The Antarctic Sun

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November 23, 2003

Finding a way to the Pole...

Photo by Kris Kuenning /The Antarctic Sun

The team charged with finding an overland way to the South Pole left McMurdo Station Tuesday. This year's journey will take the seven men to the Leverett Glacier and back by early February.

See South Pole traverse on page 11, Science traverse on page 10

Moon to stage show for Ice people

By Brien Barnett, Kristan Hutchison and Kris Kuenning
Sun Staff

Most times the best party is one with the lights off.

So, hats off to the moon for agreeing to throw the switch midday Monday to kick start the total solar eclipse party.

Most everybody in Antarctica will be able to witness at least a part of the eclipse, with those in extremely remote areas seeing totality, or the actual shadow of the moon as it passes between the sun and Earth. But don't be late because the peak of the show lasts only about two minutes.

Cross your fingers for clear skies. McMurdo forecaster Greg McQuoid said a weather system is due in from the Ross Sea on Monday and viewers there should expect a mostly cloudy day with an occasional break.

At McMurdo station the show begins Sunday at 22:08:57 UT or just after 11:08 a.m. Monday local time when the moon first starts to cross the sun's edge. At 12:06 p.m., the time of maximum eclipse at McMurdo, viewers will see about 75 percent of the sun's disk covered by the moon. About 10 minutes later, South Pole residents will see almost 90 percent of the disk covered. In your haste to witness the phenomenon, remember not to look directly at the sun. (See story page 9.)

One group of astronomy fans at McMurdo is hoping to receive solar filter sunglasses from the States.

"Otherwise, we'll watch it through welder's masks," said Jennifer Wilson, who has led a McMurdo astronomy club in past years. Wilson started tracking solar

See Eclipse on page 8

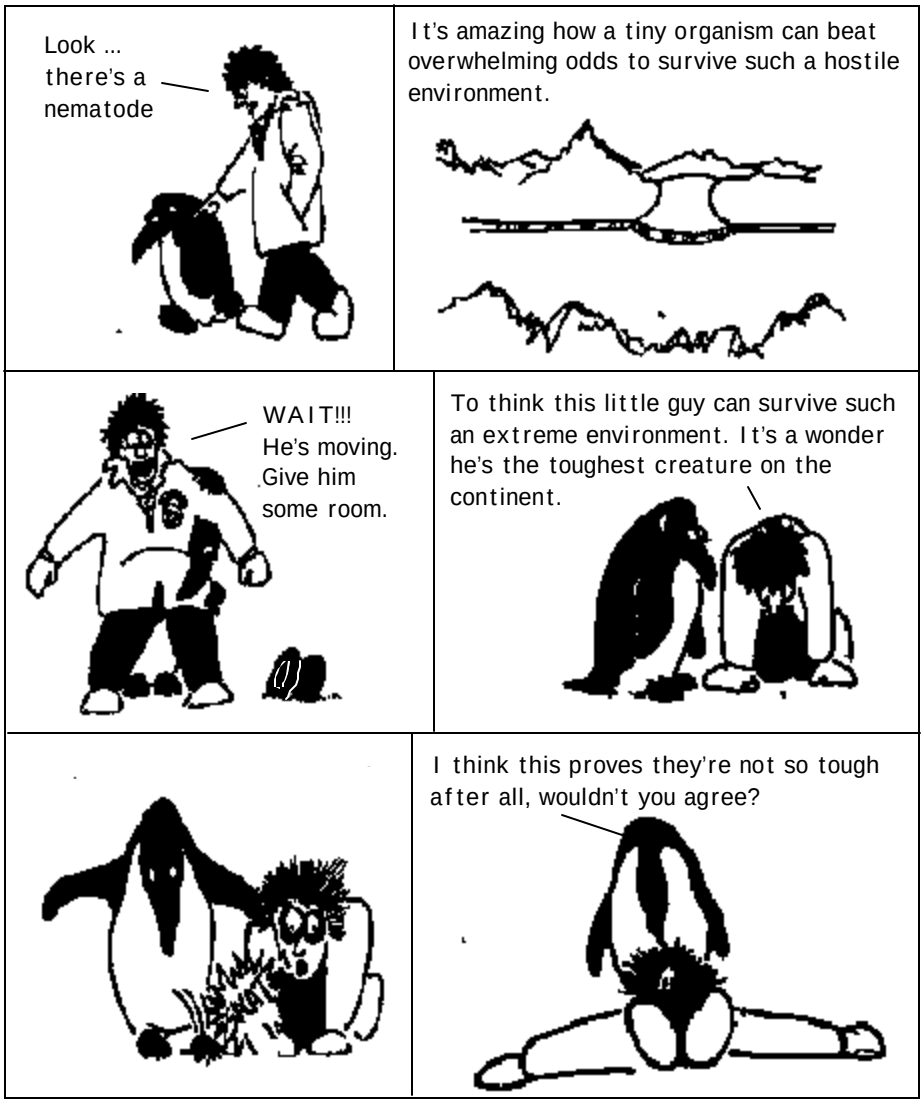
INSIDE

Quote of the Week

"You can't be everywhere at once. Darn this physical life."

- Photographer on the difficulties of bilocating for the eclipse

Ross Island Chronicles By Chico



Cold, hard facts

Let there be totality

- A solar eclipse can occur only at new moon, when the moon passes between earth and sun.
- Total solar eclipses happen about once every 1.5 years.
- The longest duration for a total solar eclipse is 7.5 minutes.
- Only partial solar eclipses can be observed from the North and South Poles. (Monday's eclipse holds true to that. The path of totality is not at the actual Pole.)
- Nearly identical eclipses (partial, annular or total) occur after 18 years and 11 days, or every 6,585.32 days (Saros Cycle).
- The maximum number of solar eclipses (partial, annular or total) is five per year.
- Eclipse shadows travel at 1,770 kph at the equator and up to 8,046 kph near the poles.

Sources: Space.com and MrEclipse.com

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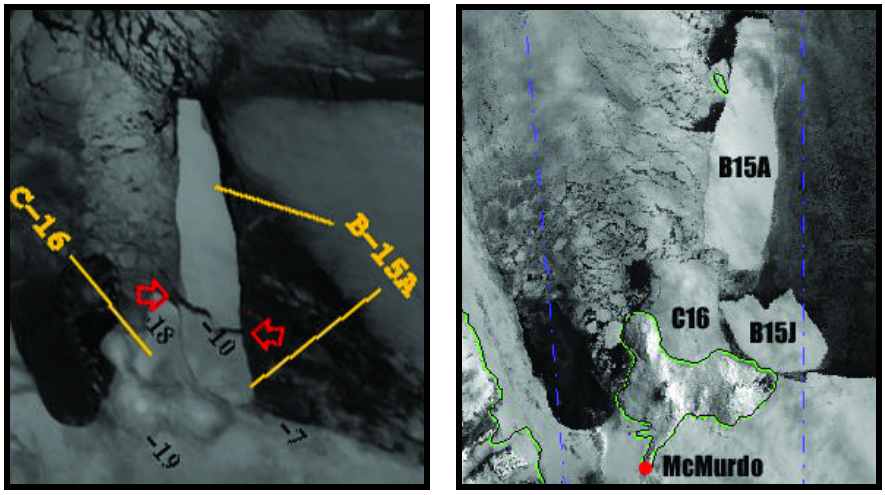
ICEBERG UPDATE: On the move



October 2003 **November 2003**

In these images taken by satellites, giant icebergs B15A and B15J appear to be on the move, with the larger one swinging west at the bottom and B15J rotating west and sliding east. The two were connected as one iceberg until they split apart in October.

Bare hooks lure tiny fish for research

Scientists want to learn more about the species' curious saltwater drinking habits

By Kris Kuenning
Sun Staff

No one understands the phrase "drinking like a fish" better than David Petzel. The researcher from Creighton University School of Medicine in Omaha, Neb. is studying how fish drinking rates relate to water temperature.

"We're trying to figure out how the temperature affects the amount of salt in the blood," Petzel said. Further down the track, Petzel's research may have applications for hypertension problems in people.

After doing PhD work with long-time fish researcher Art DeVries and the University of Illinois Urbana-Champaign in 1982, Petzel knows a thing or two about Antarctic fish. Now he's back at McMurdo station with his second grant to study the unique cold-water adaptation of *Trematomus bernacchii*.

But first he has to catch them.

"We're always looking for good fishing spots," Petzel said. And good fishermen.

Petzel recruits dining assistants, construction workers and any other willing bodies to set and pull traps or try their luck at ice fishing.

Bernacchii fishing is a simple sport. First you drill a hole near an old crack in the sea ice. A 2-meter long drill will break through the ice with a rush of seawater over the ankles in just a few minutes. Then hook, line and sinker are attached to a simple wooden block and lowered to the seafloor. The bottom-dwelling bernacchii are not particularly wily, but it does take a quick pull of the line to snag the brown, palm-sized fish.

A good day's fishing will haul around 30 fish. The trick is to get them to the cooler bucket before the –10 C air temperature freezes them.

On a recent Sunday fishing trip, Petzel's daughter Anne drove the sloshing cooler of fish back to the station in a tracked vehicle. The outdoorsy 17-year-old works in the Crary lab when not out fishing.

The sloshing helps keep the water oxidized long enough to get the fish safely back to the laboratory aquarium. Petzel and his team, which includes pharmacologist Margaret Scofield, and cell biologist Phil Brauer from Creighton University, are observing how the fish can adapt the salt content of their blood in different temperatures.

Oceangoing fish take in seawater, which has a salinity of 1000 milliosmoles per kilogram. A milliosmole refers to the number of particles in a specific amount of liquid.

Photos by Kris Kuenning / The Antarctic Sun

Above, fish researcher David Petzel, left, and his daughter Ann use a power auger to drill a fishing hole near Cape Evans. Petzel is studying the tiny McMurdo Sound fish called bernacchii to learn more about how they adapt to cold water.

At left, Petzel pulls one of the small bernacchii out of the hole. He uses only a hook, line and sinker attached to a wooden block to catch and reel in the fish. On a good day, the research team will land about 30 fish and rush them to the lab for further study.

The fish use an enzyme in their gills to pump some of the salt out of their bloodstream. The lower the blood salt content, the more the fish has to drink to replenish water lost to the sea.

Most fish have a blood salinity of around 300 milliosmoles but the bernacchii is almost 600. By pulling the fish out of their –1.9 C waters and placing them into the comparably tropical temperature of 4 C, Petzel's team has observed an increase in drinking rates and an almost 20 percent drop in the blood salinity.

His research is working to understand why the fish changes its salinity in different temperatures.

"The question is 'is it to resist freezing or conserve energy?'" Petzel said.

Higher salt content in the blood makes the fish more resistant to freezing but the adaptation might also be a trick for conserving energy in the cold waters. By looking at the oxygen consumption, Petzel is trying to determine if the fish use more energy at –1.9 C or 4 C.

He is also studying the specific enzyme in the gill membrane that is responsible for removing salt from the blood. The research team has isolated the enzyme and viewed it under a microscope. The team found the properties of the enzyme changed after four weeks in the warm bath.

Understanding more about how these cells work could be useful for understanding hypertension in humans, Petzel said.

"It's a far-off application, but it could be helpful for people with a high salt content in their blood. We're interested in the fish's adaptation to this unique environment," Petzel said.

Petzel's three-year grant from the National Science Foundation includes two years of study in Antarctica. After analyzing the data and making adjustments to the focus of his research, Petzel will return to the Ice in 2005.

"In year three of the grant we look forward to determining the effects of temperature on hormone levels in the fish and their effects on blood salt levels, drinking rates and enzyme activity."

Petzel's research is being followed on the Web by high school students in Omaha, Maine, Washington State and Australia.

Perspectives

People make the Ice an experience

By Karen Murphy

On Oct. 2, I stepped off a C-141 onto the continent of Antarctica for the very first time. A new found friend told me not to hurry when I got off the plane, but stop and turn full circle. The ice sparkled, Mount Erebus was puffing, the air was crisp on my cheeks and the military plane I just got off was enormous. I was awed, excited and scared at the same time. It was my first time here and I knew that I would never experience these moments again.

A first timer. We're a little embarrassed to be one because when others refer to us as such it's not a compliment. We're the tourists in town. We show child-like awe at everything around us with our mouths gaping at the beauty of the landscape. We are judgmental, arrogant, believing we could do things better because we are smart, educated and experienced beyond our positions — so we may think.

"In a little more than seven weeks on the Ice I've grown to love all the good things about being new."
- Karen Murphy

In a little more than seven weeks on the Ice I've grown to love all the good things about being new. I am still wowed every time I come out of my dorm and see a glimpse of the Royal Society Range. And I cannot wait to see how Winter Quarters Bay will look when the vessel arrives. I cannot imagine it now and I know this will be the only season I can say that. We all need to acknowledge and appreciate the excitement of the first season and hope others who have been here before can, at times, remember how the first season felt.

To appreciate being in Antarctica for the first time or to recapture the feeling of the first time, we must be open to remembering all the memorable first times in our life—going to school, making friends, moving away from home, falling in love, making love. Other firsts might include losing a pet, losing a loved one, getting divorced, almost losing a loved one through illness. One common thread to these experiences is emotion.

Photo by Brien Barnett / The Antarctic Sun

Karen Murphy works for McMurdo Station's housing office and said one of the goals still on her to-do list is to hike to the top of Observation Hill, just outside of McMurdo. So far, she's completed the Armitage Loop, which is a flagged trail on the sea ice from McMurdo to New Zealand's Scott Base on the other side of Ob Hill.

Emotion cements memories. There are no events remembered well, joyful or painful, that do not stir strong feelings. My first time in Antarctica is and will be no different. I will always remember my first look at Mount Erebus, penguins walking on the runway and seals lazily lying around on the ice looking like slugs. However, more than any scenery or wildlife, I will remember all the remarkable people I have met—people who have given of themselves generously without a second thought.

I am fortunate to work in the housing office because it allows me to meet everyone on station, from those who are new like me to those who have come for many seasons. I have met so many smart, funny, creative and caring people.

People who on their day off give tours to newcomers, those who offer classes in their free time to share music, exercise, dance or the history of Antarctica. And, those who simply do something nice for you.

There are so many. The person half my age who cared enough to ask me how I was doing when he knew I might be having a rough time; the person who made me a CD just because; the person who gave me his phone card when he learned I hadn't brought one; the people who wished me a happy birthday and those who trucked out to the sea ice runway with me and walked back together because they knew that was what I wanted to do on my birthday; the person who sang me Happy Birthday in Swedish, the person who carved me a penguin, the person who nicknamed me "Karry-On." There are so many more.

Just three weeks ago, I was calling this Papillon On Ice, in reference to an old movie where a guy is sent to a prison camp on a tropical island. Now I know leaving will be poignant.

In the end, we go to a place for the first time, but what we find are these people.

around the continent

SOUTH POLE

Changes under the Dome

By Tracy Sheeley
South Pole correspondent

This week at Pole marks the true beginning of a busy summer season – the last of our winter crew left the station and put it in our hands on Nov. 14. We are all settling into our world here, even as it changes before our eyes.

Now that the new Elevated Station and kitchen are in use, the former dining area under the Dome has been turned into an exercise room, and the old kitchen is now storage for do not freeze kitchen and store items. The freshie shack, which has housed our fruit, vegetables, soda and beer for years, was demolished last week, and a bare space remains under the Dome. Two additional buildings will be taken offline this summer – the Dome weight room and the "black box", another storage area. These buildings were heated with electric heat, so the fuel savings will be considerable.

Oldtimers find themselves struggling a bit with lingo as we adapt to these changes. Old Galley? Dome Gym? Old Galley Gym? Undoubtedly, we will develop new terms through the transition to the elevated station – perhaps even some new acronyms.

The science population is growing at Pole, as is the population in general. Inhabiting the new station has enabled us to raise our base population number to 232 – a gain of 12 bodies since last year. Our population is already in the 220s. In addition to the usual RPSC support projects and ongoing science, we will host a variety of visitors this season. One group is here now – the Light Ground Traverse Crew. The first of them arrived on Saturday, and they hope to depart within 10 days or so. Polies are enjoying watching the steps involved to get the science traverse rolling across the plateau.

As we have acclimated to the altitude and the summer routine, more energy for fun has emerged. Bingo Night with our acclaimed host, James Brown, has commenced and promises to be a popular summer activity. Classes are being scheduled, and folks are breaking out the skis – even though our temperatures have been holding in the minus 40s.

One of our unique offtime activities involves a ski or walk out to a buried LC-130. Roughly 1½ miles from station, the LC-130 crashed upon landing on Jan. 28, 1973. South Pole Station then was "Old Pole" – the first South Pole Station in 1956, prior to the move to the Dome in 1975. There were eight people staffing Old Pole at the time. No one was seriously injured in the crash, but the plane was destroyed. The aircraft was making a ground controlled radar approach to South Pole in poor weather and landed too hard. The wing tips hit the skiway, and the outer wings, tail, landing gear and engines came off and caught fire.

In the thirty years since, the aircraft has been almost entirely buried by drifting snow. Each summer, we dig it out, and make certain it is still safe to explore. So on our flightless Sundays, the curious bundle up in ECW gear, wander out to the plane – and marvel at the history. They also enjoy a nice warm dinner inside upon their return.

PALMER

Pack ice adds challenge

By Kerry Kells
Palmer correspondent

This past week the research vessel *Laurence M. Gould* arrived at Palmer Station, bringing with it more researchers and new staff. The *Gould* had to fight through the pack ice that had returned to surround our station. With the pack ice in, our researchers were not able to Zodiac out to their research sites for samples. Another of the projects here at Palmer studies phytoplankton, the light dependent plants at the mercy of the ocean's movements, and the physical parameter and optics of the water in which the phytoplankton live.

Four researchers at Palmer Station represent two components of the Long Term Ecological Research project concerned with primary production. Both groups

Photo by Kristan Hutchison / The Antarctic Sun
Pancake ice in the sea outside of Palmer Station earlier this year.

work under two principal investigators, Maria Vernet and Ray Smith. Vernet's research focuses on the phytoplankton ecology component. Smith's research looks at the bio-optical component; what kind of light the phytoplankton have to use. Our four researchers on station – team leaders Wendy Kozlowski and Karie Sines, along with Peter Horne and Bryan White – share the responsibilities of this research from collections of samples to lab work to experimental work.

Their collection sites are at the end of Bonaparte Point (representative of inshore sampling) and at Station E, a point farther out at the end of Laggard Island (representative of where the shore break falls off). They do water column samples twice a week. Defined as a volume or area of water going down in depth, a water column is a vertical profile equivalent to an ice core. The "euphotic" zone of water is where the light filters into the water and where the phytoplankton can use this light to photosynthesize. Phytoplankton require light and nutrients as a food source for their survival and success.

Both projects, the bio-optics and the Phytoplankton ecology component, visit these sites for samples. The bio-optical component collects conductivity, temperature and density and other data at these water column sites. The euphotic zone in water, where the light is available for use, is measured by different instruments brought to the sites. One of these instru-

See Palmer on page 6

the week in weather

McMurdo Station
High: 21 F / -6 C Low: 9 F / -13 C
Wind: 21 mph / 34 kph
Windchill: -27 F / -33 C

Palmer Station
High: 41 F / 5 C Low: 19 F / -7 C
Wind: 47 mph / 76 kph
Windchill: 10 F / -12 C

South Pole Station
High:-37 F / -38 C Low:-43 F / -46 C
Wind: 16 mph / 26 kph

Palmer

From page 5

ments is the new Ocean Sensors Autonomous Profiling Vehicle, which is still in the setup stage. The phytoplankton component focuses on basic physical oceanography. This includes looking at the temperature, salinity and water clarity and filters for particulate carbon and nitrogen, pigment composition, discrete chlorophyll and measurements of dissolved inorganic nutrients among many other tests conducted in the labs. Data are collected daily on photosynthesis-available light and ultra violet radiation. Experimental work analyzes the effects of the microzooplankton grazing on the phytoplankton or the chlorophyll biomass.

While phytoplankton are basically single-celled organisms not visible to the eye, they survive by the sunlight and nutrients available to them, add a component to the water in which they livem, and serve as a source of food for the zooplankton. The data collected on phytoplankton and their position and dependency on the water around them, as well as analysis of the ocean water, are an important part of the marine ecosystem and the response of the ecosystem to their ice-dominated environment, the Southern Ocean. With the sea ice now blowing out and the water calm, our researchers will again be out sampling.

SHIPS

Laurence M. Gould

Compiled from reports by Steven Ager

The *Laurence M. Gould* arrived at King George Island Nov. 15 to resupply Copa field station and drop off one scientist, Stacey Buckelew. Working in remarkably calm weather the crew hauled out the accumulated trash and empty propane tanks. The second Zodiac took Palmer Station passengers ashore to visit Polish research facility Henryk Arktowski. All of them enjoyed an afternoon of exploring and socializing. At 3 p.m. the ship left King George, heading north for Punta Arenas. The next day the *L.M. Gould* crossed latitude 60 south after passing safely through an armada of icebergs north of Robert Island.

The ship arrived in port Nov. 19 and will remain there until Nov. 23.

Nathaniel B. Palmer

Compiled from reports by Don Michaelson

Science started the week off pumping water into carboys and filtering at a "frenzied pace." The ship departed for New Zealand on Nov. 12, and stopped the next day to continue water probes to measure salinity and temperature, filtering water for science crews and plankton net casts in what would turn out to be the last day for science stops. The voyage north continued with choppy seas and swells up to 20 feet.

"Right now I type with one hand while holding on with the other," Don Michaelson wrote in the daily report. On Nov. 16, the wind and seas turned around and pushed the *Palmer* along at a solid 11 knots. The ship didn't dare stop for water samples because the seas would have caught up. The *Palmer* crossed into New Zealand waters that day and docked in Lyttleton, New Zealand on Nov. 19 for unscheduled engine repairs.

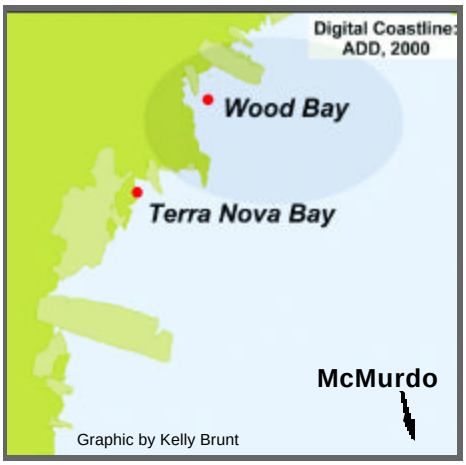
OTHER STATIONS

Estonia picks station site

From a report produced by the Institute of Geology at Estonia's Tallinn Technical University

Estonia is planning to establish a station in Antarctica.

The small eastern European country on the Baltic Sea has sent scientists on expeditions run by other countries since 1957. In January, a representative of the Estonian Antarctic Expedition visited the coast of Victoria Land in the region of



Terra Nova Bay and Wood Bay in search of a location for a station. The Italian and New Zealand Antarctic programs provided transportation. The scout looked at five sites and selected one on the coast of Wood Bay, according to a report presented at the July meeting of the Joint Committee on Antarctic Data Management in Brussels.

The chosen location is a small coastal oasis, free of snow and ice, on basaltic moraine. At least five small shallow lakes were found in the area, most of them connected by a stream discharging into the Ross Sea, which the Estonians plan to use as a water source. The area had patches of relatively lush vegetation and was inhabited by a few skuas, but no penguins.

Estonia plans to build a summer-only research station for six people. The station will include two prefabricated huts, fuel storage and a small workshop for storing two snowmobiles through the winter. The snowmobiles will be the only means of land and sea ice transport at the station. A 20-meter ship will supply the station out of Hobart, Australia, according to a report by Antarctic Tasmania from the Antarctic Treaty Consultative Meeting in Madrid Spain. Estonia expects to have the station operational by the 2006-2007 season.

Continental Drift

What food do you most crave in Antarctica?

"Mint leaves; spring rolls with lots of fresh mint leaves."
Wendy Beeler,
Palmer Station cook from Bar Harbor, Maine, 13th season

"Fried grubs. They go good with beer ... I had them in Thailand a few years ago."
Beaver Cohen,
South Pole sous chef with storage units in Missoula, Mont., fifth season

"Sushi. You spend all day cooking, so you like it raw sometimes."
Rich Anderson,
McMurdo Station production cook from Leavenworth, Wash., first season

Changes ahead for Pole telescopes

By Brien Barnett
Sun Staff

The continuing search for the secrets of the earliest moments of the universe is prompting changes at Amundsen-Scott South Pole Station.

Probably the most recognizable telescope at the South Pole is being reconfigured to host another planned instrument and two more telescopes are in the works.

The Degree Angular Scale Interferometer, or DASI, telescope was mostly dismantled earlier in November after four years observing the cosmic microwave background (CMB). The CMB is light that emanated from the early universe. The $3 million scope recorded slight temperature differences in the radiation and measured its polarization.

DASI had fulfilled its purpose and made several important discoveries along the way, said John Carlstrom, lead scientist on the project and professor of astronomy and astrophysics at the University of Chicago.

The two most important discoveries, according to Carlstrom, were that DASI confirmed the universe is flat and that ordinary matter, the stuff that makes up the stars and us, only accounts for 5 percent of the density of the universe. Another 25 percent of the density is composed of dark matter, which does not absorb or emit light but can be inferred by its gravitational pull. Surprisingly, very little is known about the remaining component except that it apparently is causing the expansion of the universe to accelerate. The confidence in these results was boosted when DASI revealed the background radiation is polarized precisely as predicted for such a universe. The discoveries support theories of modern physics. The polarization data were the cover story of the Sept. 2002 issue of the scientific journal *Nature*.

Scientists now hope to use the DASI telescope and its prominent brown wooden reflective shield for another, more sensitive instrument. The new telescope would provide researchers the sensitivity necessary to study in detail the polarization of the CMB that was discovered by DASI.

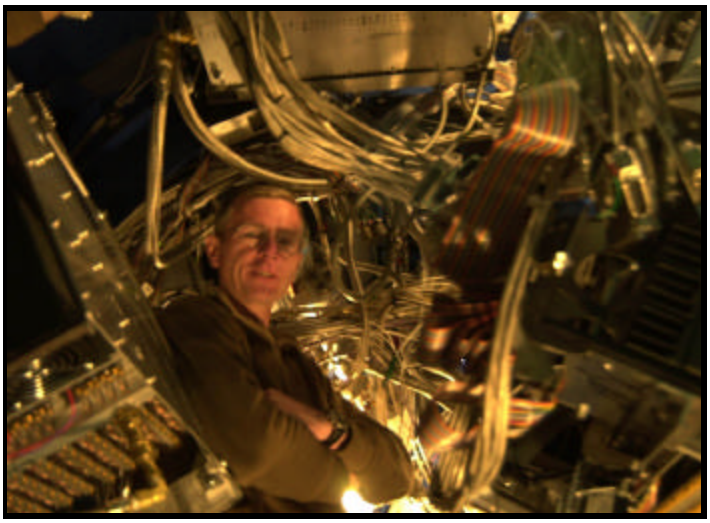


Photo by Brien Barnett / The Antarctic Sun

Stephen Padin stands inside DASI. One of the big boxes and much of the wiring was removed to make room for a more sensitive telescope to probe the cosmic microwave background.

Photo by Brien Barnett / The Antarctic Sun

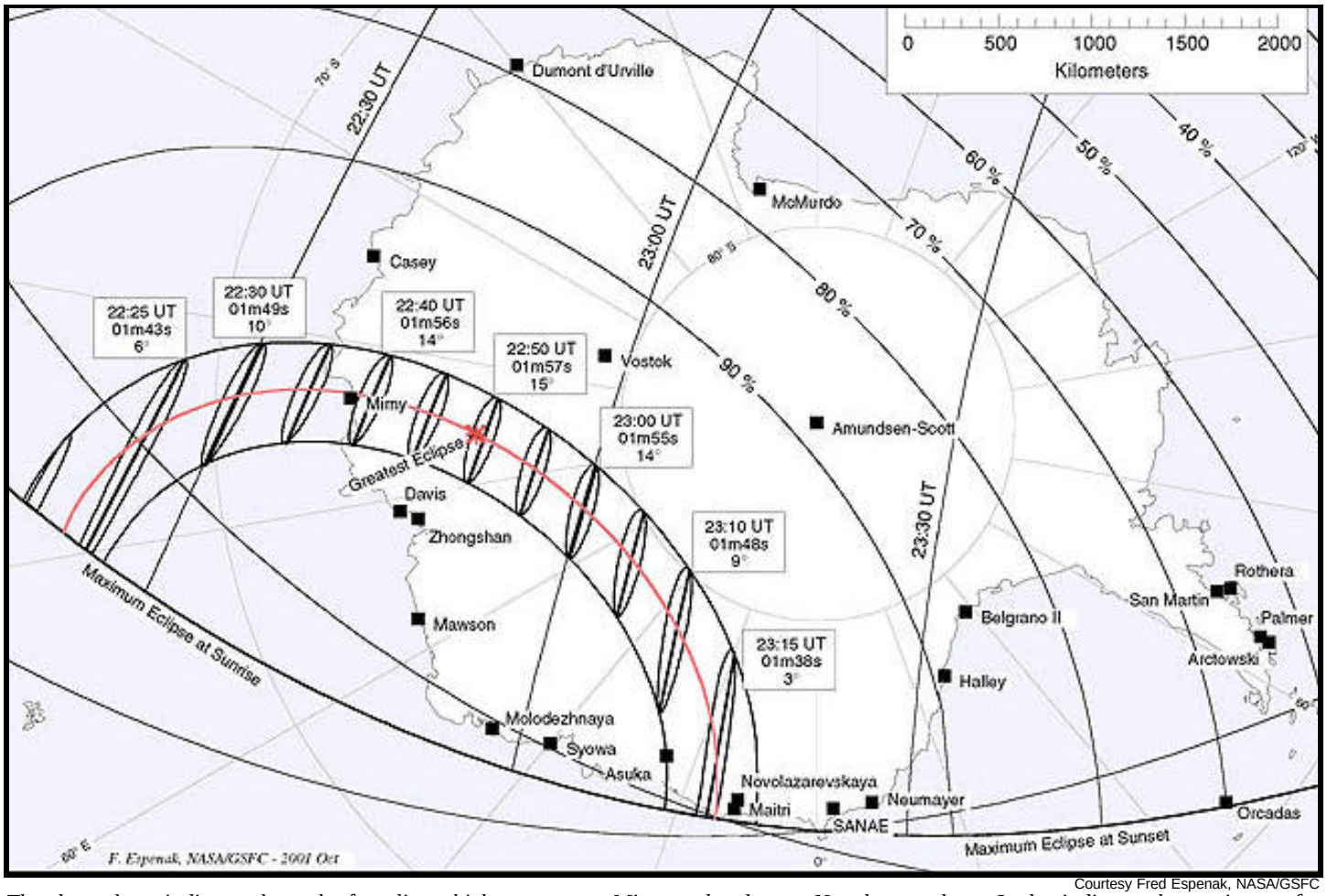
John Carlstrom, DASI's principal investigator, talks about the telescopes that helped in the hunt for cosmic background radiation.

Astrophysicists believe that the CMB is light that escaped the hot interior of the universe about 400,000 years after the event that sparked it. Because its wavelengths have lengthened over time, the CMB is now detectable only in the microwave portion of the electromagnetic spectrum. The researchers study data gleaned from the observations to learn characteristics about the universe, such as the rate of expansion and what may compose the mysterious dark energy which seems prevalent throughout the universe, but which they know little about.

An upcoming project planned for operations beginning in austral winter 2007, the South Pole Telescope will feature an 8-meter diameter mirror and a 1,000-element bolometer array to probe deep into the background radiation and possibly find clues about dark energy. Each bolometer measures the intensity of the CMB by sensing the tiny change in temperature that occurs when the radiation is focused onto the detector. The radiation shield for the South Pole telescope alone will be 16 meters high and 45 meters in diameter at the peak. Carlstrom is heading the project.

Another telescope that is now planned for deployment next year at the Pole is the smaller Background Imaging of Cosmic Extragalactic Polarization telescope, or BICEP. The telescope sports a 30-centimeter primary aperture and a 96-bolometer array in an attempt to precisely map the polarization of the CMB on angular scales of 1 to 10 degrees. These measurements will probe the physical conditions that existed in the universe less than a nanosecond after the big bang.

"One thing that's fun about working on BICEP is that we are looking so far back in time with such a small instrument. Because we're interested in objects in the sky that are pretty big, about a degree or so, we can use a very small telescope," said Andrew Lange, lead scientist for BICEP from the California Institute of Technology. "BICEP will be a very important little sister to... the 8-meter dish. The experiments together will allow us to study just about every aspect of the CMB."



Courtesy Fred Espenak, NASA/GSFC

The chart above indicates the path of totality, which passes over Mirny and ends near Novolazarevskaya. It also indicates the maximum of the eclipse as seen from other areas. For example, at Amundsen-Scott Station at the South Pole, the eclipse will reach nearly 90 percent.

Eclipse

From page 1

eclipse predictions two years ago, during her first season on the Ice.

"A lot of people pay thousands and thousands of dollars to come down and see the eclipse. Being here already is very handy."

Wilson said an eclipse is a reinforcement of the need for science beyond our planet. "It's a reminder of how much there is to learn and how much we can be amazed by the little things."

At Palmer Station on the Antarctic Peninsula the eclipse will be less dramatic, with maximum coverage of only about 65 percent. The peak coverage will occur just after 8 p.m. Sunday Palmer time, just before sunset at the station, which is outside the Antarctic Circle.

"Even though it won't be total, any interesting celestial event is cause for some festivities," wrote Glenn Grant, the Palmer research associate. He's checking for welder's goggles with a rating of 14 or higher, which would allow people to look at the sun safely. But if Palmer has its typical rainy weather, there won't be much point.

"We're looking forward to it, and we've got our fingers crossed for clear weather," Grant said. "Many of the station personnel have suggested taking the day off in celebration, which should be no problem since it happens on our Sunday. Others would like to do the Polar Plunge – although we may have to push the sea ice out of the way before diving in. Either way it will be a lot of fun."

Just a few people at Russian bases, on a tourist cruise ship or aboard chartered airplanes will be in the area of totality where the moon blots out the sun entirely and allows a glimpse of the mostly unseen corona. If those in the totality are lucky, they'll see a visual effect in which the sun's rays pop out at one spot while the corona is in full effect, creating a pattern resembling a sparkling diamond ring.

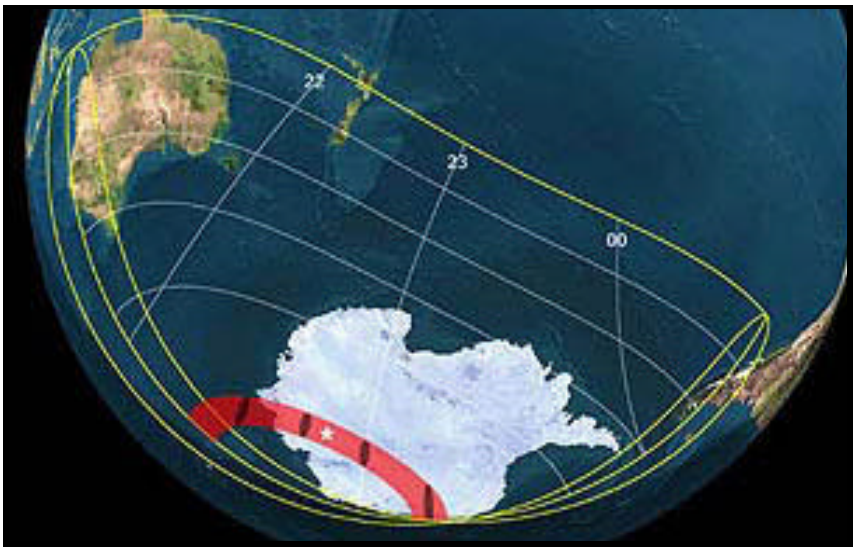
> "There are strange primal feelings when the Sun vanishes in broad daylight."
>
> - Fred Bruenjes

Considering the seeming randomness of the cosmos, an eclipse requires uncanny timing. Technology has come a long way from the Styrofoam and wire eclipse models back in grade school, but the mechanics of an eclipse remain the same. Now people can log onto NASA's eclipse Web site to see animated previews of the event and learn how the three objects – the earth, moon and sun – align precisely to form a shadow across the planet. A live Webcast of the event also is planned at www.live-eclipse.org.

Although eclipses are not rare, occurring every couple of years, most people have not been in the actual shadow. The last eclipse shadow to touch Antarctica was 1985, according to records found on the NASA eclipse home page. The next one won't zip over the ice until 2021.

This eclipse is a bit unusual in that it occurs near the bottom of the earth. Being just beyond the South Pole and within the sunrise terminator where it is constantly daylight, allows for the eclipse to traverse from east to west and begin and end at sunrise. Also, the angle at which the sunlight strikes the surface of the earth creates a more elongated shadow of the moon

See Eclipse on page 9



The star indicates the maximum eclipse point. Courtesy Fred Espanek, www.mreclipse.com

Eclipse From page 8

than is normal at higher latitudes. Still, you have to be in just the right spot to catch the shadow.

Several hundred people have converged on Antarctica by land, sea and air to view the eclipse. Most of the visitors are hard-core eclipse followers, who paid from $900 for an aisle seat on a flight to $36,000 for a month-long cruise.

The quickest, cheapest trips are on two flights, one on Qantas, which leaves Sydney and the other on LanChile, departing from Punta Arenas. Both sets of passengers will end up viewing the sun when it is fully obscured by the moon during the 2 minute-25 second event, which is 29 seconds more than they would experience if they were on the ice below.

Lan Chile's Airbus 340 plans to fly over the South Pole as part of its special package. The Qantas flight will sightsee for two hours before the eclipse, flying over Australia's Casey base and along the Antarctic coast.

"I suspect most occupants of those flights are significantly more interested in the eclipse than Antarctica" Fred Bruenjes e-mailed from his home in San Diego, California as he packed for his eclipse trip.

Bruenjes will also fly to Antarctica, but he'll see the eclipse from the ground at Novolazarevskaya Airstrip with about 70 other eclipse chasers on a tour arranged by Astronomical Tours. They plan to spend 72 hours at the Russian station, which is in the path of the full eclipse.

Tourists with the time, money and interest in Antarctica itself, signed up for a month-long cruise on the Kapitan Khlebnikov. The 120-passenger Russian icebreaker left Port Elizabeth, South Africa Nov. 8 to travel to Hobart, Tasmania. The Khlebnikov will observe the eclipse off the Queen Mary Coast, in the Davis Sea, west of the Shackleton Ice Shelf.

"Those people were so excited," said Susan Anschutz, whose co-owner at Astronomical Tours arranged the trips starting four years ago. "We serve a real niche market. These were people who were not only eclipse chasers, but also wanted to see Antarctica."

For Bruenjes, the Antarctic eclipse is the tenth one he's attempted to see and the fifth he's traveled to, with previous trips to Zambia, Mexico, Australia and Scotland.

Bruenjes considers the eclipse an opportunity to visit an obscure and unique place. He'll have two days in Queen Maud Land, out of a 12-day vacation.

"If the weather is good, seeing the eclipse will make it worth every penny," Bruenjes said. "A total solar eclipse is such a beautiful thing that is so out of the daily experience it is impossible to describe. Solar phenomena-like prominences and corona leave the domain of textbooks and journals and stare you in the face. Decades-old mathematical predictions come true with near split-second accuracy.

"There are strange primal feelings when the sun vanishes in broad daylight."

Eclipse tips

Don't look

Monday's eclipse is an unusual sight, but if you're not careful it could be one of your last.

McMurdo station chief physician J.J. Lefford said looking directly at the sun during a partial eclipse can permanently damage the retina, leading to blindness.

"The visible and near infrared light of the sun literally can burn the light sensitive cells of the retina," Lefford said.

Because retinas contain no pain fibers, it's not something that can be felt. The damage to the retinas may not show up for several hours after exposure.

"The only effective treatment is to prevent the injury in the first place," Lefford said. The doctor recommends a simple, pinhole viewer as the safest way to view the eclipse.

Other viewing tips

- Use welders goggles/glasses, No. 14 or higher. Glacier glasses or sunglasses are not dark enough, Lefford said.
- Make a filter mask using fully exposed and developed black and white photographic film, such as Tri-X, Pan-X or X-ray film. Do not use color film or newer black and white film that uses dyes or any film with an image on it. Lefford recommends using two layers of film.
- Even with a filter, the concentrated light of a telescope or binoculars will burn the retina. The same goes for the optical viewfinder on a camera. Do not look through them directly at the sun.

Make a pinhole viewer

One safe way of enjoying the eclipse is through a pinhole viewer. All you need are two thin, stiff pieces of white cardboard. Punch a small clean pinhole in one piece of cardboard and let the sunlight fall through that hole onto the second piece of cardboard, which serves as a screen. An inverted image of the sun is formed. To make the image larger, move the screen farther from the pinhole. To make the image brighter, move the screen closer to the pinhole. Remember, this instrument is used with your back to the sun. The sunlight passes over your shoulder, through the pinhole, and forms an image on the cardboard screen beneath it. Never look through the pinhole directly at the sun. Instead, photograph the reflection.

"A fun thing to do is to poke a pattern of holes into a sheet of paper, spelling out words," suggests Fred Bruenjes, an eclipse fan. "The words will then be made up of a multitude of crescents."

Antarctic errands

Science traverse has a few things to pick up on the drive home

By Kristan Hutchison
Sun staff

Eight people got one-way plane tickets to the South Pole last week. To get back, they'll have to drive 1,500 miles to the Taylor Dome on the eastern Antarctic plateau.

Two Challenger 55 tractors will creep away from Amundsen-Scott South Pole station next week, each pulling about 18,000 kg. The six sleds hold all the fuel, food and equipment the traverse crew and scientists will need for eight weeks. They'll move about 8 kph, keeping a close eye out for crevasses.

"If you see one, you get nervous," said Dan Dixon from the University of Maine.

Like many driving trips, their route is determined by the list of errands they need to accomplish along the way, in this case removing seismic equipment, dismantling or rebuilding field camps and collecting ice cores.

For Dixon, it will be a chance to collect seven new ice cores from areas the previous U.S. ITASE traverses didn't cover. The cores will contribute to the International TransAntarctic Scientific Expedition , which is assembling a 200-year climate history for the entire continent.

"To make the picture as fine as possible, I need lots of cores," Dixon said.

So far, ITASE has more than 30 cores from West Antarctica. Dixon has analyzed ion chromograph data from many of these to determine the levels of nitrate, sodium, potassium, magnesium, calcium, chlorine and sulfate.

"Each ion or combination of ions tells you a different story," Dixon said. "I try to figure out what they're telling me, what they represent in terms of Antarctic climate and atmospheric processes."

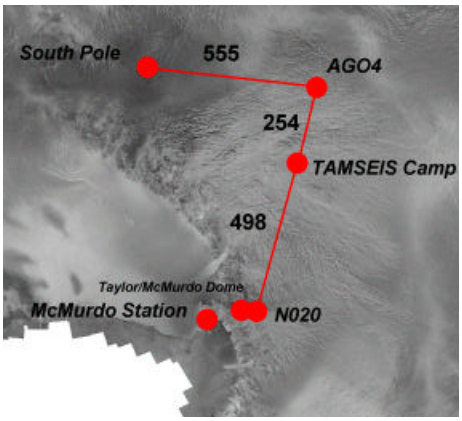
He started with sulfate, which comes mainly from dust, volcanic eruptions, and marine biological activity. Comparing sulfate levels around the continent can help researchers figure out the atmospheric circulation patterns at different times in the continent's past.

Sulfate also helps date layers in the ice core, which can be read like tree rings. In the summer, an increase in local marine biological activity creates an abundance of sulfate aerosols in the atmosphere. These aerosols get carried over the continent by air masses and show up inland as a layer of increased sulfate concentration in the snow. In the winter the sea is iced over and there isn't any marine biology to release sulfate into the air. On average, at an inland site, Dixon sees about 40 parts per billion of sulfate in summer layers and about 5 ppb in winter.

Photo by Peter Rajcek/Special to the Sun

To prepare for the upcoming departure, traverse mechanics Lynn Peters, front, and James Meinert check the tightness on the Caterpillar's track spacer bolts in the new garage at South Pole.

"These layers are really clear," Dixon said. Large volcanic eruptions throw the pattern off, coating the entire continent in sulfate for several years. Dixon has found the sulfate residue from large eruptions including Pinatubo in 1991, Agung in 1963,



Krakatau in 1883 and Tambora in 1815.

"It's pretty amazing to be able to see this over all West Antarctica, these layers should be detectable over the whole Antarctic continent," Dixon said. "I'm hoping to be able to find these same signals over the east Antarctic cores from this year's traverse."

What he hasn't found is evidence of pollution from anthropogenic sulfur sources. In the northern hemisphere, the sulfate concentration in ice cores goes off the scale in recent decades, caused by the larger human and industrial presence in the US, Canada, Europe, Russia, China and Japan. The air masses of the northern and southern hemispheres generally stay separate, with very little mixing occurring at the equator, Dixon said. With few human sulfate sources in the southern hemisphere, Antarctica seems pretty well isolated from sulfate pollution.

"Thanks to the Southern Ocean, Antarctica is well-separated from the rest of the world. That's why the water here is the cleanest you'll ever drink and the air is the cleanest you'll ever breath," Dixon said.

While Dixon picks up ice cores to look back in time, the traverse will pick up instruments seismologists Patrick Shore and Douglas Wiens left on the ice to look deep into the earth. The traverse will be collecting 17 seismic stations Shore and Wiens installed along a line about 80 km apart extending to a site near the top of the Taylor Glacier behind the Dry Valleys. Since the project is coming to an end this year, the 60 cm by 120 cm instrument boxes need to be removed and the instrumentation returned to the U.S., Wiens said.

"It seemed the best way to do that is the traverse," said Wiens, from Washington University. "Some of them are over 1,000 kilometers from McMurdo, so they're difficult to reach without a camp out there."

See Science traverse on page 11

South Pole traverse team heads out

A line of tractors and towed supplies left McMurdo station on Tuesday pulling enough gear to get seven men two-thirds of the way to the South Pole. Project manager John Wright formally announced the traverse departure from Williams Field by radio. "Mac Ops, Mac Ops... South Pole Traverse is departing McMurdo for the Ross Ice Shelf and points south, seven souls on board five tractors. Estimated time of return to McMurdo: February 01, 2004."

The traverse project is testing the possibility of partially supplying the Amundsen-Scott South Pole station by land. Five vehicles, pulling fuel and supplies, living quarters and power and water production capability, are headed through the highly crevassed area called the shear zone, across the Ross Ice Shelf and to the Leverett Glacier. Last year, the traverse got through the shear zone, filling in crevasses as they went. The traverse's challenge this year is to reach the Leverett Glacier and progress as far as possible up the glacier toward the polar plateau.

"Gaining access to the polar plateau will exceed expectations," said Rick Campbell, the project's point of contact at McMurdo.

In 2004-2005, the convoy will go the full distance to the South Pole and back. If the journey is successful and evaluations show the approach to be consistent with Antarctic Treaty environmental protection measures, this three-year proof of concept program will have blazed the way for regular ground deliveries of equipment and material.

Photos Kris Kuenning/The Antarctic Sun

Project leader John Wright, above, drives a modified Challenger tractor around McMurdo. Russ Magsig, right, drives a Challenger pulling fuel tanks as the traverse begins its journey. Above right, the traverse's living, dining, power and water production modules are pulled across the sea ice.

Science traverse

From page 10

Wiens expects data collected from the seismic instruments this year will confirm preliminary results from the first year's data.

The seismic stations were able to sense waves from earthquakes coming from the north polar region and use them to look at the inner core of the Earth, Wiens said. They revealed a large anomaly due to the orientation of iron crystal in the Earth's core.

"This will be a very important additional constraint," Wiens said. He was also able to map the speed of the seismic waves going through the Earth's mantle below east Antarctica. From them he learned that the Earth's mantle, below 40 km, is colder under East Antarctica than in surrounding places.

"I guess that makes some sense to the person on the street, but it really doesn't have any relation to the cold weather above the surface," Wiens said.

So far the results are preliminary, which is why Wiens needs the data the traverse will bring back, along with the instruments.

"The second year should allow us to be more confident about the results," Wiens said. The traverse team will also dismantle a field camp used in previous years, loading portions of the camp equipment into an LC-130 aircraft and carrying the rest 84 miles to the new Megadunes camp. Megadunes will be set up for two science groups working to survey and sample large snow dunes in East Antarctica, hence its name.

The scientific traverse is the sixth of its kind in the U.S. Antarctic Program. On the way, the traverse crew and scientists will spend most of their time in dining and berthing huts mounted on modules on two of the sleds. But now and then they'll stop to enjoy the white scenery and stretch their legs.

"It's still beautiful when you're out there and the sky is so blue. When you look up close the crystals are amazing," Dixon said.

Profile Pi keeps an eye on Pole life

By Peter Rejcek/*South Pole Correspondent*

Somewhere between scenes of impossibly long icicles hanging from the concave roof of the dome and footage of the 1957 South Pole winter-over crew, one of the narrators in Tom Pi's documentary observes that the isolated station draws a "band of nomadic people with a bad sense of drection and a broad sense of adventure." Each year the 41-year-old filmmaker documents those adventures at the South Pole.

"It's fun. It's rewarding," said the soft-spoken Pi, also known as Tom Piwowarski, about making movies, whether they're hour-long documentaries or five-minute docu-comedies. "You get a roomful of people watching it and they're laughing. People recognize themselves in it," he added. "That basically propels me to the next project. People see my work and they like it."

Pi works the swing shift as a carpenter on the exterior panel crew. This is his seventh consecutive year coming to Antarctica. All but one stint had been spent at the Pole. It was during his second year on the Ice that he decided to share this personal interest in photography and videography with his fellow Polies.

"I thought it would be pretty cool to bring a video camera down here," he explained. "I was pretty much doing it just to practice, because eventually I want to get involved in making a feature movie of some sort.

"Then somebody said, 'Why don't you compile your footage together and show it to people.'"

And, as the saying goes, the rest is history.

"It's become a seasonal thing now," Pi said. "This many years people expect it."

Photo by Peter Rejcek/Special to the Sun

South Pole filmmaker Tom Piwowarski documents the life and times of Polies.

Over the summer seasons Pi has perfected his craft, and like any artist he's highly critical of his earlier efforts — the first ran upwards of two hours and featured a five-minute violin solo. Last year's video was the first to feature music and voice-over narration by several Polies he interviewed for the project.

One of the voices in last year's film belongs to Mike Boyce, a carpenter from Denali Park, Alaska, who has worked with Pi in summers past. He said Pi has obviously made tremendous leaps in his filmmaking over the years.

"All of us are just blown away by the way he's improved," Boyce said. "It's good to see the hard work pay off."

Boyce added that Pi is known as Tom the Tasmanian devil among his co-workers, so it's no surprise he finds so much additional energy to pour into his craft.

"Tom is an incredibly hard worker," he said. "He never stops."

After a half-dozen years of doing the documentary, Pi admits one of his biggest challenges is to please his own artistic tastes while still including the scenes that make the annual video so popular — from the frenzied preparations of Thanksgiving dinner to the breathtaking shots of the LC-130 as it lands on or takes off from the Pole's short ice runway.

"I'm always looking to get some fresher ideas and to do that I just sort of talk to people or walk a different direction and look at something in a different light … walk around at a different time of day," he said. Last year's video, for instance, captures all those events that Polies write home about — the bag drag, suiting up at the CDC in Christchurch and even the ride on Ivan the Terra Bus in McMurdo. That's certainly the stuff that gives the video mass appeal. But Pi the artist also throws in fish-eye views of people moving cargo or flashes a silhouette of a lone Polie standing in the desolation of the flat landscape.

The documentary impressed Polie Gailyn Taylor, who attended a recent showing of the video at the Summer Camp lounge.

"It made me want to find out more of what's going on here," said the first-year carpenter. "I do want to get one for my family."

Pi said he doesn't script the documentaries, but simply shoots what he sees and then edits it. This year, though, will include less construction — a natural bias given his job — and more science, he promised.

"Ultimately, it will be a product of what I have," he said. "It's kind of an evolving thing."

While the process may be organic and ever-changing, there are certain elements that Pi says he's interested in as a filmmaker.

"What I'm interested in is motion, mostly," he explained. "Flags waving are good. People standing there with a sign and flags waving are even better. It's about people and it's about movement."

Pi, who lives in rural Buffalo, N.Y., during the rest of the year, has been interested in videography for about 15 years. He started doing film about seven years ago after seeing one bad movie too many at the theater. His personal tastes run to art house movies — the kind featured in the Sundance or Toronto film festivals.

"I prefer going to non-mainstream movies," he said. "To me a movie is not about making money, it's about expressing your art. I'm doing both — there's a practical side to any art," he added "If people like your art and it turns into a career, that's great."

Professionally, Pi has made a video montage for the Buffalo Philharmonic back home. Some of his South Pole footage made it into the made-for-TV movie "Ice Bound," starring Susan Sarandon as Dr. Jerri Nielsen. Nielsen was the winter doctor in 1999 whose battle with breast cancer drew international attention.

He also makes short movies. Last year he wrote and directed a five-minute film about a general assistant whose quixotic task consisted of filling in the snow void around the dome.

Boyce, friend and fan, said of the filmmaker, "I think he's got the ability to go places."

Pi will showcase his 2003-04 video several times near the end of the season.