

The Antarctic Sun



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

Into the drink



Photos by Melanie Conner/The Antarctic Sun

Emperor penguin researchers concluded their work in McMurdo Sound on Saturday. The team studied penguins' ability to maintain body temperatures in freezing waters and their tolerance for oxygen depletion. At right, some penguins carry a heart rate monitor on their backs to collect data for researchers. At left, an emperor plunges into an ice hole located inside its corral.

ITASE: Science on the move

Convoy of research sleds making way across ice sheet in search of history

By Mark Sabbatini

Sun staff

How's this for a challenge: Using only snow and ice, construct an area's history for the past 200 years while building a foundation for predicting the Earth's weather decades into the future.

Those who regard snow as a uniform mass of gunk to be shoveled might shudder or laugh at such a task. For scientists, it's the sort of thing that inspires a road trip.

So for the third straight year a team of researchers is slowly crossing west Antarctica in an odd collection of portable laboratories and other huts, collecting ice and snow as they go.

Getting elaborate data from frozen bits of water is nothing new, they say, since ice and snow layers can be read the way a biologist

studies rings on a tree to determine its age. But samples are needed from across a region to accurately uncover its secrets.

"In a way in the past you were collecting ice cores in an isolated spot and you really couldn't prove how much of a region it represented," said Paul Mayewski, director of the International Trans-Antarctic Scientific Expedition (ITASE).

The four-year ITASE project involves 15 countries collecting similar data across the continent. Members from the U.S., who are traveling the West Antarctic Ice Sheet, will conclude their portion next year with a traverse to the South Pole.

This year the U.S. team is traveling 1,200 miles (2,000 km) from Byrd Field Camp to the old Siple Station and back, the longest of their voyages to date. Much of the work continues previous research, but participants say variations - such as more snow and ice accumulation due to a warmer climate along the route - are expected.

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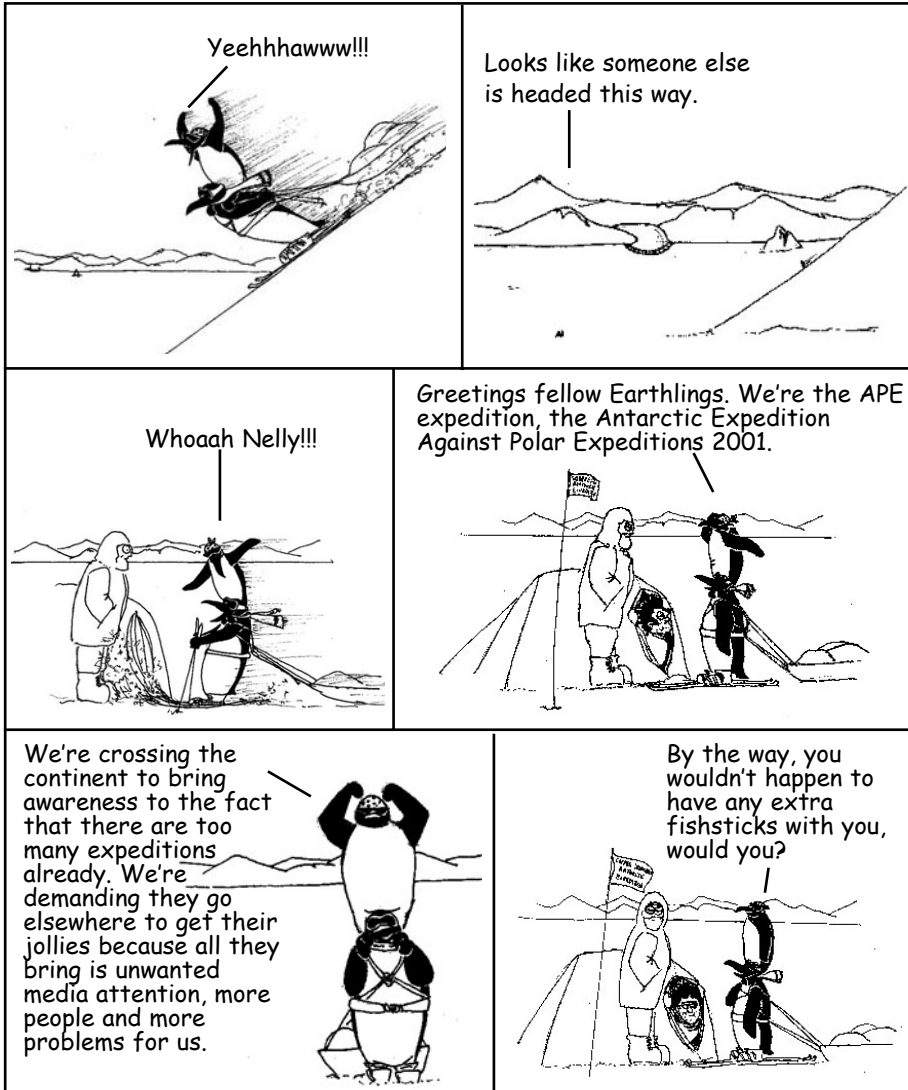
Quote of the Week

"To take a Challenger 55 and use it to move a sled that weighs 10,000 pounds over a few inches is not a trivial matter."

- an ITASE participant

Ross Island Chronicles

By Chico



Cold, hard facts

Ice people

Number of Raytheon Polar Services Company employees in full-time and contract positions, respectively: 285, 876

Median age of full-time and contract employees: 41.9, 38.1

Age range of full-time and contract employees: 22-66, 19-73

Male-female ratio of contract employees: 2-1

Ethnic status of contract employees: 96 percent Caucasian, 2 percent Hispanic, 1 percent Asian, .5 percent African American, .5 percent Native American

Number of states with contract employees: 47 (Delaware, Kentucky and Oklahoma have none)

States with the most contract employees: Colorado (202), Alaska (64), California (63), Washington (62)

Source: Raytheon Polar Services Human Resources

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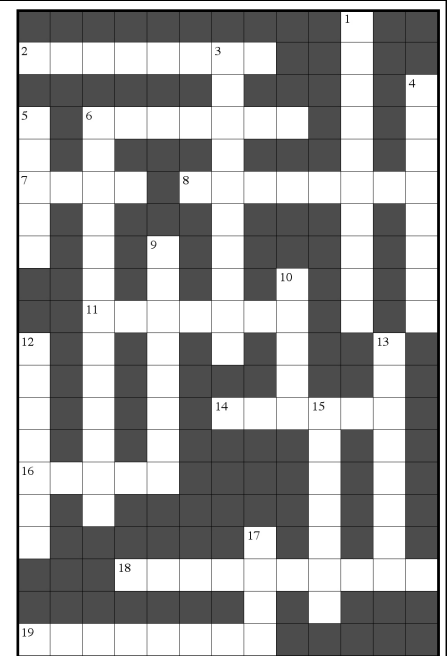
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South Pole sayings

- ACROSS**
- 2) Snow formations resembling sand dunes
 - 6) You get two per week of two minutes each
 - 7) This, not cold, is called the biggest danger
 - 8) Despite all the white, very little of this
 - 11) South Pole Remote Earth Observatory (abv.)
 - 14) The Pole and Sahara share this classification
 - 16) The first person to land a plane at the Pole
 - 18) A Pole night is made for this scientist
 - 19) This deceptive factor can make you feel low
- DOWN**
- 1) The Pole's official time zone
 - 3) Where the only green growing plants are found
 - 4) A month of this before sunset and sunrise
 - 5) "Great God, this is an _____ place."
 - 6) The type of clouds that form during winter
 - 9) For \$25,000, you can join the first to run this here
 - 10) The only clothing allowed by the "300 Club"
 - 12) The type of huts used by summer workers
 - 13) The only 90-degree reading you'll get outdoors
 - 15) The time of year the sun rises and sets
 - 17) The Pole's dominant structure - for now

Answers on page 12

Note: This puzzle is being rerun from last week due to a printing error.



The Preservation of Rocks



Library for polar geological samples to be built in Ohio

By Kristan Hutchison
Sun staff

Explorer Robert Scott died collecting rocks in Antarctica. He wouldn't have wanted them to end up in a gravel pit.

While geologists today don't give their lives, bringing home stones from the Antarctic is still a difficult and expensive process. A rock repository planned for Ohio State University will ensure the samples are saved for future research.

"A lot of geologists have rocks stored in their garage or they have rocks in the basements, so many rock collections are not in permanent curated storage," said Rosemary Askin, a geologist at Ohio State University who's pushed for a way to better retain those collections. "Many PI's (principal investigators) are about to retire and there's a danger of the rock collections being lost."

The soon-to-be-built U.S. Polar Rock Repository will be a library for samples from both polar regions.

The Antarctic Treaty requires scientific information to be shared, and that includes samples. Similar repositories already exist for ice cores, sediment, meteorites and even specimens pulled up from the Southern Ocean.

"The way I see it is that the collection of data down here is extremely expensive and therefore materials that have an infinite shelf life, like rocks, should be made available," said geologist David Elliot.

While a geologist in the U.S. can usually just drive back to the area where rocks were collected and pick up some more, getting to regions of Antarctica is much harder.

"There are many geologic sites that only one field party has ever visited," said geologist John Isbell. "They're like moon-rocks. They're valuable."

Since Antarctic rock collecting began in earnest in 1957, geologists have lugged back tons of mostly hand-sized rocks. By the 1990's, some of the rocks were at risk

of being discarded and a group of geologists began discussing the need to save them. A few rocks with important fossil material ended up in the Smithsonian and other museums, but many other rocks were probably lost as the scientists who collected them moved on to other topics or retired, said Scott Borg, the National Science Foundation's Geology and Geophysics Program Manager.

"I'm sure that a lot of material had been dumped out on the waste rock pile outside geology departments," Borg said.

Part of the beauty of rock is it doesn't go bad. It stores information for eons. Though one geologist may be done studying a particular rock, another geologist may be able to make further discoveries.

In 1999, the NSF gave Ohio State University a grant that covers much of the cost of building the \$700,000 facility. The rest is covered by matching funds from various Ohio state sources. OSU geologists had been discussing adding a rock repository to the Byrd Polar Research Center for 20 years, and had already started an online Antarctic Geologic Database, Askin said.

The repository will be adjacent to the Byrd Polar Research Center's laboratories, with a wet lab, rock saw, drill press, microscope and photographic equipment for preliminary rock and fossil examination. It is expected to open in August of 2002 with tens of thousands of rocks already, Askin said.

"I personally have, from one particular part of Antarctica, 2,000 samples," Askin said. "We have from one retired geologist over 3,000 samples."

Isbell estimates he also has about a ton of Antarctic rocks that will end up in the repository.

The repository will provide pieces of the rock samples to researchers upon request, but the core of the rock will always be retained.

"We will keep one small piece of the rock so we've always got an archive for

people to see," Askin said. "Oftentimes we collect quite a big chunk of rock, so a small piece off the side is no big deal."

The rocks tell stories. They come in all three of the major rock types - igneous, sedimentary and metamorphic. Some carry traces of pollen or fossils from Antarctica's warmer years. Others connect Antarctica to other continents, from the time when they were joined in the great Gondwanaland. The movement of the continent across the South Pole can be traced through magnetic fields left in the rocks. As technology and techniques develop, geologists will learn to read even more from the stones.

Eventually the rock repository could reduce the need for geologists to come to Antarctica, but it will never completely replace going into the field, Borg said. The observations geologists make as they collect rocks can be important to the research.

For instance, when Borg collected granite samples for his research he didn't pay attention to how the rocks were oriented. Though those granite samples couldn't be used in magnetic studies, a researcher could test them for magnetic fields to determine if it would be worthwhile to collect similar samples, Borg said.

"In the future I believe the repository should be a data source that anyone proposing a new investigation must examine and reference in order to demonstrate that they really do have a requirement to go in the field," Elliot said.

The repository will also be a source for students and the general public, who could tour the facilities. For Elliot and other researchers who dedicated years to collecting and studying Antarctic rock, it's satisfying to know their work will be retained.

"It would just be a damned shame if materials that have been properly collected and catalogued are simply dumped when somebody retires," Elliot said.



Perspectives Perspectives

Un-doctoring at Palmer Vo-tech

By Kristin van Konynenburg, MD

Palmer Station physician

I am steering a Zodiac Mark V over ocean swells raised by an unexpected 30-knot wind. Freezing water is splashing over the port side, and everyone is feeling the vulnerable spots in their Mustang suits as the cold wetness sneaks through fleece and long underwear. I can't feel the fingers of my left hand, which has become drenched holding on to the safety line as my right hand moves the tiller. I navigate through the ice floes and bergy bits while continuing to head for Palmer Station into the wind and waves. My fellow Search and Rescue Team members are full of encouragement, and laugh at my salt-covered sunglasses. I feel entirely alive in this land of wind and water and ice. I am the Palmer Station Physician, I think to myself, and at this moment it's the most perfect job in the world.

I applied to work in Antarctica because I wanted to practice medicine in an austere environment, where my job connected me to the outdoors. I taught Wilderness Medicine for the Juneau Icefield Research Project in Alaska last year, and discovered I loved teaching and working in that world of rock and ice. I also learned at least as much as I taught, as I lived and worked with the students, staff and professors of the project during their two-month trek across the Icefield.

As Dr. Maynard Miller, the JIRP director, said to us, nature is screaming at you. What he meant was that the rocks and ice and the beings who live there are full of history and meaning, we only need to know how to read the information in front of our noses. So the next natural step for me was to apply for a position in Antarctica, supporting folks on the cutting edge of research in the earth sciences.

Working at Palmer Station as a physician is an exercise in being both the ultimate community physician and the Un-doctor. Palmer is a small station. Follow-up is easy. I know where to find folks. However, I may be the only person who actually likes that fact. Our closeness also makes confidentiality an important issue. More than once I have been asked about a colleague's problem, and I tell the person I can't give that information. But if someone has an injury



Photo courtesy of Kristin van Konynenburg

Kristin van Konynenburg is much more than the doctor at Palmer Station.

and feels comfortable with an audience, then it can become a learning experience for others as well.

The beauty of working at Palmer is not that the medical problems are particularly interesting, or that they are particularly numerous. The beauty of working here is that you are practicing in a very unique work and living environment, where your patients are your friends and teachers and roommate and supervisor and knitting buddy and workout buddy. You need them as much as they need you. It's a sort of egalitarian utopia with a manager. Except that no one disputes the fact that the most important person on station is the one who knows how to run the power plant.

As the Palmer physician I'm responsible for all aspects of the clinic and medical care, as there are no allied personnel. Before medical school, I had been a medical receptionist, a phlebotomist, a medical assistant, a community health worker and a specimen processor in a lab. I thought I was well rounded, but I realize now I had not experienced numerous aspects of providing medical care and running a clinic. Not only do I perform all of the jobs above, I'm also the x-ray technologist, the radiologist, the lab technician and pathologist, the medical records clerk, the central supply clerk and resupplier, the janitor, the pharmacist, the operating room supply tech, the dentist and the nurse. This work seemed to happen

magically at the hospital and clinics where I work in the states; I will never again take it for granted.

Now I'll explain the Un-doctor part of the job. In addition to maintaining the clinic and taking care of health problems when they come up, I'm the fire safety inspector, the food safety inspector, the building inspector, the eyewash station inspector, the water safety inspector and the hot tub chemical maintenance person. I take air samples for NOAA and Scripps research groups. Plus I do the 1800 GMT weather observation and radio the results to Rothera, our neighboring British station, every day.

I now know why they call this Palmer Vo-tech, because I've learned about everything from the chill box to how to alkalinize our water supply. I've learned how to maintain a barometrograph and what is a cirrus spissatus cumulonimbogenitus cloud versus those of the altocumulus translucidus undulatus variety. I know how to recharge a portable fire extinguisher. I have a favorite snow shovel and ice chipping tool. I'm even figuring out how to use MAPCON. Oftentimes the scientists need a hand with their research as well. So I've fished for krill and counted penguins on nearby islands. I can tell a skua from a giant petrel, which is valuable knowledge when you want to avoid an avian attacker. I know where the cormorants nest and I've been dive bombed by an Antarctic tern. I can't remember having learned this much about such a wide variety of things ever before.

It's clear to me that weather, water, fire prevention and having a generator that works are the most important safety and health issues at the station. But the potential for major trauma or a serious medical condition is always present. The challenge of the job is being prepared for a major injury, disaster, or illness, while at the same time taking care of the many small details of maintaining an entire Environmental Health and Safety department. Aside from maintaining emergency medical equipment and supplies in the clinic, I'm also focused on better preparing the station for an emergency. Along with our Boating Coordinator, Jeff Bechtel, who is a Wilderness EMT, I've been teaching some courses for our Search

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around the continent

PALMER

Close brushes with toothy leopard seals

By Tom Cohenour
Palmer correspondent

At 120 feet below the surface of the ocean, the predatory carnivore suddenly appeared. Easily recognizable by its prehistoric reptilian appearance and sleek movements, the two divers knew instantly they had to abort their dive and seek safety out of the water. The sheer face of the submerged rock wall provided them with the best means of retreat. With their backs literally against the wall, Charles Amsler and Bill Baker slowly made their ascent. Both men, part of a team of seven conducting research on the Chemical Ecology of Shallow-Water Marine Macroalgae and Invertebrates (BO-022-O), have encountered *Hydruga leptonyx* before.

Known commonly as leopard seals, *Hydruga leptonyx* is, as noted by Ted E. DeLaca in his article "Encounters With Leopard Seals Along The Antarctic Peninsula" (*Antarctic Journal*, May/June 1975) "... a major large carnivore in Antarctic waters that frequently consumes warm blooded prey." DeLaca further notes in his article that over a four-year period "... there have been several encounters with leopard seals that have caused us concern."

This was the fourth dive in recent years the BO-022-O team had undertaken off the north end of Cormorant Island near Palmer Station and the third in which leopard seals have been encountered there.

Female leopard seals are larger than the males. At 10 feet long (3 meters) and 770 pounds (350 kg), the average female leopard seal has a large head and a powerful lower jaw with rows of sharp tricuspid teeth. Their large canine teeth are well-suited for capturing

prey common to their diet such as birds, penguins and other seals. Krill, however, have been shown to comprise 37 percent of their diet.

"It [the leopard seal] swam around us darting to within 3 feet (1 meter) several times," said Baker.

"And once it came within 1 foot (1/3 meter)," added Amsler. "Bill had his knife drawn just in case," Amsler said with a grin.

The underwater diver-to-diver signal for leopard seals is a hand and thumb "jaw" motion in front of your face. Though the signal is unmistakable, the warning is likely more conveyed by the intensity in which it's delivered - and the diver's wide eyes. Either way, the signal was understood. Over the next 12 minutes, both divers made their way to the surface and immediately hailed James B. McClintock and Margaret O.

Amsler who were waiting in the nearby Zodiac. Established protocol for evading a leopard seal attack while retreating is to emerge on land if possible. Fortunately for the dive team, a rock ledge provided the perfect staging area to remove their dive gear and re-enter the relative safety of the Zodiac. Relative safety.

Leopard seals have been known to bite and puncture Zodiac air tubes. In 1999, Pete Duley with the seabird component of the Long Term Ecological

Research (BP-013-P) had the fortitude to



Photo by Pete Duley/
The Antarctic Sun

A leopard seal bites into a Zodiac in 1999 near Palmer Station.

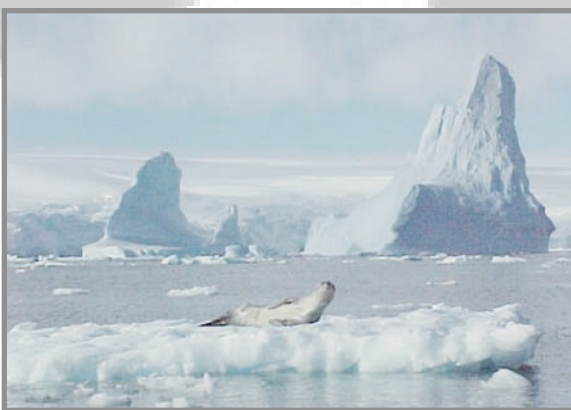


Photo by Tom Cohenour/Special to the Antarctic Sun

A leopard seal rests on an iceberg near Palmer Station.

pause long enough to take a photo of a leopard seal in action biting his boat. The tube partially deflated but he was able to make it back to station safely. Zodiacs at Palmer are now routinely equipped with puncture guards on the cone-shaped pontoon ends. "I've seen leps swim back and forth biting the Zodiacs tied up by the pier," said Boating Coordinator, Jeff Bechtel. "Last year we had seven boats in the water. Four had guards and three didn't. The three without all got punctured by leopard seals," noted Bechtel.

Despite their reputation for cunning and ferocity, leopard seal attacks on humans are few in number. DeLaca reminds us in his article that, "This seal nevertheless is potentially dangerous because of its large size, mobility and feeding habits."

SOUTH POLE

Thanksgiving festivities

By Judy Spanberger
South Pole correspondent

This past week at Pole was pleasant and even relaxing during a two-day break for the Thanksgiving holiday. The weather was sunny and in the minus 20s all week, which is great outdoor weather for this environment.

It's been a rather routine week for science. Science activities have been mostly of a maintenance, cleansing and calibration nature in preparation for another successful year of data collection. The field team leader for the meteor radar experiment is here to replace a broken power supply and to calibrate the experiment. This experiment is studying the dynamics of the atmosphere over the polar plateau with a ground-based radar system that uses the ionized trails of micrometeorites in the upper atmosphere as a reflecting medium. Mostly, however, it's been business as usual for the science community here at Pole.

Construction continues on track and progress is noticeable on the elevated station. Operations has been busy with more snow removal. There are a few large mounds of snow dotted around the station,

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the week in weather

McMurdo Station

High: 37F/3C Low: 14F/-10C
Wind: 23 mph/38 kph
Windchill: -22F/-30C

Palmer Station

Not available due to technical difficulties

South Pole Station

High: -24F/-31C Low: -36F/-38C
Wind: 14mph/23kph
Windchill: NA

Continent From page 5

but other than that it's nice and flat. A couple of bases and maybe a pitcher's mound and we could get a game going out there, or maybe a golf course?

A fair amount of our energy this past week seemed to focus around the Thanksgiving holiday. We celebrated our Thanksgiving on Saturday, which allowed us to have two days off in a row. A rare treat for us hard working Polies. The preparation began earlier in the week in the galley where each evening between 20 and 40 people would help prepare food for the grand feast. It was a reminder of the wonderful colors and textures of fresh food to watch the boxes and boxes of produce come in from the coolers outside. We made pies by the dozens with no two looking the same. Pounds and pounds of veggies were chopped. Brie was wrapped in pastry dough and decorated according to the whim of the wrapper. It was near enough to working in the kitchen at home with laughter, conversation and flour being flung about as the pie makers dove into their work.

We took a break from food preparation on Friday night for the annual pre-Thanksgiving disco ball. Many of us brought vintage disco outfits with us for this event, but many more made due with what



Photo by Alice Orlich/Special to The Antarctic Sun

Polies share a Thanksgiving toast.

was on station. The results were astonishingly late 70s. The Afro was alive and well that night, and there was more polyester than anyone had seen in decades. The summer camp lounge was decked out with lights, a DJ cage and a fully functional disco mirror ball. And with the lightheartedness of people who have two days off and a magnificent feast ahead of them we danced the night away. Prizes were awarded for most authentic and most creative outfits.

Thanksgiving was a day of food, relaxing, helping in the kitchen, conversations, movies, kite flying, chess games and sleeping in. Later in the afternoon we set up the galley for the feast. We set the table with linen and candles. It was beautiful. The

lights were dimmed, the candles lit, announcements and thanks were said and then it was time. And what a meal it was. Amazingly good. Roast turkey, smoked turkey and deep-fried turkey. Sweet potatoes, fresh mashed potatoes, stuffing and gravy. Bean casserole, fresh bread, three different kinds of cranberry sauce and mashed carrots. And more. As we sat and dined some of our fellow polies had volunteered to wander around and pour wine as needed. I had to remind myself that I was indeed at the South Pole, which when I did made everything so much more special. A big thanks to the kitchen staff who created a small miracle for us to enjoy. We hope you all had as wonderful a Thanksgiving.

Un-doctor From page 4

and Rescue Teams and anyone else who is interested. We've trained people on the use of the Automated External Defibrillator and had a CPR review course. We've had an introductory Wilderness Medicine course to prepare folks for assessing injured or sick colleagues in the field and communicating the victims situation to the station via radio. The Wilderness Medicine series of lectures

will continue, covering topics such as orthopedic injuries and splinting, wounds and burns, hypothermia, drowning, packaging and remote evacuation.

If you're getting the impression that I'm enjoying myself here, you're absolutely right. It's the best 54-plus-hour work week I could imagine. I'm already wistfully thinking that when I return home I won't look out

the window and see seals float by on ice floes or hear the roar of a calving glacier. Because right now out the window I can see a snow shower traveling towards the station from over the sea, with long gray tongues licking down from the storm clouds. Suddenly, it is snowing. Time to go out and enjoy the weather. Nature is screaming at me. If I listen, my life will never be the same.

Continental Drift

What do you think of commercial tourism activities in Antarctica?



"It's OK in limited quantities as long as they are educated on the Antarctic Treaty provisions and their activities are monitored."

Carmen Lemon
Assistant logistics supervisor at Palmer Station, from Colorado Springs, Colo.



"It is the epitome of checking something off their lists. I guess money does buy happiness after all."

Ellen Kerkow
Cargo handler at South Pole station, since sent home to Washington state with a broken arm



"I doubt they could do much more damage than we do. They're not erecting entire cities."

Quinn Redman
Prep cook at McMurdo Station from Seattle, Wash.

On the Road again

"For those of us returning from previous years it was almost like being home again. We moved back into our old bunks in the Blue Room and made ourselves comfortable for the next 6-8 weeks."

-excerpt from ITASE group journal, 11/16/01

By Mark Sabbatini

Sun staff

They started their 1,200-mile road trip Thanksgiving Day, eating cold bean burritos while driving at jogging speed through blowing snow across a vast ice sheet.

It's a bumpy ride, but flat white terrain stretches to the horizon in every direction. The view won't change anytime soon - certainly not during this leg of the trip, which lasts more than 30 straight hours.

About once an hour the line of sleds carrying laboratories, a kitchen, sleeping bunks and other structures reaches a waypoint on a GPS system that serves as a road map. The procession stops so about a dozen people aboard can refuel tractors hauling the two "trains," check the stability of loads and use the outhouse that is one of the "caboozes." Between stops, they read, talk, eat and try to perform scientific work despite the bumps and jolts.

This routine, with a series of stopovers to dig up snow and ice, will be life during the next two months for the U.S. component of the International Trans-Antarctic Scientific Expedition (ITASE). One member calls it "an old-fashioned expedition," another "industrial mountaineering" and a third "the price you pay for progress ... (squeezing) nine blokes in the



Photos by Mark Sabbatini/The Antarctic Sun

Members of the 2001-02 U.S. ITASE traverse arrive at Byrd Field Camp, above, to begin final preparations for their 1,200-mile trip in a variety of small research and living facilities attached to sleds.

Below, two researchers gather in front of a set of sleds from last year's traverse during a stop in its voyage across the West Antarctic Ice Sheet. The U.S. ITASE traverses will end next year with a trip to the South Pole.



Photo courtesy of ITASE

See Roadtrip on page 8

Lynn Peters, a mechanic and driver on the ITASE traverse, tries to balance a 4,000-pound track on a Challenger tractor at Byrd Field Camp. The space between the tracks on the tractor needed to be widened to prevent snow and ice from clogging the vehicle during its 1,200-mile journey across the West Antarctic Ice Sheet.



Photo by Mark Sabbatini/The Antarctic Sun

Roadtrip From page 7

Blue Room" at night.

"It's going to be a long, bumpy ride," said Dave Schneider, a University of Washington doctorate student who is making his second traverse with ITASE across the West Antarctic Ice Sheet.

There is a mix of new and familiar as the scientific research convoy begins the third of four annual trips. Newcomers join returning veterans on the research team. There are more structures for living and working instead of tents. A second Challenger tractor provides more horsepower for pulling the 80,000 pounds of gear and sleds. Equipment has been modified as a result of past problems such as the rough ride. For the first time, someone has packed a portable shower.

The hours of digging snow and drilling ice are largely the same as past years, but ITASE members expect their research to expand on previous findings. There are also hopes the flat views of the ice sheet will be replaced by better views as they reach crevasse fields near the end of their route.

We spent the morning (at McMurdo Station) doing a risk assessment for our field program ... Some of the risks are obvious, like encountering crevasses, being injured by some of the heavy machinery or vehicles, and food hygiene. Each member was asked to voice their single greatest concern. Some were quite surprising - Dan, for instance, was

concerned about being left behind if the traverse starts moving while he is still visiting the bathroom. Hopefully we convinced him that the risk was minimal."

- excerpt from ITASE group journal, 11/10/01

Adjusting to life on the traverse isn't a big deal for most of the ITASE team; either they've been on previous trips or worked in remote field camps elsewhere. The lone exception is Dan Dixon, a London native who is now a graduate student at the University of Maine.

"I didn't even have the right clothes for Maine," he said.

Dixon, whose first field work came on a Russian research ship where "the Russians were drinking a lot and it was just good fun," said a snow survival school course at McMurdo "kind of shocked my body into producing more heat." He said he has few concerns now, especially after living in tight quarters with others during long sailing trips.

"In a way that's what we're going to be like on the traverse," he said. "The traverse is going to be our survival capsule. In a way we'll actually have more freedom because we can get out and walk around."

For many, the lengthy and jarring ride between work sites is the worst part of the trip - sort of Antarctica's version of getting carsick. Everything from eating to working can be difficult as the high center of gravity of most structures makes the jolts from the uneven terrain even worse.

"I guess the closest thing would be like a ship in very rough weather ... the thing

is always shaking and jerking in all directions," said Gordon Hamilton, an assistant professor of climate studies at The University of Maine who is participating in his third ITASE trip. "Some people complain of seasickness."

"I can easily read or listen to music," he said. "Some people, all they can do is basically curl up and sleep through it all."

Working during travel times is crucial for those doing projects that rely on movement, such as radar mapping, while others are forced to forego portions of their research because of the risk to delicate equipment. During leisure time they watch movies, prepare meals and play "Who Wants to Be a Millionaire" tournaments on one of the computers.

Some relieve their boredom by taking a turn driving one of the Challenger tractors pulling the sleds and gear. The Challengers aren't difficult to operate - one ITASE member refers to them as "My First Sony Tractor" - but drivers must watch for hazards.

One of this year's biggest hazards are the crevasses, said Steve Niles, a mechanic and primary driver. He said a crevasse radar system will be suspended by a boom about 5 meters in front of the machine - "on an inner-tube, just sort of floating" - to help detect hollow spots in the ice. But they will be limited to speeds of about 3 mph (5 kph) - about half their normal traveling speed - while using the radar.

"It's going to be one of these deals where you won't be able to see the crevasses, (but) a lot of these guys have studied the area," he said.

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Roadtrip From page 8

"Besides," he added dryly, "when I get into the crevasse areas I'll let the scientists drive."

"By late evening the wind had dropped and a fog bank had moved in. Hoar crystals began to form on all surfaces. In the part of the sky opposite the sun, a fogbow formed - for many of the team this was their first experience of this unusual phenomenon."

- excerpt from ITASE group journal, 11/24/01

Scenery isn't on the priority list of some ITASE participants, since most of the voyage occurs over terrain that is white and flat. But even the duller-looking stretch of ice can offer glimpses of beauty depending on how it is viewed.

A satellite map of the traverse has promise, with ridges surfacing along glaciers toward one end of the route. Hamilton said that is deceptive at ground level, since the ripples are about the height of an office ceiling. But look even closer and a snowfield that looks the same during a 60-mile driving trip takes on new life, said Cobi Harris, a mountaineering guide from Portland, Ore., who is providing field support during the traverse.

"If you look down at the snow, there's amazing patterns and it's really beautiful," she said.

Some crew members are hoping for a bit more scenery as they approach the Ronne Ice Shelf and two prominent glaciers along the route. Those participating in last year's trip saw only one mountain, and

the lone rock they encountered was a stone about 12 miles away that apparently had blown off the summit, Harris said.

Even though the monotony of things such as scenery and routine are felt by most people, it's not a serious impediment, said Paul Mayewski, director of the U.S. ITASE program and the larger international ITASE project involving 15 countries making traverses at different locations on the continent.

"To me that's the hardest part, that things are pretty much the same every day," he said. "But with a good group of people it doesn't bother you that much."

"Today turned out to be the ideal day to celebrate Thanksgiving. Cobi and Gordon cooked up a feast, improvising with available ingredients and adapting to the cramped cooking conditions. Our menu consisted of: eggnog, appetitifs, mixed nuts, turkey, garlic mashed potatoes, yams, glazed carrots, sausage stuffing, dried cherry stuffing, mushroom gravy, cranberry sauce, red and white wine, pumpkin cheesecake with ginger snap crust, liqueurs (and) cigars. The cigars were a surprise gift from Zach Smith, a participant in last year's expedition. Dan presented the gift on his behalf to hearty good cheers all around."

- excerpt from ITASE group journal, 11/26/01

Harris' duties include being the expedition's food manager, but everyone shares cooking and other domestic duties. Menus are reasonably varied, since meat and vegetables can be kept safely frozen in storage boxes outside the trailers.

Sleeping arrangements are considered both better and worse than past years. The galley has been removed from the nine-bunk Blue Room, which is also being supplemented by a smaller sleeping trailer. Everyone is well-sheltered - a big plus during storms - but perhaps a little cozier with their co-workers than they'd like.

"Oddly enough, given our preference we would sleep in tents," Mayewski said. But tents took hours to set up and remove during the first year's trip, and didn't provide the warmth much of the field equipment needed.

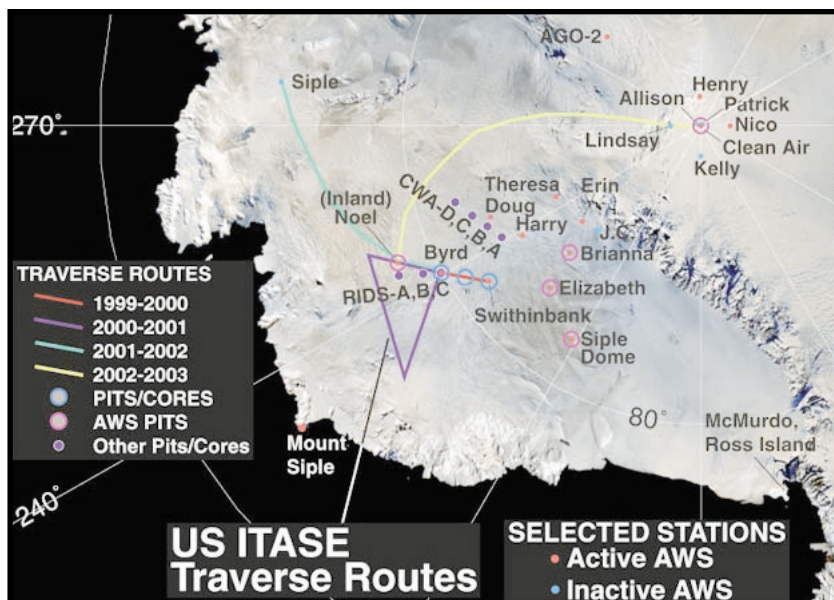
One person has a place of his own to call home, although Brian Welch's box-shaped "Popesled" - named because the design supposedly resembles the Holy Father's travel vehicle - makes an average prison cell look vast by comparison. The plywood structure isn't tall enough for him to stand upright in and is barely long enough for him to sleep, once he crawls partially under the work table that dominates the interior. On the table is his computer and other radar-mapping equipment, along with two 300-watt light bulbs driven by a gas generator outside the hut.

"Essentially I'm in my own giant Easy-Bake oven," he said. "On a good day it'll be 60 degrees just from body heat."

Welch's tactics on the road are as unusual as those in camp. His Popesled rides to the rear and side of one of the trains, held there by two ropes to ensure his radar readings aren't disrupted by the tracks made by the Challenger and other sleds. He said he doesn't mind the isolation.

"When I designed my shelter I knew I might be sitting in there for 36 hours at a time," he said.

"Drilling began today. A few bugs had to be ironed out of our new 2-inch system, but by the end of the day we had our first core samples ... Brian and Steve N. carried out a 10 km traverse using Brian's deep radar - the results appear to be very impressive. Steve A. and Allan used a higher frequency radar to map the stratigraphy



Map courtesy of ITASE



Photo by Mark Sabbatini/The Antarctic Sun

"One of the things I've found out about museums is kids tend to ask the most intelligent questions, especially when it comes to dinosaurs."

-ITASE researcher Brian Welch

Markus Frey, left, and Brian Welch make one of two weekly calls by ITASE team members to a Boston science museum.

Roadtrip From page 9

of the snow trench excavated by the tractor yesterday. Markus continued his atmospheric sampling program. Others worked indoors."

- excerpt from ITASE group journal, 11/27/01

The work pace speeds up considerably when the trains aren't moving, with some ITASE members working 16 hours a day.

"That's the way you always work in the field, because the sooner you get your work done the sooner you get to go home (and finish researching)," Hamilton said. "It's not like there's much to do if you finish early."

Most of the projects are related, so it's common for researchers and non-science field support workers alike to help with tasks such as digging snow pits and drilling ice.

In addition to the usual camp chores, there is the task of keeping the outside world informed of their progress. Every day someone writes a log that is e-mailed by satellite phone to the Boston Museum of Science, which posts the journal at www.secretsoftheice.org. Also, various members call the museum twice a week to answer questions from visitors, with the conversations also archived at the Web site.

"One of the things I've found out about museums is kids tend to ask the most intelligent questions, especially when it comes to dinosaurs," Welch said before making one of the calls with fellow researcher Markus Frey.

In addition to talking about their projects, Welch and Frey fielded questions from an elementary school class about food, clothing, weather, if any wildlife

lives in the area and what it's like trying to sleep in constant daylight.

There is time to have fun, the students were told in response to a question, but outdoors it tends to be active pastimes such as skiing or running because of the extreme cold.

The cold can also impose other recreational limits, Hamilton said separately.

"Last year we played frisbee and it broke on the third throw," Hamilton said, noting he has a 3-inch model this year he hopes is less likely to shatter in the cold.

The traverse is scheduled to end in

January, with participants returning to their various universities and other mainland occupations to study the results of their efforts. Some will almost immediately begin preparations for next year's traverse. Others who are unsure if they'll be able to return said no matter what happens, they'll always have the thrill of participating in a unique adventure.

"I've been locked into the same job for 22 years and I'm an outdoors person, so it's a great deal," said Lynn Peters, a longtime mechanic who is maintaining and driving the Challengers along the polar highway.



Photo by Mark Sabbatini/The Antarctic Sun

Gifford Wong, on snowmobile, takes Markus Frey's science research hut for a test drive at Byrd Field Camp.

For the Byrd's



Photo by Mark Sabbatini/The Antarctic Sun

A canvas Jamesway, far right, and other portable buildings and tents make up Byrd Field Camp.

By Mark Sabbatini

Sun staff

This year's put-in at Byrd Field Camp will be remembered largely for one of the worst storms anyone can recall. And possibly Pat's spaghetti Sundays.

Tasks such as taking buildings for test drives and outfitting an industrial tractor with a set of custom wheels were just part of the job.

Ten carpenters, mechanics and other workers were flown three hours southwest of McMurdo Station to prepare the way for a convoy of research sleds making a two-month traverse across the region. Much of the work was similar to numerous other put-ins at remote camps each season, but the weather and unusual scientific mission made for some unique moments.

Work days were spent digging out gear left from last year's traverse, assembling new trailers and getting two tractors ready to haul the convoy. During the evenings, the all-male crew gathered in a canvas hut, wolfing down platters of steaks while discussing snow chemistry and the merits of using fresh basil in pesto sauce.

"I don't mind the shop, but hanging out in the field is where I feel most comfortable," said Doug Drexel, a carpenter's apprentice who is working his first year on the Ice.

When Drexel arrived at Byrd the night of Nov. 1, lugging his gear and a five-gallon jug of water, there wasn't much to see besides the canvas hut, partially caved in from winter storms, and a lot of snow-covered lumps he would soon be digging out. He had no complaints.

"It was just beautiful when I got off, just a white desert," he said. Even with a few structures to break up the scenery, "It seemed to me like we were out in the middle of the ocean."

The crew set up camp, going to sleep in their tents well past midnight. The next day they started routine tasks such as digging out food buried during the winter and assembling the research sleds for the U.S. component of the International Trans-Antarctic Scientific Expedition (ITASE).

Little of note happened until their second night when their stellar - but still subzero - weather was interrupted by clouds on the horizon.

"It came over us like a white wave," said Pat Plaia, the camp's construction foreman.

By the next morning it was clear a severe storm had arrived. Four of the camp's eight tents were flattened by winds of up 60 mph during the day, forcing workers to sleep in the canvas hut or in a trailer filled with bunks for the incoming scientists. At the same time, a solar flare knocked out radio communications with McMurdo for a few days - a concern for those at the larger station who had no way of knowing how the remote workers were faring.

Everyone was safe, although a few cases of cabin fever may have

See Byrd on page 13

Views of a deep field virgin

By Gifford Wong

Special to The Antarctic Sun

At one time or another, we've heard the cliché, "It's a harsh continent," but how bad can it really be?

At McMurdo Station we have showers, television, radio and the Internet. We get mail, freshies and the occasional storm. But a storm watched through windows from a heated building is different than a storm survived in the deep field, like the five-day blizzard we endured at Byrd Field Camp.

I suppose I'm getting a little ahead of myself, so let me back up a bit. As a carpenter's helper my job entails doing exactly what I'm told, which is great because the jobs we get are so interesting. This particular job was to re-establish Byrd Field Camp for scientists heading out on the International Trans-Antarctic Scientific Expedition or ITASE.

Whenever science needs a camp to live in or a sled to work upon, they call on the carpentry shop to deliver, (many other trades and folks come together to piece an actual camp from scratch, but I've only been working in the carp shop, so please bear with this slight oversight). We typically precede the scientists with what is called a "put-in." Ever wonder what that camp is like?

Well, if it weren't for the incessant flapping I'd have sworn I was in a library. There were a few conscientious readers, the silently snoozing sleeper and a couple of rabble-rousers pushing cards. From the sound of things, the game was "Grandma Niles' rummy," the flapping was utterly undeniable and I was about as far away from a library as one could be. I was actually sitting inside an eight-section Jamesway planted at 120° west, 80° south, which are basically the coordinates for a long-ago abandoned Byrd Camp in Marie Byrd Land. Why inside? It seemed Mother Nature thought it wrong

See Virgin on page 12

Virgin From page 11

for us to come so soon in November, so she was working us over with a storm that produced hurricane-force winds and very limited visibility. We were shut in and shut down.

When we arrived a few days before, our put-in lives had seemed destined for smooth sailing. We landed lighter than a feather, drifting our cargo and stepping out atop the still-descending rear cargo door in a matter of minutes. We set up communications and tents, and cooked dinner. The next day was marvelous - clear, calm, about minus 20 F (-30C). And the next day, though that didn't last quite so long. Remember the moving wall of sand in the movie "The Mummy?" Imagine that wall to be gray and expanding to obscure the entire horizon in the windward direction. Yeah, something was coming. I suppose you never really know what that something is until you're lost between two ridiculously close flags on your way to the outhouse because, well, you had to go. That's when you know the sass has hit the fan.

So what do "hurricane-force" winds do to a four-season tent? Of the eight tents out in our self-proclaimed tent city, four were completely smashed, two were sketchy and the other two were way too sketchy for habitation. Of the four, Kip's looked like King Kong poked it through the snow that drifted on the other side. Steve's looked like Godzilla sat on it. Cartoon cymbals wreaked musical havoc with Dave's tent and nature decided that Chuck's tent should've been a convertible. Don't get me wrong, as I like Sierra Designs a lot. I even own a tent of theirs. The thing of it is, Emeryville, Calif., where the tents are built, is just south of Berkeley and Byrd is just about south of the entire world. Things were a bit different out there.

Communications was another seemingly regular aspect of deep-field life. We needed to check in with McMurdo Station once a day, with a few weather observations thrown in for good measure. Hourly weather observations started six hours before a here flight. Well, two hours into our weather observations on the day it went from marvelous to not-so-marvelous, Mac Ops informed us of an expected solar event. These solar flare-ups interfere with high-frequency radio signals, blocking our only means of communication. For four days we didn't hear from town. We missed who won the World Series. In fact the only radio transmissions we heard were our own. We checked out VHF radios, much like the firehouse does for McMurdo folks,



Photo by Mark Sabbatini/The Antarctic Sun

Members of the Byrd Field Camp eat dinner inside the canvas Jamesway that serves as their primary community shelter.



Photo courtesy of Byrd Field Camp/Special to The Antarctic Sun

A Byrd Field Camp worker inspects his wrecked tent following a four-day storm that forced camp workers to abandon their work and seek shelter in portable buildings.

but our destination wasn't quite so glamorous as Castle Rock. It was our outhouse, nicknamed "Hotel McGarvey." Better safe than sorry, which is why our t.p. was in a large Ziploc bag. I hear frostbite of the rear is tough to live down.

The days themselves were gruesome in their own little way. Don't get me wrong - I am not complaining. But look at the nature of it. Time is usually of the essence, and put-ins are done quickly so that science can begin efficiently. A day's 24 hours can contain, at most, the pat eight hours of sleeping, leaving roughly 16 hours for "other" stuff. Usually work fills that time, but the five-day storm brought work to a halt. Given our habit of eating three meals a day and, assuming they last about an hour, that left 65 hours of reading, writing and fumbling towards the outhouse. At times it felt more like a psychology experiment than a field experience.

So, it's a harsh continent, right? A 50-year-old canvas Jamesway buffering you from an Antarctic hurricane ... 70 mph gusts threatening to loose your tenuous footing at the pee flag ... whiteout conditions playfully hiding both the flag that you just passed and the flag you were heading towards. Perhaps.

Or perhaps it just instills and inspires a very healthy respect of nature, and the unpredictable nature of things. Halfway through the five-day storm the legendary Steve Niles promised perfect weather. Kip assured us that it'd be good by 4 p.m., and it was, if you like 40 mph winds blowing you about (sorry about the trash can lid sailing towards Onset D, and could you look for that Pooh bear for Kip?). Patrick was still hankering for a World Series winner and nearly everyone, save for Doug, was lamenting how we magically ran out of lag bolts during this whole ordeal. Regardless, I'm glad that I survived my first big blow as a deep field virgin. And while I'll never forget my first time, I'm definitely looking forward to my second.

Crossword answers

from page 2

Across: 2-sastrugi; 6-showers; 7-fire; 8-snowfall; 11-SPRESCO; 14-desert; 16-Shinn; 18-astronomer; 19-altitude

Down: 1-New Zealand; 3-greenhouse; 4-twilight; 5-awful; 6-stratospheric; 9-marathon; 10-boots; 12-quonset; 13-latitude; 15-equinox; 17-dome



Photo by Mark Sabbatini/The Antarctic Sun

Byrd Field Camp workers prepare to unload a Challenger tractor from the rear of an LC-130 aircraft.

Byrd From page 11

occurred. Steve Niles, the camp manager, halted work until the storm ended after four days.

"In the six years I've been here (at Byrd) it's the worst storm I've seen," said Niles, who has worked 10 years in Antarctica and is one of the ITASE drivers.

Workers passed time playing cards, reading, talking and doing whatever else they could find in their small shelter. But going outdoors was inevitable for some necessities such as getting snow to melt for water and using the outhouse. That meant stringing ropes and flags between buildings, since visibility at times was only a few feet.

"The weather got so bad we ended up taking a radio out (to the outhouse)," Drexel said.

When the storm passed they had to catch up on work, resulting in some shifts of 12 to 16 hours. Part of their time was spent redigging out all the things the storm buried.

"I'm thinking it looked like a bad deal," said Lynn Peters, a mechanic who helped with the camp put-in before joining those making the ITASE traverse. "They were all like 'All right! This is nothing compared to last year.'"

Among the challenges Peters and others at Byrd faced was widening the tracks on a Challenger tractor by 28 inches so it could travel across the West Antarctic Ice Sheet without accumulating excess snow. Almost all the work had to be done by hand: removing scores of bolts, adding thick bolts to where the tracks are mounted, and using a variety of pulleys and other tricks to remount the tracks.

"It's like changing a big 4,000-pound tire," said Dave Anderson, a mechanic who has worked the past year on the Ice.

Although the research sleds weren't quite ready to be placed into the two "trains" planned for the traverse, many still needed to be tested individually to make sure they would hold up while traveling 1,200 miles across rugged ice. That meant roping the sled-mounted huts to snowmobiles and driving them in figure-eights on the vast ice sheets near camp.

Day-to-day duties such as cooking, cleaning and getting snow to melt for water were shared, although some were more sought after for their culinary skills than others. Plaia was one of the favorites for, among other dishes, the spaghetti he made each Sunday, somehow concocting a secret sauce out of the limited camp ingredients.

The Byrd put-in lasted a little more than two weeks, with nearly everyone returning to McMurdo a few days after the ITASE researchers arrived. Drexel said his experiences - driving a snow machine, riding an LC-130 military plane, enduring the storm - were what he hoped for when assigned to the task.

"I've done a lot of things out here for the first time," he said.

Long-time veterans also continued to have their moments. Niles, frequently referred to as a legend by those working with him, talked about retiring to his home in Wyoming after this season - but isn't really sure he'll go through with it.

"Usually the ones that say that they're never going to be back are the first ones back," he said.

ITASE From page 1

"What we've found with ITASE is if you go from camp to camp hundreds of kilometers apart you find conditions vary," said Gordon Hamilton, an assistant professor at the University of Maine who has been on all three traverses.

Findings will be combined with other field research and data to form a portrait of the region's climate and environmental history.

The bumpy journey on two moving "trains" of huts hauled by industrial tractors across the vast white desert adds a novel twist to the workday. But the actual research when they stop at preselected work sites is usually familiar to the participants since most have done remote field work before.

"The work is the same," said Blue Spikes, a University of Maine doctorate student who is working his fifth season on the Ice and first with ITASE. "It's just how you get there."

Research gear ranges from shovels for digging snow pits to custom-designed radar that is dragged behind the entire procession during traverses, measuring the icefield's thickness along the way.

"This is science going on 24 hours a day," Mayewski said. "Even when we're sleeping we have atmospheric chemistry experiments going on."

Ten projects make up this year's itinerary, although the work generally falls into a few categories: drilling and extracting cores of ice to study the layers that have built up over time, digging snow pits to study surface snow and how it interacts with the atmosphere, and using radar and GPS systems to collect data about ice and snow accumulation and thickness.

Going back 200 years in time allows the best combination of historical perspective and widespread sampling possible with the 12,000 pounds of ice cores the ITASE can carry, Mayewski said. The weight will allow a total of 900 meters of ice to be collected from six to eight drilling sites.

Deeper or more samples would be nice, he said, but other data is or will be available. Deeper ice samples have already been extracted on a more limited basis in the region, for example, while satellite data can provide a broader - but less detailed - view of the area.

Heavy traverses in Antarctica date back to the 1940s, Mayewski said. But until ITASE, traverses were typically three or four people on snowmobiles doing much more limited research.

"We were just in many cases looking for ways to open up science in the region, producing maps," he said. Now "we're extracting records I never thought I'd find."

Among the researchers participating in this year's journey, and the work they are performing:

■ Mayewski, who is overseeing general operations during the traverse and supervising the ice core research. He has participated in dozens of scientific expeditions worldwide, including more than 30 in Antarctica. Constructing the ice sheet's history may provide clues that allow for reliable long-term future predictions - possibly decades into the future, he said. That could be useful for making forecasts worldwide, since a link between the region and global weather factors such as El Nino is suspected.

■ Hamilton, who is establishing GPS sites and using other satellite data to measure the thickness of the ice sheet, and determine if portions are getting thicker or thinner. He said sea level is rising about two centimeters every 100 years - "about twice the rate as it was 1,000 years ago and it seems to be getting faster all the time" - and all known causes account for only about half of this. He said possible melting of the ice sheets in Antarctica and Greenland are an "obvious possibility" for the remaining rise, but it's too early to draw conclusions since readings from previous research indicate both increase and decreases in thickness in different spots. Hamilton is being assisted by Spikes, who will use satellite data from a future fellowship at NASA to supplement his research.

■ Steve Arcone, a science investigator at the U. S. Army Cold Regions Research and Engineering Laboratory in Hanover, N.H. He is using subsurface radar to profile snow layering in the region dur-



Photo by Mark Sabbatini/The Antarctic Sun

Brian Welch hooks up a generator to his "Popesled," a research hut where he will work and live during the ITASE traverse.

ing the past 200 years. Snow layers at testing sites have generally been horizontal and stable, he notes at an expedition Web site, but in some areas dipped or folded layers can be seen. "These dipping layers could be caused by unequal rates of snowfall around hills, or by ice deforming as it travels over a buried mountain, which might even be a volcano," he explains.

■ Markus Frey, a field assistant and doctorate student at the University of Arizona in Tucson, who is analyzing the chemical interaction of the atmosphere and surface snow in snow pits dug at various sites. He said one of his main goals is to construct an atmospheric history of the region, which might provide a better understanding of factors such as ozone depletion.

■ Dan Dixon, a graduate student at the University of Maine who plans to study the chemical composition of ice cores to determine past air mass movements in the region. By studying the amounts of dissolved ions - such as sodium, which peaks during winter - "you can actually see the seasons as chemistry," he said.

■ Brian Welch, a post-doctorate fellow at St. Olaf College in Northfield, Minn., who is mapping the ice sheet using a deep-sounding radar system being dragged behind and to the side of one of the trains. He said the system will look deeper into the ice than other ITASE projects - up to 3,800 meters - as he assists with a project at his college to determine the ice sheet's thickness and stability. "This could be some of the deepest ground-based radar that has been done," he said.

■ Mark Wumkes, a drilling specialist who lives near Fairbanks, Alaska. He will lead efforts to extract ice cores three to four inches in diameter using an electromagnetic drill. The samples are expected to be 60 to 150 meters long, depending on the location being drilled, and will be preserved in 100 carefully labeled storage boxes for shipping back to the U.S.

Because many of the overall goals of the ITASE researchers are the same, there is considerable overlap and sharing of data.

"It's not 10 non-related projects," said Dave Schneider, a University of Washington doctorate student making his second ITASE trip, where he is collecting and analyzing snow samples. "They're all interrelated."

Even so, it's vital to treat samples collected in the field like jewelry, so that everyone gets their fair share of the "goods" when they're divided back in the mainland U.S., Dixon said. Extensive precautions are taken to keep ice samples pure, including drilling well away from camp sites and ensuring instruments are sterile so they don't contaminate the ice.

"When you think about what each meter is worth it's almost priceless because the chance of going back to that exact location is almost nothing," he said.

Hardening snow to pave a runway

By George L. Blaisdell
and Gary Cardullo
Special to the Sun

There currently exists a six- to eight-week period in the middle of the USAP austral summer season when the McMurdo runway system can only support ski aircraft. This significantly restricts the program by placing all inter- and intra-continental airlift requirements on the limited LC-130 Hercules fleet. Further, the use of the LC-130 for inter-continental missions is quite inefficient, considering this aircraft's reduced payload and speed (compared to the standard wheeled C-130). During the skis-only period, the Pegasus runway is covered with a thin layer of snow to protect against solar-induced melting.

Work at the Pegasus site during its original development in 1991 suggested that it could be possible to process the protective snow cover to an adequate strength for the support of wheeled C-130s. However, this approach was not pursued. Instead, a level-graded glacial ice surface was chosen, with an annual requirement for placing and removing a temporary reflective snow cover. During the 2000-2001 season, the original compacted snow surface approach was tested on a 1,500-foot segment of runway overrun. The results were hugely successful, with snow compaction being completed by Dec. 15 and taxi and landing tests by LC-130s operating on wheels following shortly after. As a bonus, an inadvertent test of the surface was performed when a C-141 unknowingly traversed the compacted snow surface. In all cases, once the compacted snow cover was completed, only the smallest of tire impressions could be detected in isolated locations.

These results convinced the National Science Foundation that a compacted snow cover could be placed on the Pegasus runway in order to support mid-season wheeled Hercules flight operations. Work began this season at WINFLY to cover the entire runway with a compacted snow cover. Progress has been rapid and rewarding, owing to extensive planning and preparation during the off-season, obtaining new dedicated and specialize equipment, and having a full, professional and motivated on-site staff.

The construction technique to achieve this strong snow pavement is not complex.



Photo by Gary Cardullo/Special to the Antarctic Sun
A D-8 tractor tows a 100-ton roller, compacting the snow on Pegasus runway.

Principally, it involves pneumatic-tire-roller compaction with progressively higher loads, and some interspersed grooming efforts. However, timing of activities is the challenge, as the efficiency of snow compaction depends on the tire pressure, the total tire load and the snow temperature. Thus, close attention is paid to keying the roller loads/tire pressures and timing of compaction activities to temperature and weather conditions. Just as important as timing of the compaction activities are the "rest periods" that afford the snow a chance to sinter (grow inter-granular bonds) between rolling efforts.

This approach has resulted in a strong 3.5-inch-thick snow pavement. The first test of the new all-season Pegasus runway took place Nov. 28 when a New York Air National Guard LC-103 (SKIER 92) landed on wheels at maximum weight (155,000 lbs). A series of progressively more demanding taxi, take-off and landing actions was completed to evaluate the performance of the compacted snowcap on the 10,000-ft runway and on three progressively weaker test sections at the southern end of the runway. The intent of the reduced strength test sections was to hopefully induce rutting (surface strength failure) in one or more of the weaker test sections in order to accurately determine the minimum level of strength required to sustain wheeled C-130 operations.

The evaluation activities - which included tight, hard turns, aborted take-off hard braking stops, and a simulated emergency short field landing - generated no failures of any type on the runway. Close visual inspection on the ground, under proper lighting conditions, was required to detect the mild burnishing of the surface

left by the aircraft tires.

In the test areas, only the second and third reduced-strength areas showed any sign of surface failures. In the test areas, one long classic rut was developed and several "pops" 1 foot in diameter were found. These are currently being analyzed to determine what levels of strength define the boundary for reliable tire support.

Efforts at the Pegasus site over the next week are aimed at getting in place the necessary runway support devices to allow a Little Rock, Ark., C-130 Air Force unit to start regular inter-continental service Dec. 10.

Maintenance, including periodic compaction rolling to preserve the snow pavement strength, will occur throughout the period of C-130 operations.

Redeployment airlift is still planned to occur with C-141s from the Pegasus runway starting in late January each year. This may require that the compacted snow pavement be placed and stripped each year. While this scenario meets NSF's goal to provide reliable C-130 operations from Pegasus from the time of sea ice runway closing until late January, the Pegasus construction team have as their goal to make the compacted snow strong enough to support C-141 operations, thus making it a permanent snow pavement.

The Pegasus Project is on schedule due to the dedicated and outstanding performance of many people and organizations within NSF, Raytheon Polar Services Company, NYANG and Cold Regions Research Engineering Lab leading the way. On-site direction of this challenging project has been expertly accomplished by Gerald Crist, Pegasus Fleet Operations Foreman. His knowledge of ice and snow conditions and specialized techniques with equipment are instrumental in the successes achieved. Outstanding support for this project has come from many work centers and individuals, including the Heavy Shop, Fleet Operations, Surveying, Supply and the Carpenter shop, who, in less than 30 days, built over 90 two-ton concrete blocks for roller ballast.

Gary Cardullo is the McMurdo airfield manager and George Blaisdell is a research civil engineer with CRREL.



Profile

By Kristan Hutchison
Sun staff

Stoking the fires

Zellard Lemon can take the heat. He makes it. All day long he goes from building to building, slipping into the rooms residents seldom see, the ones marked "Boiler room. Authorized personnel only."

Each boiler room is different, some a maze of pipes leading to a stained orange boiler the size of a Volkswagen Bug. Other, newer boilers are fed by pipes encased in shiny aluminum with large labels on the sides. The boilers themselves are square, gray boxes, controlled through panels of lights and wires on the wall.

Lemon peers through a keyhole window at the orange flames, a hellish 300 degrees, what he calls "real hot." He doesn't need to look at all to know if the boiler is running well or not.

"You can hear that pump. It sounds sweet," he said. "You know it's doing right."

Lemon's interest in boilers started when he was a boy in South Carolina, reading about steamships.

"It seemed like they would take me foreign places," Lemon said. "And they do take me foreign places."

As a boy his daydreams were general - the Orient, maybe Alaska. He put them aside when he enrolled in Claflin College in Orangeburg, S.C., earning a teaching degree. For 10 years he taught middle school and high school biology before his boyhood dreams came back to wake him up.

"I always want to move about to all different places," Lemon said. "I like being flexible."

He joined the Army for four years, where he worked as an administrative personnel. That didn't satisfy the dream, so he moved over to the Navy and was trained as a boiler technician on the ships.

Finally he was working with steam, moving big ships, going to foreign places, but he had no inkling how far it would take him from his home in Corpus Christi, Texas, and his wife and two children.

After the Navy he began to work for the merchant marines, running boilers in tankers, cargo vessels and other ships. They took him to Bali, Indonesia; Venice, Italy; Salu, Spain and other ports around the world. During the Persian Gulf War he was working on a merchant marine ship there, refueling the fighter jets. He spent eight months on the floating fuel-tank, 120 miles from the air fire.

"Every time a scud missile would go an



By Melanie Conner/The Antarctic Sun

Zellard Lemon builds glycol pumps in the boiler room at McMurdo Station.

alarm would go off, but all we had were gas masks," Lemon said. "We were sitting ducks anyway."

Sometimes he would go from one extreme to another in a matter of days, as he did on a trip from Kuwait to Shanghai. Kuwait was a sweaty 120 degrees. When they pulled into Shanghai the decks frosted over.

"Of course, I'm in the boiler room, so that makes me feel secure, because that's where you get the heat," Lemon said.

The same is true in Antarctica, where Lemon and two other boiler techs are in charge of the care and feeding of 25 boilers. None are officially the "lead," but the other boiler techs look up to Lemon.

"We consider him the lead because he knows the systems better than anybody right now," said Scott Saltzman, one of the other boiler techs. "He's great. He's smart...He's very patient with me when he's teaching me."

Lemon's happy to help, he just doesn't want the title.

"I don't reckon an extra \$10 for more headaches," Lemon said.

Four of the boilers are steam driven, producing hot water for the kitchen and laundry room and humidity for the Cray Lab. The rest of the boilers use glycol, a clear liquid chemical commonly used in antifreeze and cooling systems, to heat the dorms and work centers. No matter how hard and cold the wind blows outside, the boiler rooms are oases of warmth.

Working in Antarctica is easier than on the ships, Lemon said. On the ships the boilers are under high pressure, and he could barely move in the boiler room with all the hot pipes winding around. He's had to work 85 days at a time with only seven other people, and been caught at sea in a hurricane, sickened by the 16-foot waves.

"I said 'Whoa, 10 more days and I'll be out of here, because I'm going to Antarctica,'" Lemon said. "It's safer here."

He also enjoys having more people to socialize with and being able to walk around.

"It's more of a community here," Lemon said. "You meet more people. It gives you piece of mind and happiness."

Especially if you're Lemon. It's rare to catch him without a smile, and if he catches you he'll follow the smile with a "Hi, buddy, how are you?" Lemon seems to know everyone, Saltzman said.

"He's very friendly," Saltzman said. "He goes out of his way to make you feel comfortable."

It's Lemon's second year in McMurdo, and he plans to stay the winter again, as he did in 2000. The quiet night was his favorite part of his first year, when he would go on long walks.

"You see the stars, auroras, stuff like that, and the nights are real soft," Lemon said. "It's like walking in a dream."

And if it gets too cold outside, he knows just where to go to warm up.