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The Antarctic Sun

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New dome in the neighborhood

Photo by Lucia Simion/Special to The Antarctic Sun

French and Italian workers construct one of two new buildings at Dome C, a new station being built on the high plateau. It is only the third permanent research station on the polar plateau, joining the U.S. Amundsen-Scott South Pole Station and Russia's Vostok Station. The site was chosen to do research complimentary to that done at the South Pole. Read a full story on the new station on page 7.

Heat wave melts ice, floods valleys

By Melanie Conner
Sun staff

Antarctica is too warm this summer.

Too warm for smooth roads and tranquil traveling, that is.

Recent record-breaking summer weather pleases the soul, throws scientists a curve ball and nearly cripples station transportation at McMurdo station.

On Dec. 30, 2001, the temperature at McMurdo reached 51F(10.5C), an all-time high for the station. The previous record was 49F(9.4C) during the mid-70s. The warm streak did not end there. In the first week of January the temperature reached 50F (10C).

"It often reaches temperatures in the 40s in the summer, but it doesn't usually stay in the 40s for a long time," said Jim Frodge, meteorology manager at McMurdo Station.

Meanwhile, resident-workers at Amundsen-Scott South Pole Station are experiencing a similar heat wave this month. Last week, the temperatures climbed to plus 5.4F (-14.8C).

"The last time it was above 0F was in January 1985," said John Gallagher of the South Pole meteorology department. "It's quite rare to be on the plus side of zero here."

In November, five daily high temperature records were broken at the Pole and the

See Heat on page 11

The Ice cools as world warms

By Kristan Hutchison
Sun staff

Despite the recent streak of unusually warm weather around McMurdo Station, the overall trend in Antarctica continues to be cold and colder.

While the rest of the world seems to be warming, scientists doing Long-Term Ecological Research (LTER) in the Dry Valleys near McMurdo Sound found at least some parts of the icy continent were still chilling in the 1990s. The temperature drop sets off a chain of reactions in the Dry Valleys, leading to the kind of mass devastation of invertebrate populations that would have animal lovers crying if the microscopic worms were large and fluffy.

> "We don't know why this part of the Antarctic is cooling."
> *Andrew Fountain, glacialogist*

"This is a fairly rapid response to these changes," said Peter Doran, a LTER hydrometeorologist from the University of Illinois, and lead author of a paper the LTER group published Jan. 13 in *Nature* online.

The LTER group's findings triggered a lot of other headlines, with stories on CNN, the BBC, *USA Today*, the *Washington Post* and other media.

"It's caused a lot of interesting discussion back in the states," said Berry Lyons, project manager for the 28-member LTER group.

The discussion comes as the general public tries to make sense of what seem like contradictory weather reports. The LTER produced 14 years of weather

See Cold on page 9

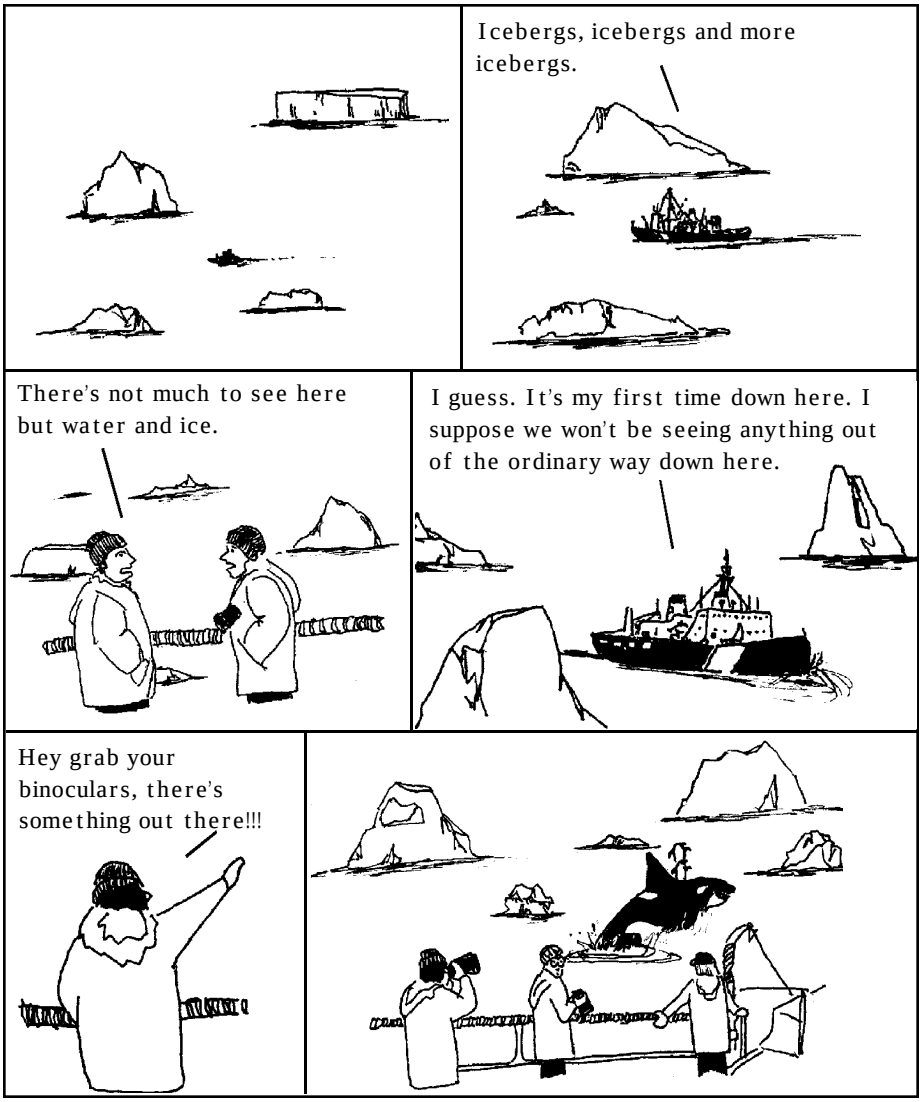
INSIDE

Quote of the Week

"The water you're drinking is 1,000 years old."

- South Pole official to a distinguished visitor

Ross Island Chronicles By Chico



Cold, hard facts

Science galore

Number of McMurdo based science projects: **78**

Number of science projects at South Pole Station: **28**

Number of projects at Palmer and on research vessels: **25**

Number of projects relating to the cosmos: **35; 20 at South Pole**

Most studied subjects: **Biology and Medicine, 38; 22 McMurdo-based, 16 Palmer-based**

University with the most projects: **University of Washington; 8**

Longest on-going project: **The South Pole Observatory, established in 1957.**

Scientist with the longest on-going project: **Art Devries, fish antifreeze research at McMurdo Station, 40 years**

Source for facts: Robbie Score and NSF

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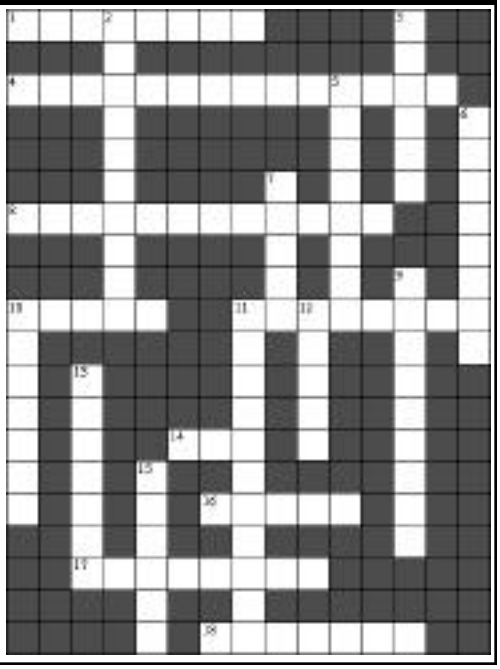
Web address: www.polar.org/antsun

Under the sea

answers on page 6

Across
1) Grows on crystals
4) The deepest creatures
8) A wimp or one without a spine
10) Extracts specimens from the sea
11) Longer than a platform
14) Something fishy here
16) Huge pack hunters
17) Sky scene plus ocean creature
18) Less than 1km from the surface

Down
2) Not only for the car
3) Single-celled monsters
5) Larvae nutrition
6) Cities of microscopic unknowns live here
7) Shrimp-like creatures
9) Evolved, cold-water mollusks
10) Produces ice-binding molecules
11) Has large spines on each gill-cover
12) A Hollywood hit from the depths
13) Associated with the ocean bottom
15) Human contribution to ecosystem



Rock collectors look back in time

By Kristan Hutchison
Sun staff

Somewhere in the rock record of Antarctica, John Isbell expects to find clues related to what caused, or didn't cause, ancient changes in sea level.

That could force other scientists to rethink how coal deposits in the Appalachian mountains and other areas of the northern hemisphere formed during the Carboniferous and Permian ages, 360 to 270 million years ago.

"Geologically, the environments and continents around the world are interlinked," said Isbell, a University of Wisconsin sedimentologist working in Victoria Land on a National Science Foundation grant with Rosemary Askin and Anne Grunow of Ohio State University. "What happened here in Antarctica constrains interpretations of what went on elsewhere."

During the late Paleozoic age the world was even more interrelated than it is today. All the continents were connected in a single land mass, called Pangea. What would eventually become Antarctica was situated in the south polar portion of the Pangea supercontinent, but it looked much different.

Within that period of time, the Antarctic region went from being covered by an ice sheet to only having glaciers in the high country. Glaciers lined the edge of a huge lake, stretching from possibly where Ross Island now sits to South America, Isbell said. It was a dynamic environment, with submarine slumps and slides along the lake bottom and icebergs floating on the surface. The lake was gradually filled by large deltas and braided rivers.

"There's evidence that it was cold, potentially still having glaciers in the upland for a relatively long time after the lake filled," Isbell said. "However, the lake may have been re-established several times for short intervals of time due to rapid melting of the glaciers that remained in the uplands."

As it warmed, plants took root. In the Beardmore and Shackleton Glacier areas Isbell has found fossilized leaves, wood and even standing stumps. Those ancient trees might have looked similar to ones found today in Alaska.

"These were probably conical, narrow toward the top," said Askin, a palynologist. The trees' shape evolved to share light from the low-angled sun at those polar paleoaltitudes. "The trees had wide annual rings, wider than found in trees in the midwest," Askin said. "They must have grown like crazy in the polar summer."

Photo from John Isbell/Special to The Antarctic Sun

Keri Wolfe looks for rocks from the Permian age on Maya Mountain in the Dry Valleys. Wolfe works with John Isbell and they will use the samples to help unravel what happened during a transition from glaciated to green more than 270 million years ago.

As mindboggling as it is to think there were forests in Antarctica, that wasn't unusual. Through all of geological history, major parts of the Earth have been buried under ice during only four intervals of time, said Askin said.

"Much of geological time was greenhouse conditions when, at least since land plants evolved, there were forests growing near the Pole and animals scurrying around," Askin said.

Though nobody knows what the temperature was in Antarctica then, Isbell said that the petrified trees suggest the summers were frost-free, because the tree wood had little or no frost damage.

Extensive coal deposits occur in Carboniferous and Permian rocks in the northern hemisphere. Scientists believe that these coals resulted from large-scale landward and seaward shifts in the position of peat mires due to rapidly rising and falling sea level.

Many scientists attribute Antarctica's big meltdown with raising the sea levels 60 to 200 meters worldwide during that time.

But Isbell believes the Antarctic and southern Pangea were innocent, at least partially. The time period in which the seas rose and fell, 360 to 270 million years ago, doesn't match when glaciation occurred on Antarctica and elsewhere in southern Pangea, from about 310 to 275 million years ago.

"The Antarctic glaciation could explain the tail end of the sea level's rise, but not the first 50 million years," Isbell said. "Right now there is no good explanation for the sea level changes during that 50 million year interval."

Isbell has also found signs that indicate that the final late Paleozoic Antarctic meltdown occurred rapidly, in geological terms, over a period of 2 million to 3 million years. If all this is true, the science community may need to look further for the cause of the rapidly changing sea levels at that time.

"There's a lot of evidence for numerous rapid rises and falls in sea level during the late Paleozoic, but if the data coming out of Antarctica is correct, then waxing and waning glaciation is not the complete answer, and ultimately other hypotheses will need to be put forward and then tested," Isbell said. "Ultimately the study of Antarctic rocks will change how we view the rest of the world during that time period, and what we find out about that time frame will help us better understand the present."

Weather throws kink into Pole construction

Flight delays hold up materials for the second year in a row

By Mark Sabbatini
Sun staff

The new South Pole station won't be ready to house winter staff this season after all.

A shortage of flights due mostly to bad weather this summer has resulted in about 2 million pounds of equipment failing to reach the Pole. As a result, the housing facilities won't be ready for occupancy this year and further problems are likely next year due to the backlog of shipments.

There's also concern about some settlement occurring at the base of the new facility, although officials are unsure of its cause.

The $153 million core facility, scheduled for completion in 2006, will replace the dome that has been a landmark at the Amundsen-Scott South Pole Station since 1975. The impact of the latest developments on short-term work is minimal, said Jerry Marty, the station's National Science Foundation representative.

The plan for the new facility is to occupy sections as they're completed, Marty said. A new housing section was originally scheduled to be occupied this winter.

"The purpose of that was not only to occupy the facility, but to reduce the number of people living outside the dome this year," he said. One of the reasons, he added, is the new station is more efficient when it comes to using resources such as fuel.

More than 50 of the 348 flights scheduled to the Pole this season failed to arrive, Marty said. It is the second year in a row a significant number of flights have been grounded.

It's too early to know the long-term impact of the missed flights and station settling, including whether the completion date of the facility will be delayed, Marty said. Construction has stayed on schedule during previous years, but Marty said next year's situation is "a true question mark."

One known impact will be shipping and availability of construction materials next year, since there is almost no time left this summer for planes to bring in new supplies. Carlton Walker, the station's construction manager, told a group of Raytheon Polar Services Company officials who visited the Pole recently that the station will operate in 100 percent "need and feed" mode next season. That means items will be flown in as they're needed, a potential problem if flights are held up or there are mix-ups in shipments.

"I'll be fortunate to get enough cargo on the ground these two weeks for two to three weeks (of work) next year," he said.

A portion of the new station has also settled three or four inches into the snow, Marty said. He said a couple of projects are being held up as engineers in the U.S. study the situation, but at the moment it isn't causing any overall delays.

"Man has never put these types of loads in Antarctica before," he said. The cause will be studied further by engineers, but "to be honest, we're all scratching our heads" at the moment.

South Pole construction employees, above, work on a section of the new station. The facility, scheduled for completion in 2006, will replace the dome that has been a landmark at the Pole since 1975.
Photos by Mark Sabbatini/The Antarctic Sun

Have you logged onto the Sun's Web site lately? If not, look what you're missing:

* A full-color 2002 calendar featuring the winners of our Photo, Poetry and Prose Festival
* A full-length album from this year's Icestock music festival
* Answers to questions from people around the world about Antarctica
* Our weekly crossword puzzle in an online interactive format (with hints!)
* And lots more! See for yourself by going to **www.polar.org/antsun**

Coming soon:
A special end-of-year present to our readers

around the continent

PALMER

Vessels come to station for tours, emergency

By Tom Cohenour
Palmer correspondant

Over six days last week, Palmer Station received one yacht, four tour ships, one helicopter and one British Naval research vessel.

The *John Laing*, a 72-foot (22 meter) steel-hulled ketch chartered by the British Army, arrived unexpectedly because of a minor medical emergency. Sixteen crew members were on board. Their mission, primarily team building, includes sailing, cold weather survival and mountain climbing along the Antarctic Peninsula. They are also collecting samples for scientists back in the UK and doing a survey of historic sites.

Photo by Tom Cohenour

British Army Officer Major Richard Pattison plays the bagpipes during a stop at Palmer Station.

Visits were exchanged between station personnel and members of the *John Laing*. One of the two visitors wearing kilts quite unexpectedly opened a case and produced a set of bagpipes. British officer Major Richard Pattison's lively bagpipe tunes filled the unusually still night air. Anyone wishing to learn more about their travels can log onto their Web site at http://www.BAAE.org.uk

The 237-foot (73-meter) *Explorer* arrived the day after Palmer hosted the crew of the *John Laing*. Sponsored by Mr. Forrest Mars of the Mars candy company, the ship arrived with 75 high schoolers, 12 teachers, and eight Mars family members. Brothers Forrest and John Mars enjoyed seeing Palmer along with their wives and four of Forrest's children. Station cooks baked brownies with M & M's for the occasion. Information and photographs of the *Explorer* can be seen on their Web site at http://www.explorership.com

With 450 passengers, the 578-foot (178-meter) tour ship *Marco Polo* moored offshore from Palmer Station. A delegation of station personnel traveled via zodiac to meet her. Speakers presented a talk about the United States Antarctic Program (USAP), station life, science conducted at Palmer and answered questions from the audience.

Formerly known as the *Caledonian Star*, the tour ship *Endeavor* arrived at Palmer with 98 passengers and crew. After hosting a station tour for the *Endeavor* passengers, station personnel had the opportunity to spend a two-hour social with passengers aboard the ship well known for its hospitality.

Another tour ship of enormous size was the 718-foot (222-meter) *Ryndam*, which stopped just off Bonaparte Point directly in front of Palmer Station with 1,200 passengers. Speakers from Palmer presented two excellent PowerPoint presentations in the 600-seat auditorium about the work being done in the USAP, station life and science conducted at Palmer. After the talks, speakers answered questions from the audience seated on both the main level and the balcony overlooking the stage. Visible from station was the caged tennis court on the ship's top back deck adjacent to the swimming pool. The *Ryndam* carries up to 1,400 passengers, nearly as many people as are deployed to Antarctica in the entire USAP program.

A few hours after the *Ryndam* departed, a 296-foot (91-meter) Royal Naval research vessel arrived at Palmer with 120 personnel. The HMS *Endurance* is a true icebreaker assisting the British Antarctic Survey and carrying out scientific research programs. Tours were provided to 45 Royal Navy visitors who in turn provided tours of their vessel to station folks.

SOUTH POLE

Congressional staffers stuck at the South Pole

By Judy Spanberger
South Pole correspondant

We're going to start calling our lovely little station at the bottom of the world the Southern Most Motel 6 after the events of this past week. We had the pleasure of hosting a passel of distinguished visitors (DVs) that got stuck here due to bad weather.

Eight members of the House Committee on Appropriations escorted by Karl A Erb were our distinguished visitors this week. They came to observe the installment of the new El-Station time capsule and to tour the progress of the new station. Quite a crowd gathered to watch the time capsule put into place. The contents of the capsule are a few South Pole souvenirs from our store, vials of the cleanest air on Earth from the clean air sector, posters from the NSF and the ANG, signed by those organizations and a poster of the new El Station signed by polies, and lastly a book of Antarctic press releases from last year. After the capsule ceremony the DVs then got a tour of the station. A more intimate tour than they'd planned to be sure! The weather socked in and our gracious visitors

Photo by Andres Martinez/Special to The Antarctic Sun

Visitors from the House Committee on Appropriations help workers at the Amundsen-Scott South Pole Station bury a time capsule at the base of the new station, which is under construction.

See Pole on page 6

the week in weather

McMurdo Station
High: 50F/10.1C Low: -14F/-26C
Wind: 28 mph/45 kph
Windchill: -20F/-29C

Palmer Station
High: N/A
Wind: N/A
Windchill: N/A

South Pole Station
High: 5.4F/-15C Low: -14F/-26C
Wind: 39 mph/62 kph
Windchill: N/A

Photo by Lt. Edward Beale/Special to The Antarctic Sun

Sister ice breakers, the Polar Sea and Polar Star, both work to clear the channel to McMurdo Station. Two breakers were needed this year to deal with extra-thick ice.

Breakers struggle with McMurdo sea ice

The sea ice reaked its revenge on the icebreakers sent to cut through it.

Though the Coast Guard breakers chopped through the thick, second-year ice, the 17-mile channel to McMurdo Station remains clogged with ice chunks, said Coast Guard Commander April Brown. The strain of constant ice-breaking is showing on both breakers.

The *Polar Sea*, called out of the maintenance yard to assist the *Polar Star*, developed a leak in the starboard propeller hub, Brown said. Booms were set up to contain the leak. Fixing it will likely require salvage divers, who need to be flown in, Brown said. She expects the divers to arrive Wednesday. If the hub is not fixed properly it could damage the $2 million propeller, Brown said. The *Polar Sea* continues to work clearing the channel, but it cannot go into reverse.

Meanwhile, the fuel tanker *Gus Darnell* and *Greenwave* resupply vessel are still on their way. The tanker is expected at the ice edge today, but because of the clogged channel and problems with the breaker it may have to wait there until Tuesday, when the Coast Guard breakers can escort it in. Talk of using the breakers to ferry fuel from the tanker at the ice edge to McMurdo Station was dropped because the tanker pump is needed to move the fuel up the hill to the tanks, Brown said.

The *Greenwave* is still expected at the ice edge by Feb. 1.

Correction: Trace Wright, one of the winning poets listed last week, was erroneously refered to as she rather than he. He recieved an honorable mention for writing the poem "A Day Down South."

Pole

From page 5

became our honored guests. We had people camped out in the library, pool room and gym while the winds blew and the snow flew. Room service was not available, but everyone seemed comfortable and happy to be here socializing with the polies.

The season is coming to a close. Boxes and items safe outside during the warmer and calmer summer months are beginning to be put indoors or on storage berms, our brains are getting mushy, redeployment meetings are being held and the winter-overs are heading off to McMurdo for R & R. McMurdo has been going out of their way to provide some great activities to keep them out of trouble. Cosmic bowling, survival school, classes and more. Thanks to the folks at McMurdo for all the fun!

Whew! "Vat a Veek!," as my grandmother would say.

Answer to crossword from page 2

Continental Drift

What winter Olympic sport could Antarctica excel at?

"An ice coring contest."
Amy Chiuchiolo
Graduate student at Palmer Station, from, Danvers, MA

"Spryte jousting and boondoggling."
Laura Bonneau
Assistant lab supervisor at McMurdo Station, from Seattle, WA

"Curling, because nothing is funnier than big guys pushing little pucks around the ice with brooms."
Henry Malgren
Network engineer at South Pole, from Austin, TX

Bienvenu!

Gradito!

Photo by Serge Drapeau/Special to The Antarctic Sun

This summer workers began enclosing the framework of the new French-Italian station at Dome C with insulated panels.

Concordia - The new French-Italian station

By Lucia Simion
Special to The Antarctic Sun

DOME CONCORDIA - After many days of bad weather conditions, the sun is finally shining again over Dome C, a tiny village of white and green tents and orange containers at 75° 06' south and 123° 23' east. Three flags are flying in the wind blowing from South Pole, 1,500 kilometers (930 miles) away: blue, white and red for France; green, white and red for Italy; and deep blue with 15 yellow stars for the European Union.

In fact, Dome C is a speck of Old Europe lost in the very heart of Antarctica. Located 3,200 meters (10,400 feet) above sea level, it's the place chosen by France and Italy in 1993 to build a new science station, the first to be shared by two countries.

"There are actually only two permanent science stations up on the polar plateau," said Gérard Jugie, director of the French Polar Institute, whose headquarters are in Brest. "Amundsen-Scott station at South Pole and Russian Vostok, located at 80° of latitude south. Concordia will be the third, but in terms of modernity it will be the second one, after South Pole."

Named "Concordia" by the late Paul-Emile Victor, founder of the French Polar Expedition (later to become the French Polar Institute), the French-Italian station has been under construction since 1999 and will be inaugurated in 2004.

Photo by Lucia Simion/Special to The Antarctic Sun

A signpost at Concordia Station points the way home to cities in France, Italy and other European destinations.

French Jean-Paul Fave designed Concordia in the late 1990s. It consists of two elevated, cylindrical buildings with 36 faces and three floors, connected by an enclosed bridge about 10 meters (32.5 feet) long.

"This solution provides a clear separation between areas where noise is produced and areas were peace and quiet are wanted by locating them in two well-separated buildings, the "noisy" and the "quiet," explained Fave who spent four weeks at Dome C supervising the construction, together with the building team manager Serge Drapeau from the French Polar Institute. Serge was flanked by a team of 10 building workers, half Italian, half French.

Like the new South Pole building, the Dome C buildings can be raised to stay above the snow.

"The uplifting is supposed to be performed every 10 years," Fave said.

In 1994, the steel frame of one of the two main buildings was erected in France and three foreign experts were invited for inspection: Wayne Tobiasson from the Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, N.H., Don J. Taylor from the

See Dome C on page 8

Dome C From page 7

British Antarctic Survey and Heinz Kohnen from the Alfred Wegener Institute in Bremerhaven, Germany.

A joint venture between IFRTP (French Polar Institute) and PNRA (the Italian Polar Program run by ENEA), Concordia's budget is 31 million Euros ($27.4 million U.S.), split 50-50 by Italy and France. Researchers and technicians from other European countries are welcome, and during the summer field season 2001-2002 in Dome C it was possible to meet people from 10 different countries, including Russia, Switzerland, Sweden and Denmark.

About 1,200 kilometers (750 miles) from both the French station Dumont d'Urville, and the Italian base in Terra Nova Bay, Dome C was originally selected for glaciological research. A substantial layer of ice, 3,200 meters thick (10,400 feet), offers great potential for climatic reconstruction of the last 500,000 years. The EPICA project (European Project for Ice Coring in Antarctica), funded by the European Community, has been working there since 1999.

On Jan. 17 the drilling operations reached 2,600 meters (8,450 feet) below the ice and more than 1,000 meters (3,250 feet) of ice cores were processed by an international team of 14 people directed by Eric Wolff from British Antarctic Survey.

Photo by Lucia Simion/Special to The Antarctic Sun

Jean-Paul Fave, right, looks over his designs for the Concordia Stationwith one of the builders. The two steel-frame buildings weigh 275 tons. They stand on six legs on a platform of compressed snow. This season the first 25 external panels were put up.

Dome C has other valuable characteristics that support the installation of a permanent scientific station, said Mario Zucchelli, director of the Italian Polar Program. Many of them are the same reasons that American researchers go to the South Pole. Dome C is located inside the polar vortex where the ozone hole can be detected in the austral spring. Since it is far from any marine perturbations, Dome C is an ideal place for studying solid Earth geophysics, especially seismology. Being 3,200 meters above the continental crust, Dome C is protected from any magnetic perturbations by anomalies in the Earth's crust and is an ideal place for studying magnetism, Zuchelli said.

Dome C is also a very isolated site experiencing severe climatic conditions, Zuchelli said. It will be an excellent site for evaluating techniques and procedures for future work on other planets.

Its isolation also makes it an easy place to study small groups of people in conditions similar to those encountered in orbitting space stations, Zuchelli said.

The base is designed for 16 people yearround, with double that many for a month during the annual change-over period. The station is supplied by regular Twin Otter flights and three times a year by a truck traverse from Dumont d'Urville.

Dome C is also a very good location for the search for micrometeorites, tiny specks of comets fallen to Earth, with dimensions between 25 microns and 500 microns, Zuchelli said.

But the happiest of all with Dome C are the astronomers. Karim Agabi, French-Algerian astronomer, is in Dome C for his second season in a row.

"As a possible future site of astronomical observations, the Dome Concordia looks extremely promising," said Agabi.

Some of the reasons are obvious - high altitude, very cold and dry air favoring infrared astronomy, and long days and nights favoring a long time of integration.

"An additional interest could very well be the unique stability of the almost windless local atmosphere, giving access to high resolution astronomical imaging capabilities inaccessible anywhere else on Earth," Agabi said.

Astronomy plans at Dome C include instruments to measure atmospheric turbulence and photometric studies focusing on Alpha Centauri, a very bright double star.

"It could also provide the first real asteroseismological investigation of two solar type stars, in complement to the less bright stars that space projects are aiming at," Agabi said.

The site testing of the Concordia site is part of the worldwide campaign to qualify all the sites of large modern telescopes worldwide. The Alpha Centauri seismology is a very useful and important complement of the possible space missions, which have no access to that star, much too bright for the onboard camera.

There are lots of other good reasons for astronomers to work at Dome C, said Paolo G. Calisse, an Italian astronomer from the University of New South Wales in Sydney, Australia.

"The place is out of the auroral area, is extremely dry and located at high altitude," Calisse said. "Wind speed is by far lower than at other locations, including South Pole station. That should make the turbulent layer thinner, improving, in turn, the quality of potential astronomical observations."

Calisse added that the University of New South Wales, which has been running an astrophysical site testing program at the South Pole since 1995, last summer started testing the Dome C potential for astronomy in collaboration with NSF-CARA. Many instruments at Dome C will run parallel to ones at the South Pole, including cameras to automatically monitor cloud cover and a system similar to the AASTO, running at present at the South Pole.

"The idea is to supply the characteristics of the two sites to the international astronomical community, and then use the information gathered to propose the construction of a 2 m class infrared telescope at Dome C," Calisse said.

"We can also get free lesson of French and Italian language," he said.

"Last but not least," said Calisse, who was born in Rome and moved to Sydney two years ago, "at Dome C you can enjoy the best Italian-French restaurant of the continent run by Jean-Louis Duraffourg, a veteran of Antarctica."

Two field workers bring back ice to melt for water at Lake Hoare. The frozen lake and the valley around it have been cooling over the past decade, making life more difficult for the microscopic plants and animals living in and around it.

Photo by Kristan Hutchison/The Antarctic Sun

Cold

From page 1

data from a station on the shore of Lake Hoare showing the air temperature has been dropping 1.3F (0.7C) per decade on average. The Dry Valleys have an average annual temperature of minus 0.4F to minus 2F (-18-19C), Lyons said. The temperature decline is most pronounced in the southern summer and fall.

Moreover, the cooling goes beyond the Dry Valleys, already unique because they are one of the only parts of the continent not covered in ice. John Walsh, a climate scientist from the University of Illinois, looked at 35 years of measurements from weather stations across the continent. Taking into account where the weather stations were located, he determined 66 percent of the mainland has been cooling since 1966.

At the same time the weather data flies in the face of the global warming trend, which is an average increase in air temperature of 0.01F (0.06C) every 10 years during the 20th century. That warming trend already takes into account the colder weather data from Antarctica, Doran said. On an even longer time scale, ice records collected this summer at Dome Concordia on the East Antarctic plateau show the temperature at the equator was 11F (6C) colder 170,000 years ago, according to Dr. Eric Wolff, chief scientist for the European project for ice coring in Antarctica. Within that longer warming trend there is plenty of room for smaller ups and downs in temperature, including the recent data from the Dry Valleys.

"We kept thinking the cold stuff was a blip in our system, but then we realized the cold stuff *was* the record."

-Peter Doran

The Dry Valleys data is also the opposite of the 7F (4C) warming on the Antarctic Peninsula. But the Peninsula is the continent's banana belt and follows different climate patterns than the mainland, Lyons said.

"We don't really know why this part of the Antarctic is cooling," said Andrew Fountain, another co-author. "All we point to is that the system is complex. You don't get uniform warming everywhere. There are places that cool as the rest of the world is warming up."

Even the scientists who wrote the *Nature* report were originally surprised by their findings. When the LTER group started working in the Dry Valleys they expected to be watching the area react to global warming.

"For years we were sort of in the mindset that global warming was affecting our system and we kept waiting for the warm stuff to come back," Doran said. "We kept thinking the cold stuff was a blip in our system, but then we realized the cold stuff *was* the record."

One of the things that distinguishes the LTER project, one of 24 sites funded by the National Science Foundation in the U.S. and Antarctica, is that it involves scientists in a number of disciplines collecting and comparing data over a long period of time. At their annual meeting in Fort Collins, Colo., last March, the diverse members of the Dry

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Cold

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Valleys LTER group decided to pull together their climate data and compare it to changes in their individual research. Like puzzle pieces, the climate data aligned with changes in stream and lake levels, ice thickness, and plant and animal life.

"We wouldn't have known this if we hadn't been doing long-term research," said Diana Wall, another LTER co-author. "If we'd stopped at three years we wouldn't have noticed this."

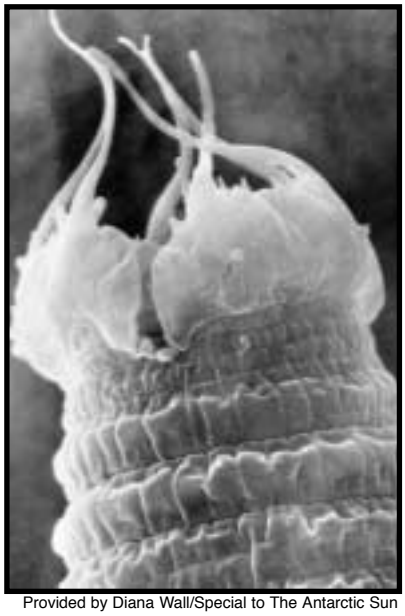
The temperature drop came with a decrease in wind speed and clouds. In the Dry Valleys, the wind tends to warm the temperature, so less wind contributed to the cooling trend. Fewer clouds allowed more evaporation and may have decreased the snowfall, an average precipitation of 4 in. (10 cm) or less. One way or another the soil became 36 percent dryer. The soil-dwelling worms and other invertebrates suffered in the colder, dryer conditions, and their population has shrunk 50 percent since 1993.

"All these animals turn off and on with water," said Wall, who studies the microscopic worms, called nematodes.

Though nobody's starting a Save the Nematodes campaign, the worms play an important role in soil fertility around the world.

"If we were in a temperate climate, some farmer would be wondering what's going on," Wall said.

With colder temperatures the glaciers melted less in the summer, so the streams shrank and the lake shores receded. The cold also froze more of the lake water, creating a thicker expanse of ice for sunlight to filter through to reach the water below. With less light, the microscopic floating plants in the lakes began to wither and die. LTER researcher John Priscu found a 5 percent average annual decrease in phytoplankton productivity in Lake Bonney since 1989.



Provided by Diana Wall/Special to The Antarctic Sun

Magnified photo of a Scottnema lindsayae, a type of nematode or microscopic worm, from the Taylor Valley. Cooling in the valley has caused the nematode population to shrink 50 percent.

"All these animals turn off and on with water."

-Diana Wall

"It's just like if you took a population of humans and starved them," Priscu said. "We're all going to slow down and emaciate and then eventually start to die."

Some pieces of the chain react slower than others. While the glaciers' surface melting or freezing is an almost instant reaction to daily changes of temperature and light, the glaciers' movement is driven by what the temperature was 1,000 years ago, Fountain said.

Despite the recent decade of cold, the three glaciers he has photos of from the 1970s appear to be advancing. They still retain heat from a warmer time 1,000 years ago, allowing them to move faster.

"It's the difference between pouring really cold maple syrup vs. really warm maple syrup," Fountain said.

Looking at the longer timescale, the effects of a few degrees temperature on the Dry Valleys can have even more dramatic effects. Lyons said previous research by other scientists and ice core records indicate the temperature was probably warmer about 3,000 years ago and Lake Vanda in the Wright Valley was 100 to 200 feet (30 to 60 meters) higher than its current level. Over several thousand years the temperature dropped 1.8F (1C) causing the lake to shrink to a 16-foot (5-m) deep brine pool. Since then the temperature increased 3.6F (2C) to bring the lake level back up to what it is today.

Figuring out what is and has happened in the Dry Valleys is only a first step, Lyons said.

"What we'd like to be able to do is make predictions if the climate changes what will happen down the line," Lyons said.

Based on paleo-climate records from the Ross Sea region, Lyons predicts a 1.8F (1C) change in temperature, if sustained, could cause the Dry Valleys to truly dry up.

Photo provided by LTER/Special to The Antarctic Sun

The Taylor Valley, at right and left, cooled by 1.3F during the 1990s, triggering a chain of reactions. Researchers aren't sure why the Valleys and other parts of Antarctica are cooling while the world in general is warming.

Photo by Shad O'Neel/Special to The Antarctic Sun

Heat

From page 1

temperature hovered about 5 degrees above normal throughout the month, bringing the average up to minus 32F (-36C) for the month.

"But the real warm weather has been in January," said Gallagher. "The average temperature so far for this month is minus 8.7F (-23C), which is warmer than it ever got during the past two summers."

Frodge and his team of meteorologists at McMurdo Station are collecting raw data they will process and analyze in Charleston, S.C., upon their return, where they will study the cause of the warming blitz. It may turn out to be an isolated year, or represent part of a larger pattern.

"There is no way at this point in time to know what is causing this unseasonably warm weather," said Frodge.

Regardless of the cause, both stations are shuffling and prioritizing flights at a time when all are hustling to complete the station goals before they move into winter-status in one month.

The biggest problems associated with near-zero temperatures at the Pole are increased wind that leads to decreased visibility and cancelled cargo flights, said Katy Jensen, South Pole Station area manager. At the South Pole, warm weather is associated with wind and cloud cover, which keeps long-wave radiation from escaping into space.

"It's like having a blanket thrown over us," said Gallagher. "The days that feel warmest around here are when it's sunny with light winds and the temperature is around minus 15F."

McMurdo Station has other heat-related problems, where upper-40s means constant road maintenance, monitoring and conditioning.

"The warm weather has caused havoc on operations," said Bill Turnbull, Antarctic Terminal Operations manager.

Runway crews groom Pegasus and Williams Field runways day and night and hope to keep the runways lightly covered with about one-half inch of loose snow to prevent the runway surface from melting and turning to slush.

"It is very remarkable that we have been able to continue bringing in aircrafts from Christchurch," said Gary Cardullo, airfield manager. "The airfield crews have been working long hours at both airfields to keep them open … It's really commendable."

While 11 of the 17 scheduled aircrafts have landed at Pegasus, incoming flights from Christchurch are restricted to land between 11 p.m. and 11 a.m., when the runway is the coolest and reaches its full strength, said Cardullo.

The Pegasus runway allows C-130 wheeled-aircrafts to transport passengers to and from New Zealand, allowing the LC-130s to fly on-continent missions to support science and South Pole construction.

"Despite any setbacks, Pegasus is an important project," said Cardullo. "Those 11 successful flights have saved 20 to 30 on-continent missions, without having to use the LC-130s to fly north."

Typically, McMurdo Station transportation operates with about 10 shuttle vehicles; however, the station has been limited to four large-wheeled vehicles - three Deltas and one Terrabus - since the heat wave began in mid-December.

"Large-wheeled vehicles actually pack the snow, but small tires cut through the crusty surface and get buried in the soft snow," said Turnbull, who said it is not rare to be limited to Deltas, but this the longest time he had ever seen.

"It has been tough. We can't use light vehicles, only Deltas," said Cardullo.

At a top speed of 18-20 miles an hour, the Delta vehicles are much slower than shuttle vans. It can take up to 45 minutes to travel from McMurdo Station to Williams Field in a Delta, compared to 30 minutes in a shuttle. The shuttle services coordinator makes daily adjustments to the shuttle schedules, as well as prioritizing passengers to accommodate for limited transportation.

Scientists in remote field camps at the Dry Valleys, 60 miles northwest of McMurdo, are experiencing their own transportation woes as glacial runoff has saturated much of the area by turning pathways into impassable rivers, streams and lakes.

"Last year the streams didn't always make it all the way to the lakes," said grantee Chris Jaros of the University of Colorado - Boulder. "This year, you have to wear gaiters to get around."

According to Jaros, the excess runoff forces them to travel around the water to collect the data from the streams. To navigate the area, many scientists are resorting to using precious helicopter time to fly around the once-walkable lakes of the Dry Valleys.

"Instead of walking for eight hours a day around the water, we have to helo from place to place," said Jaros.

Despite the difficulty getting around, scientists are puzzled and fascinated by this year's warm temperatures, as they consider the rarity of the flash flood like waters in the Dry Valleys. For example, one small stream that flows into Lake Fryxell was reported by scientists to flow at a rate of 38 cubic feet per second (CFS). Last year the same stream had a maximum flow of 5 CFS.

"The streams are putting a lot of water around the lake," said Jaros. "There is more water this season than in the previous 10 years. They speak of the mythical years from the early '90s and I could hardly believe it, but now I'm seeing it."

Now Jaros enjoys a nightly water show as the sun hits a glacier between 6 p.m. and 7 p.m.

"It's like a flash flood, every night if the sun hits it right, you can see huge flows of water," said Jaros.

Diana Wall studies microscopic worms in the Dry Valleys and has never seen water "like this before." She said she is already anxious to visit the Dry Valleys next year to see what resulted from the unusual water flows.

"We don't know what this pulse of warm weather will do to biology," Wall said. "It could have sparked life, because it's water and water causes life - but maybe not."

Wall said she enjoys working in the warm sunshine, but admits that the "science part" of her is not sure what the current natural experiment will mean for the biological future in the Dry Valleys.

As Wall described it, "It's one of those totally unexpected events, like a hurricane … I wouldn't want to miss it."

"We don't know what this pulse of warm weather will do to biology."

- Diana Wall

Profile

At the bottom of the world there is only one janitor

Keeping the Pole tidy

By Mark Sabbatini
Sun staff

The South Pole's only janitor gets his day started these days with a case or so of wine.

"We had 75 cases of wine that froze over the winter, so I've been taking out a case and a half every day, thawing them out and pouring them down the drain," said Jeremy Sohlstrom, a Minneapolis resident working his second year at the Amundsen-Scott South Pole Station. "It's a Pole thing."

It is often the first of many odd jobs during the day for Sohlstrom, who doesn't do bathrooms but may on occasion find himself emptying chamber pots. He also puts in several shifts a week at the station's store and helps with various administrative projects, despite being the only person hired to clean up after 220 people. By comparison, McMurdo Station has 21 janitors to clean up after about 800 people.

But Sohlstrom's resume is hardly that of an average janitor: he's spent his time off the Ice smuggling bibles into China, working for Mother Theresa's Home For The Dying, and helping special education and troubled youths. So keeping the bottom of the world clean is hardly an overwhelming challenge.

"I like making the place look good," he said. "I love it here."

One of the reasons the station has only one janitor is everyone is assigned shifts to clean bathrooms and departments are given the task of cleaning various indoor sections of the station. Two janitors were originally planned this season, but one position was eliminated so another construction worker could be hired to help build the new station.

Several Pole workers said if there is only going to be one janitor at the Pole, Sohlstrom is an ideal choice.

"He's one of the most quick-witted guys I've known down here," said "Cookie" Jon Emanuel, a sous chef at the Pole. "Every time I can I try to say hello to him just to hear what he has to say."

Sohlstrom's also known for the occasional practical joke, including an incident about seven weeks ago when he used the station store manager's e-mail address to announce a variety of items such as lilac-scented boot liners and replica rock samples from Scott's expedition had arrived.

"It just bordered on believable," said Louise Mercier, who manages the station's store and post office. "All of a sudden these messages (from customers) started popping up on my screen."

The serious part of Sohlstrom's personality comes out in much of the work he does, if not always how he does it. Of particular interest to him is ministry work.

Two years ago he spent a month smuggling several hundred Bibles into China, where the government only prints enough for a tiny fraction of the population. At times he makes the mission sound like a game of hide-and-seek - changing clothes between trips during the day and pretending not to understand the language when questioned - but there was the scare of getting caught twice near the border.

"Surprisingly it was less of a big deal than I thought it would be," he said. "If we had been caught deep in China with them maybe something more dramatic would have happened."

Sohlstrom's work for Mother Theresa's organization came shortly after she died in 1997. He also spent two years after college working in a residential treatment center for troubled youths, saying his favorite part of the job was when kids lost control of their emotions.

"I liked the challenge of dealing with that and working through it with them and making it a productive time," he said.

Sohlstrom grew up in St. Cloud, Minn., and moved to Minneapolis to attend college at North Central University. He graduated with a bachelor's degree in psychology and received some ministry training. He hoped to be a chaplain in a juvenile correction facility, but the job he was seeking failed to open up.

He applied to work at the Pole shortly before his trip to China, calling once he got there to see if there was an opening for him. He was hired as a dining attendant, working a rotating shift of two weeks in the kitchen and one as a janitor.

"As much as I enjoyed the kitchen, I enjoyed the janitorial work more," he said. "I would see projects and I would have the freedom to do it."

Sohlstrom spent last season off the Ice, but said he decided to return this year because "it gets in your blood." The Pole was, and remains, his first choice.

"I think it's so beautiful because there's nothing here," he said.

He said he's hoping to return in the future, but is hoping his next assignment will be in the communications department or "some nice and warm office job."

"As much as I enjoy the job, I would like to climb the ladder a little more," he said.

Photo by Mark Sabbatini/The Antarctic Sun

Jeremy Sohlstrom begins a work day by pouring wine that froze during storage down the drain of a bathroom sink at the Amundsen-Scott South Pole Station. He is the only janitor at the station, although he gets help from other employees who are assigned shifts to clean the restrooms.