete about 2 a.m. I was greeted by a trio of Polynesian men singing and playing traditional music in the arrival hall. After passing several hours in a coffee shop, I caught the ferry to Moorea. The sea was calm, the air was cool and the mountain tops disappeared into the clouds — everything you could ask for in an island paradise.

I rented a car and set out to explore Moorea. I passed Cook’s Bay and Opunohu Bay on the island’s north coast, then came to Hauru Point, about half way around the island from the ferry terminal. There I found a campground on the shore with a lovely sea breeze. A co-worker stayed there a few years before, and had made a note in my guidebook, saying something like “perfect.” I took a room in a row of bungalows.

The next morning I went to brush my teeth and shower in the shared bathroom. When I got back to the room my computer bag was gone. The handy travel emergency phone number the U.S. Antarctic Program gave us was also in the bag, so I really felt isolated.

This was on a Friday morning. I would need to get in touch with Air New Zealand in Papeete before their office closed to find out how to replace the tickets. I wasn’t able to get my phone card to work on Moorea, but the proprietor of the restaurant called Air New Zealand and let me talk to them. I would need a copy of my tickets from the travel agent in Christchurch and a police report to get them re-issued.

I found the police station (gendarmerie) and got the police report with some difficulty. The gendarme didn’t speak English and the French I learned in high school was rusty. A lady at the pizzeria across from the gendarmerie had helped me write down what I needed to say, and I think she must have called and told the agent what my situation was, because he immediately produced a multilingual theft report.

By the time I had taken care of everything on Moorea, it was getting late. I had the car until the next morning, so I decided to stay on Moorea an additional night. I wasn’t too keen to go back to the same campground, so I found a mid-range hotel on Cook’s Bay. “Mid-range” in French Polynesia is not kind to budgets. Neither are rental cars.

Saturday morning, I took the ferry back to Papeete. It was Saturday in Denver and Sunday in New Zealand, so I couldn’t do much about calling anyone for help. I sent my supervisor an e-mail with the subject line “Help! Lost tickets in Tahiti.” Yeah, right. Try to get sympathy with a line like that. I asked him to try to find some contact numbers — travel emergency hot line or Christchurch travel office, etc. In the end, I found an old e-mail from the travel agent in Christchurch, so I also sent an e-mail to him, explaining my situation.

There was nothing more to be done in Papeete, so I picked up the car I had reserved there, and drove along the north shore of Tahiti. The drive was beautiful, and my frame of mind slowly recovered.

The next morning, I drove back to Papeete along the south shore and found a hotel near the waterfront where I could receive faxes. By then it was Monday in



Photo by Kristan Hutchison / *The Antarctic Sun*
This is Allen Berggren’s 14th year working in the McMurdo Station water plant.

New Zealand, so I called the travel agent. He said he would look up my ticket and fax me a copy. He also gave me the number of the travel office in Christchurch. They said they would fax me a copy of my support letter.

With that taken care of I was able to enjoy Papeete for the rest of the day. In the evening I had supper at a “roulotte,” which is an open air food stall on wheels in the parking lots along the waterfront. Come to think of it, the food was awful, but the atmosphere was fun.

Monday morning, I went to the Air New Zealand office in town to get my tickets re-issued. The faxed copy of the ticket my travel agent had sent was all I needed. I don’t even remember showing them the police report, although I had it.

As I checked in I could hear the trio of Tahitian singers welcoming another incoming flight. I knew I had been lucky. If I had lost my ticket on the last day instead of the first, I wouldn’t have made that flight, and if my passport had been in the same bag, it would have been even worse. Next time, I’ll e-mail those emergency contact numbers to myself in advance.

around the continent

SOUTH POLE

Not so quiet week

Compiled from reports by Katie Hess and other sources

Although only one LC-130 Hercules arrived the week of Jan. 6-12 because of bad weather at McMurdo, South Pole Station was by no means quiet. The station was abuzz with anxious anticipation wondering when fuel, cargo, crew, grantees and even an outgoing medical patient would begin moving again.

A crew of Russian mechanics, engineers and pilots remained here an extra week waiting for favorable conditions to fly their Twin Otter-sized Antonov 3 plane over the mountains and on to McMurdo. The plane and crew landed safely and met a Russian cargo plane, which had been standing by at McMurdo. (See story on page 1)

Kenn Borek Air Twin Otters were by far the most mobile air traffic this past week. They flew to many field camps, bringing a small team from Patriot Hills to the South Pole and retrieving a Chinese traverse expedition member who required medical evacuation from the continent. The traverse is the Kunlun Dome A Inland Icecap Expedition, currently the most important program of the 21st Chinese Arctic and Antarctic Expedition. The expedition was at 4,022m in altitude on the Dome of Inaccessibility about 960km from the geographic South Pole.

Back at the station, researchers were relieved to meet some team members who were delayed a week or more on their travels south. The new team members started trickling into the station on Jan. 11. Though much material for new station construction is still scheduled to arrive in the next month, the construction team plowed forward this week and hung the last of the steel on the A4 pod. A4 is the third of four pods that will extend out the south side of the station.

An ambitious flight schedule has been set for the last month to finish flying in fuel and supplies for the winter, construction materials for the new station, and grantees who need to get some Ice time with their projects during the short summer season.



Opher Ganel / Special to *The Antarctic Sun*

The U.S. Coast Guard icebreaker Polar Star is docked at the ice pier at McMurdo Station. The ship is being repaired before returning to duty. See update on Page 6.

PALMER

New NSF rep on station

By Kerry Kells

Palmer correspondent

Marie Bundy, the summer season NSF Representative, recently arrived at Palmer Station.

Bundy joined the NSF Office of Polar Programs (OPP) as an associate program officer in October 2003. Bundy is a zooplankton ecologist, and was based at the Academy of Natural Sciences Research Center in Southern Maryland in a curator/researcher position. She obtained her PhD from the University of Georgia Institute of Ecology in 1994. She joins the NSF as part of the Intergovernmental Personnel Act in a rotator spot with OPP.

During her first week at Palmer Station, Bundy volunteered to give the Wednesday night science lecture. She spoke about the Office of Polar Programs, the International Polar Year and her experiences at McMurdo and the South Pole last summer. She accompanied her talk with photographs of the sites she visited.

Bundy detailed the function of the NSF and the OPP in Antarctica "to promote the

progress of science; to advance the national health, prosperity and welfare of the country." She further explained how the NSF budgets for and manages the U.S. Antarctic Program and contracts for commercial support and transportation. The OPP is responsible for Antarctic sciences, arctic sciences, polar research support and environmental protection.

Bundy explained the NSF's grant funding process. The process begins with a proposal submitted by the scientist(s). Scientists review the proposal for intellectual merit and broader impacts. A panel of scientists convenes to assess the proposals. Science staff, polar research staff and Raytheon Polar Services Co. staff then assess the logistical needs for the most viable projects. Next, it is determined how many of the most competitive proposals can be funded.

While at Palmer Station, Bundy has joined seabird researchers on day-long studies at the local islands, Long Term Ecological Research near-station sampling and hopes to join the scientists of the research vessel *Laurence M. Gould* when they visit oceanographic stations near Palmer. She is interested in all of the sci-

See Continent on page 6

the week in weather

McMurdo Station

High: 36F / 2C

Low: 27F / -3C

Max. sustained wind: 36mph / 57kph

Windchill: -8F / -22C

Palmer Station

High: 44F / 7C

Low: 29F / -2C

Max. sustained wind: 30mph / 48kph

Precipitation: 9mm

South Pole Station

High: 0F / -18C

Low: -13F / -25C

Peak wind: 18mph / 29kph

Max. Physio-altitude: 3103m

Continent

From page 5

ences currently underway at Palmer Station and wants to be an active part of the community. She will be at Palmer Station until the first week of February and return to NSF after the LTER cruise.

SHIPS

Nathaniel B. Palmer

Compiled from reports by Alice Doyle

Weather was marginal on Jan. 6 and those onboard decided not to deploy a satellite receiver. Scientists use satellite images to locate plankton blooms. The fluorometry numbers remained high in the area, indicating the bloom is still in full force.

The barometer dropped overnight, leading to yet another day of high winds out of the south and south-southwest. After a weather report indicated that conditions would remain the same for the next 48 hours, the ship sought shelter in the ice. The ship headed west to Newnes Bay in the Ross Sea where microwave images indicated there was ice. The ride was less than ideal as waves came at the ship from the side and increased throughout the day.

They arrived at the ice edge late the following night and waited until 5 a.m. to find their way through. The mission was to find ice algae for various groups onboard.

"It was a treat to be back in the ice (and out of open water!)," wrote Alice Doyle, marine projects coordinator.

The first floe was large enough to drop the gangway. Unfortunately this floe lacked ice algae. But it was large enough for everyone to get off and stretch their legs. They proceeded to two other floes and found algae.

On Jan. 9, the weather finally cooperated and the ship got in a full day of sampling. Operations continued to run smoothly through the following day.

Laurence M. Gould

Compiled from reports by Andrew Nunn

The *Laurence M. Gould* is taking water samples as part of its annual Long Term Ecological Research Cruise. The month-long cruise west of the Antarctic Peninsula studies marine and terrestrial food webs by sailing along a predetermined grid and taking water samples at various spots.

Mild weather and mirror-flat seas at the beginning of the week made operations easy. The new net depth sensor and knuckle crane fairlead head are working well.

"Weather is still spooky calm," reported Andrew Nunn, marine projects coordinator on Jan. 8, and all operations continued to run smoothly.

The next day, the weather picked up, making it feel a bit more like Antarctica. On Jan. 10, the wind kicked up in the afternoon, and scientists had to skip two sampling stations. They were able to get back to the two stations the following day as the weather improved.

POLAR STAR

By Lt. Cmdr. Don Peltonen,
Ship operations

The *Polar Star* remains moored at the McMurdo Station ice pier. A commercial dive team, Phoenix International, arrived Jan. 11 to begin repairs on the U.S. Coast Guard ship's propeller hubs. Phoenix International has previous experience diving in the icy waters of McMurdo Sound, because they made a similar repair to the *Polar Sea* in 2002.

The repair to retorquer bolts on the hubs is expected to take approximately six to eight days. The *Polar Star* is expected to depart the ice pier on Jan. 20 to resume channel operations.

Tours of the ship are available for McMurdo residents while the ship is moored at the ice pier. The ship's store is expected to be open during tour hours.

OTHER SHIPS

Tanker *Paul Buck* and the Russian ice-breaker *Krasin* are en route to the Ross Sea with a projected arrival of Jan. 20 at the sea ice edge.

BALLOON

CREAM going for record

By Brien Barnett

Sun staff

The Cosmic Ray Energetics and Mass Experiment, CREAM, is looking to set the long duration balloon all-time flight record Monday afternoon.

The current record at just under 32 days is not in Antarctica, but worldwide.

Scientists said the balloon carrying CREAM is working well on its third flight around the Pole. The balloon and its multi-million dollar scientific payload launched Dec. 15, from McMurdo Station and has been pleasing the scientists.

"We are getting excellent data," wrote Eun-Suk Seo, principal investigator of the project to study high-energy particles.

As of Saturday, CREAM was at 78-degrees latitude and had just passed 0-degrees longitude at a height of about 37km.

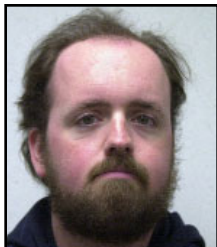
If it continues on that track, the balloon should set the record for the longest flight with days to spare.

At this point the earliest the flight would end would be the middle of next week -- several days after setting the record.

Track CREAM's progress online at <http://tower.nsbf.nasa.gov/ice0405.htm>.

Continental Drift

If you could go on a science project, which one and why?



Ben Morin,
McMurdo
janitor
from Portland, Maine,
second season.

"The guys on Mount Erebus there. I'd like to get up there sometime."



Joe Bayley,
South Pole
production cook
from Seattle,
first season

"Ice core traverse. Because there's so much information down there."



Kelsi Giswold,
Palmer Station
painter helper
from Seattle,
first season

"B-256-P (a polar insect study) because I want to be a 'bugger.'"



Photo by Emily Stone / The Antarctic Sun

Diver Jack Baldelli surfaces in the dive shack in Winter Quarters Bay after taking underwater sediment samples for a science group testing contaminant levels around McMurdo Station. Scientist Andrew Klein, right, and diver Rob Robbins, center, help Baldelli take off his gear.

Contaminants measured near McMurdo

By Emily Stone
Sun staff

They're testing the waters around McMurdo Station. And the land, for that matter.

A group of scientists from Texas A & M University and University of Texas Marine Science Institute spent three weeks in town taking soil samples from in and around the station, as well as underwater sediment samples from McMurdo Sound. The samples show how much contamination there is in the soil and sediment around McMurdo Station, which provides a measurement of human impact on the area.

The land samples will be tested mainly for fuel contaminants. The marine samples are tested for fuel and PCBs, which were used in heating and electrical systems, and are now banned in the U.S. The scientists record the animals living within the marine samples, because they are indicators of the health of the ecosystem there. They will also test the toxicity of the sediment and look at what contaminants are

found in larger animals, like urchins or mussels, which the divers collect while taking the sediment cores.

This is the second year the group has come to McMurdo on this round of testing. They were here several years ago on a four-year pilot project. Their job then was to come up with the best method for observing and measuring the impacts of science and operations at McMurdo as it related to soil and sediment contamination. Much of the contamination is thought to be from waste management practices before the current comprehensive waste management and spill reporting procedures went into place. The scientists did field work and historical research to determine where to test, what to test for and how many samples they needed to take. They are now following the system they developed to do their testing.

The Antarctic Treaty requires countries to monitor the environmental impact of their activities. The National Science Foundation funded the Texas group to do much of this monitoring, which is in keep-

ing with the government's goal of environmental stewardship.

"We're all trying to get comparable data sets so we have a bigger picture of the continent as a whole," said Polly Penhale, environmental officer for the Office of Polar Programs at National Science Foundation.

The group's goal is to produce results that can help with decision-making and environmental management. They will monitor, for example, whether heavily impacted areas remain stable over time, if they tend to spread, or if there is a change in the concentration of contaminants.

This year, there are 164 terrestrial sampling sites. The scientists go to the site, mark off a one-meter grid, and then scoop soil into a jar. They're also collecting soil from relatively undisturbed spots in Arrival Heights to compare to McMurdo's soil.

Results from the group's preliminary project showed that only 2 percent of sites had fuel contamination levels that were of

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“We’re all trying to get comparable data sets so we have a bigger picture of the continent as a whole.”

—Polly Penhale
environmental officer,
Office of Polar Programs

Monitoring From page 7

concern, scientist Steve Sweet said. These were from small areas by the helicopter pad and at fueling stations. The 164 terrestrial sites that the group is testing include 112 that have known contaminants and 52 that are randomly selected across the station.

There are fewer marine sampling spots, but it takes more work to get the sediment. There are three dive holes in Winter Quarters Bay, which is between the station and Hut Point; three near the wastewater outflow and three at Cape Armitage. The samples from Cape Armitage, which is far enough away so that the station’s output does not affect it, are used as a comparison



Photo by Emily Stone / The Antarctic Sun

Steve Sweet of Texas A & M University labels samples taken from underwater at Winter Quarters Bay near McMurdo Station.



Photo by Emily Stone / The Antarctic Sun

Marine scientist Sally Applebaum pushes a sediment core sample out of its container as fellow scientist Steve Sweet helps. The sediment is from the bottom of Winter Quarters Bay next to McMurdo Station. The scientists will measure the health of organisms in the sample and test for contaminants.

for the samples taken near the station.

Divers collect samples from 12m, 24m and 36m below the surface at each hole as the ground slopes down. The samples are basically soil cores, which are taken when the diver pushes a plastic tube into the sediment and then caps it.

Sally Applebaum, the ecologist in the group, takes the cores from the divers. She puts a hockey-puck like plug into the bottom of the tube and nudges it up. This allows her to carefully take the top 3cm of sediment and put it in a jar, and then take the next 7cm and put it in a separate jar. This way, she gets samples from the two distinct layers, which contain their own ecological communities.

Applebaum will count and identify all the tiny critters living inside her marine samples. Their numbers tell her about the health of the system. For example, a large number of polychaetes, which are marine worms, can indicate that the system is unhealthy, she said. And within the polychaetes, there are certain species that point toward higher or lower levels of contamination. In general, small, short-lived animals indicate an unhealthy system and larger, long-lived animals indicate a healthy one.

Sweet takes samples from within the cores, which he will test for contaminants.

In all, the group is putting 294 jars filled with dirt on the annual resupply boat

to the States. The jars will get to Texas for analysis in April.

Aside from the problem areas on land, the only place where contaminant levels are high enough to be of concern is at Winter Quarters Bay, Sweet said. A fuel smell emanates from the soil inside the dive hut there. Samples from Winter Quarters Bay have shown highly elevated levels of fuel and PCBs, Sweet said. The contaminants there are primarily from the station’s old landfill on the hill next to the bay.

“This is something that happened a while back,” Sweet said.

The contaminant levels have remained localized in that area, the scientists said.

“It’s very stable,” Applebaum said. “It’s not spreading out to the other parts of the bay.”

The NSF studied the question of decontaminating the bay, but decided against it, Penhale said. There is a lip, or shoal, at the edge of the bay that keeps the contaminants from spreading into open water. Many of the contaminants are very lightweight. The fear is that if the contaminants are disturbed in the process of removing them, they will become re-suspended in the water column and float up and over the lip of the bay, she said.

NSF-funded research in this story, Mahlon Kennicutt, Texas A & M University.



Photo by Rose Cory / Special to *The Antarctic Sun*

Christine Foreman holds an ice core taken from Pony Lake in November, showing the layer of green organic matter on the bottom.



Photo by Christine Foreman / Special to *The Antarctic Sun*

Rose Cory kneels on Pony Lake to cut out an ice core by hand in November, with Mt. Erebus in the background.

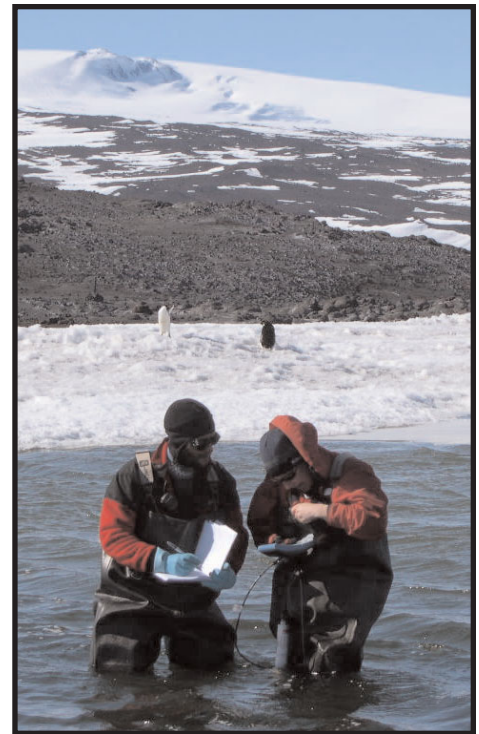


Photo by Rose Cory / Special to *The Antarctic Sun*

Ryan Fimmen and Christine Foreman wade thigh-deep into Pony Lake to take water samples.

Pony Lake From page 1

streams lack that completely.”

Pony Lake represents a simple and isolated system. There is no rainwater running off and carrying nutrients from the soil into the lake. The input of nitrogen from the penguin colony, in the form of guano particles blown into the lake, is easily identified.

The limited system offers an opportunity for biologists and biochemists to isolate how much impact microbes have on the lake chemistry and carbon cycle. While a water sample taken from a river in Colorado or Montana would have so much material from plants the microbial input would be lost, in Pony Lake the microbes work alone.

“The microbe is ubiquitous. Everywhere you’re going to have microorganisms,” said Christine Foreman, a limnologist from Montana State University. “But here we can actually focus on what their actual contribution is to the ecosystem and carbon cycling.”

Four investigators from four separate institutions are collaborating on a project to study how changes in the climate and radiation can alter the microbial pool of carbon. Besides Ping and Foreman, Diane McKnight from the University of Colorado at Boulder and Penney Miller from Rose-Hulman Institute of Technology are involved. Several students and postdocs are also on the research team — Ryan Fimmen, Jennifer Guerard, Chris Jaros, Rose Merin

Cory, and Kaelin Cawley.

“This is the only place in the world we can study it,” said Chin.

He and McKnight realized the potential of Pony Lake seven years ago, when they were studying the dissolved organic matter in the lake. The lake has a rich biosystem that has been stable for at least 100 years, since the microbiologist on Ernest Shackelton’s *Nimrod* expedition identified the algae.

This year the researchers arrived in November, so they could sample water from the lake throughout the season as the algae went from frozen to full-bloom. The first water sample they took was an ice core 1.5m down to the lake bottom. It came out looking like a layered popsicle. The top layer of ice was nearly clear. The middle was yellowish. And the bottom layer was a murky green that became unbearably pungent when melted.

Now the researchers wade into the lake to gather their samples. At Cray Lab, Cory takes the dissolved organic carbon out of the water column by filtering the water, dropping the pH and adding acid to make it sticky. Then she pumps the solution through a glass column that has been packed with plastic beads. The organic material sticks to the white beads, which become coated in a green slime. Then the organic matter is stripped off using a base solution. The solution is dried to obtain a concentrated powder that looks like a

ground spice. It takes about 100 liters of water to get one teaspoon of powder.

“It’s pretty much like environmental tea,” Cory said.

Water samples from streams or lakes up north usually produce a brown color, but the Pony Lake water samples end up looking green or yellow.

“So instead of looking like tea, it looks more like Mountain Dew,” Chin said.

However, the smell is an unappetizing aroma of urea and sulfur, as if rotten eggs were breaking open and mixing with the juices of a rancid compost pile.

To get an idea of the chemical processes prompted by exposure to the sun, the samples are put into custom-blown, 74cm-tall quartz tubes, which let in ultraviolet radiation. The six tubes are rotated at 90 degree angles to the sun for 12 hours, then examined for changes in the chemistry and biology.

The team is already seeing some promising results and they expect to publish their first papers this year.

“We’re getting little bits and pieces right now and they’re really enticing,” Foreman said.

So far, all the experiments have shown a consistent pattern. When the water is first exposed to sunlight it goes through intense chemical changes for about eight hours, then this begins to drop or level off.

See Pony Lake on page 10



Photos by Kristan Hutchison / The Antarctic Sun

Russian mechanics remove the wings on the Antonov 3T biplane, preparing it to be loaded into the Ilyushin 76 cargo plane for the journey to Russia. Below, National Science Foundation representative George Blaisdell, in the baseball cap, congratulates the pilot of the Antonov 3T while cameraman Michael Orkin films for Russian television.

Biplane From page 1

mechanics worked all night to dismantle the plane. They removed the wings and prop, then loaded it into the belly of the Ilyushin 76 waiting on Pegasus ice runway. On Wednesday, the Ilyushin carried away the smaller plane and the 42 visiting Russians.

"They have done this job in equal or less time than they proposed and with less difficulty than we expected," said George Blaisdell, representative for the National Science Foundation.

The Antonov 3T was ready to fly after a successful test flight at the South Pole on Jan. 4, but the final flight was delayed by bad weather at McMurdo Station and Beardmore Glacier, where they planned to

stop and refuel if needed.

"If it hadn't been for the weather, this would have been an in and out deal," Blaisdell said.

The Russian guests enjoyed American hospitality while they waited in McMurdo for the biplane.

"We feel here at home sometimes more than at home, because this community is very, very friendly; so many good faces, intellectual faces," said Snezhana Krasinskaya, a representative from the Central Polus expedition center in Russia. "It's that kind of community where I would like to be."

The Central Polus organizes expeditions to the North Pole, creating

temporary tent camps on the Arctic Sea ice as a base for about 40 researchers and tourists.

"It's what you do here, but on drifting ice," Krasinskaya said.

Michael Orkin, the cameraman for NTV, an independent television station in Russia, said that during the wait in McMurdo he'd had time to film "every nail in McMurdo," but that getting to know people on the station made the wait pleasant.

"We really enjoyed our stay here and really appreciated everything people did for us," Orkin said. "We made many friends here and we didn't expect it."

Pony Lake From page 9

This pattern is different than what is seen from the same types of experiments at midlatitudes and northern extremes, Chin said.

He's done similar work on Lake Toolik in the Alaskan arctic, so he is able to compare the two. Up there, most of the carbon in the water is leached from the soil in the first week after spring melt. The carbon is old, coming from the breakdown of land plants.

In Pony Lake, all the carbon is fresh and newly generated by the algae growing in the lake. The lake algae is very productive and fast growing. Foreman has been culturing the various algae and bacteria and will identify them based on DNA analysis when she returns to her lab in Montana.

At the beginning of January the lake water contained 26 parts per million of

carbon, about twice what it had been when Chin arrived in mid-December. The team expects it to double again before mid-January, when they will collect 2 cubic meters of Pony Lake water to set the standard. Because the penguin rookery and lake are in an area specially protected by the Antarctic Treaty, the water will be hauled over the hill 20 liters at a time to a helicopter landing spot outside the rookery. There it will be poured into 55 gallon drums and flown back to McMurdo Station.

The water will be processed in Crary Lab and shipped to the U.S. Then scientists around the world will be able to ask for samples of the water online from the International Humic Standards Society.

"We're doing basically a service for the scientific community," said Chin.



Photo by Christine Foreman / Special to The Antarctic Sun

Penguin feathers on a mat of algae in Pony Lake. The feathers and guano blow into the lake, providing nutrients for microbial life.



Photos by Kristan Hutchison / The Antarctic Sun

A glimpse inside the cockpit of the Antonov 3.

Above right, Russian mechanics empty fuel out of the Antonov 3T biplane. A tailwind helped the plane make it from the South Pole to McMurdo without having to refuel.

“We feel here at home sometimes more than at home, because this community is very, very friendly.”

—Snezhana Krasinskaya, representative from the Central Polus expedition center in Russia



New version of an old plane

The Russian biplane retrieved from the South Pole is an update on a classic model.

The Antonov 3T biplane was originally built as an Antonov 2, a multipurpose airplane produced by the Soviet block since 1947. About 15,000 Antonov 2's were built and commonly used as crop dusters or by airlines in remote parts of the USSR, according to *The Complete Encyclopedia of World Aircraft*. But the jet-engined Antonov 2 did not stand up to the rigors of agricultural work and many ended up permanently parked at secondary airports.

A decreased demand for the Antonov 2 led the aircraft manufacturer Polyot to retrofit an Antonov 2 with a turboprop engine in 1998, creating the Antonov 3. As the first of its kind, the Antonov 3T 9801 that flew to the South Pole was supposed to promote a reactivation and modernization of the Antonov design. The potential market for the conversion was estimated at about 2,000 aircraft from Latin America, Iraq, Cuba, Hungary, and

Yugoslavia. The prototype biplane's flight to the South Pole was a further effort to demonstrate the small plane's abilities.

“It was a test flight, and very important for technicians and scientists to study,” said Konstanti Zaytsev, an advisor from the Russian Duma who accompanied Artur Chilingarov.

More Antonov 2's have been converted to turboprop in the last three years, Konstantin said, though, “not enough for our requests from different regions, because Russia is a polar country and this aircraft can land in different conditions.”

Like the Twin Otters used by the U.S. Antarctic Program, the Antonov can be used with wheels, skis or floats.

Now that the Antonov 3T has been frozen at the Pole for three years, Russian technicians and scientists will study the effects the cold had on the plane's components, such as rubber seals and the cracked glass of the windshield. The information may be used for further updates, Zaytsev said.



Right, a mechanic unscrews a coverings on the biplane wing.

Profile Bulgarian refugee explores world

By Kristan Hutchison
Sun staff

The man passing out plumbing parts in McMurdo may be thinking about the meaning of life. Or what constitutes culture. Or how the latest Simpson's cartoon is a gentle criticism of American society.

Stefan Pashov thinks too deeply to give simple answers, no matter how straightforward the question.

Asked when he was born he answered, "In this life, this body, I was born 1958, July 14, in Sofia, Bulgaria."

He stayed there his first 28 years, earning a masters in world literature and linguistics with minors in philosophy and psychology from Sofia's Government University. Then he did two years of graduate study in history and the theory of culture.

"He's very intelligent. He should be teaching university rather than be down here," said Ilko Major, who worked with Pashov in supply two seasons ago. They had esoteric discussions ranging from religion to cosmology while they took inventory and stocked shelves. "He's a very spirited guy. He was good to work with."

Pashov's first attempt to escape the communist regime was immortalized in song. He was 18 and stole a waterbike from the beach with a friend. They were pedaling by starlight across the Black Sea toward Turkey when the border patrol caught them. He and his friend wrote a song about the incident, which a Bulgarian rock star turned into a popular hit.

On another botched attempt, he stole a boat from the dock, which turned out to belong to the border police. After that, he started considering more exotic methods, including a hot air balloon or crawling through a network of natural caves.

Eventually, Pashov left the country on a one-week visitor's visa. To get the visa in 1986, he endured a year of interrogations twice a week at the local police station, each lasting three to four hours.

"That almost brought me to the verge of psychological breakdown," said Pashov.

The visa cost him a year's salary as a teacher, along with money he borrowed from his parents. His parents understood they would probably never see Pashov again and that the family risked retribution from the government. Under the law in Bulgaria at the time, violating a visa was automatically punished with a three-year prison sentence.

"You can define it in positive and negative terms, what propelled me from the country and what drew me to the rest of the world. In my case, it was mostly the positive, striving for something greater," Pashov said of his reasons for leaving. "I wanted to delve into first-hand experience of the world."

In France, a Catholic organization gave Pashov a place to stay



Photo by Kristan Hutchison / The Antarctic Sun

Stefan Pashov considers Homer Simpson a classical antihero, who's suffering has an epic proportion and appeals to "the likeable slob in each one of us."

and after a year he was offered refugee status in the United States. A job bureau found him a position fishing for crab in the Bering Sea. Pashov arrived in Seattle penniless and slept a few nights in a car before boarding the fishing boat.

"From there it was all free sailing," Pashov said.

The work was miserable — 12-hour shifts knee deep in cold water for less than \$4 an hour. His crewmates were mostly ex-convicts from around the world, prone to fighting.

In that crowd, an 18-year-old woman from Washington State stood out like a flower growing in a dump. After two years of world travel, Amy Gomes was working to earn money to get back on the road.

Stefan and Amy have been together ever since, working a few months at a time and then traveling. They've been across Asia, the Middle East, Europe, North Africa, Central America, North America, Australia and New Zealand.

"I identify myself visually with her face, because I see her face more often than my own," said Pashov, who married Amy in 1992.

They were in Greece in 1990, when Pashov heard that his father, who was still in Bulgaria, was dying of cancer.

"I decided I had to go. I didn't care about the consequences," Pashov said.

He asked the Greek border guards not to shoot if he came running back toward. Then he walked across to the Bulgarian border guards, not knowing if they'd handcuff him or welcome him. With the communist regime beginning to crumble, they just asked if he had any U.S. dollars to exchange.

The Pashovs heard about working in Antarctica while on a boat in Alaska, but didn't apply until 2001. After three years traveling in Southeast Asia and India, their travel fund was almost gone. They were in New Zealand hitching rides and camping out when they met someone from the Ice on a hike. That prompted them to write up their resumes and catch a standby flight to Denver for the April job fair. They were both hired and have worked in McMurdo each summer since.

Pashov works for supply and Amy works in the same building as a workorder scheduler for facilities engineering, maintenance and construction. Their role in the community extends deeper. Pashov translates when Russians come through town, most recently when they came to get the biplane left at the South Pole three years ago and he may help with the Russian icebreaker on its way. He also hosts classes on topics ranging from world religions to western civilization.

"Strange things happen in life. I remember looking at a map and thinking, 'What will be the one place in the world I probably won't see? Probably Antarctica. Most maps don't even have it,'" Pashov said. "I literally dropped off the margin of the map."