ANTARCTIC

The Journal of the New Zealand Antarctic Society Vol 23, No. 1, 2005

Devonian rock Icebergs of New Zealand

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Occasional meetings are held by the Auckland, Wellington, Canterbury and Otago branches.

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ANTARCTIC

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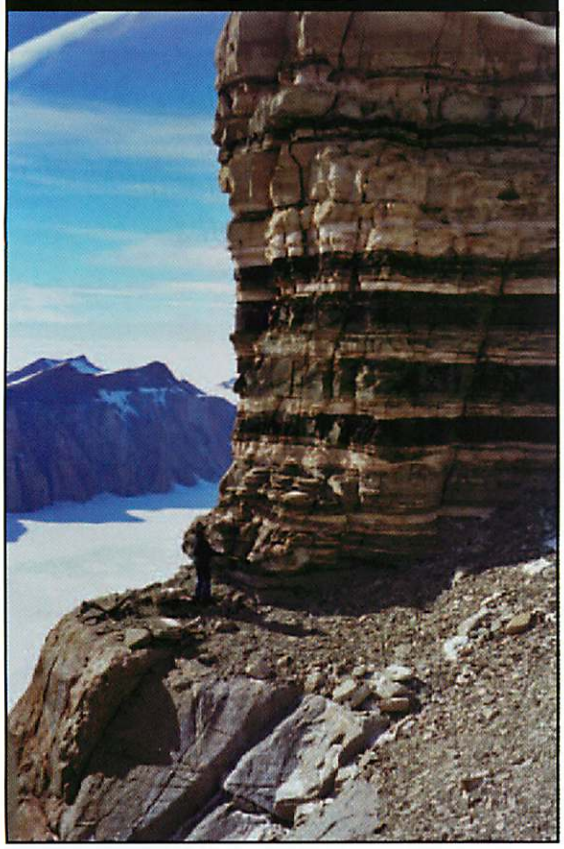

Cover photograph: *Geologist studying Devonian rocks opposite Queer Mountain (see story page 8). Photo: Jeni Savage.*

Volume 23, No 1, 2005
Issue No. 192

ANTARCTIC is published quarterly by the New Zealand Antarctic Society Inc., ISSN 0003-5327

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PRINTED BY
Herald Print,
52 Bank Street, Timaru, New Zealand.

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Icebergs sighted off Southern New Zealand

Boats sailing in the Vendee Globe round-the-world yacht race, as well as fishing vessels, have sighted many icebergs in the deep ocean east of Campbell Island (map) during the last six months.

Icebergs are a significant hazard to yachts plying the Southern Ocean.

In one sighting, 15 icebergs were counted with estimated sizes of about 3 km across. This information is constantly being forwarded to the Rescue Coordination Centre in New Zealand, and the Marine Safety Authority has issued navigation warnings for the area.

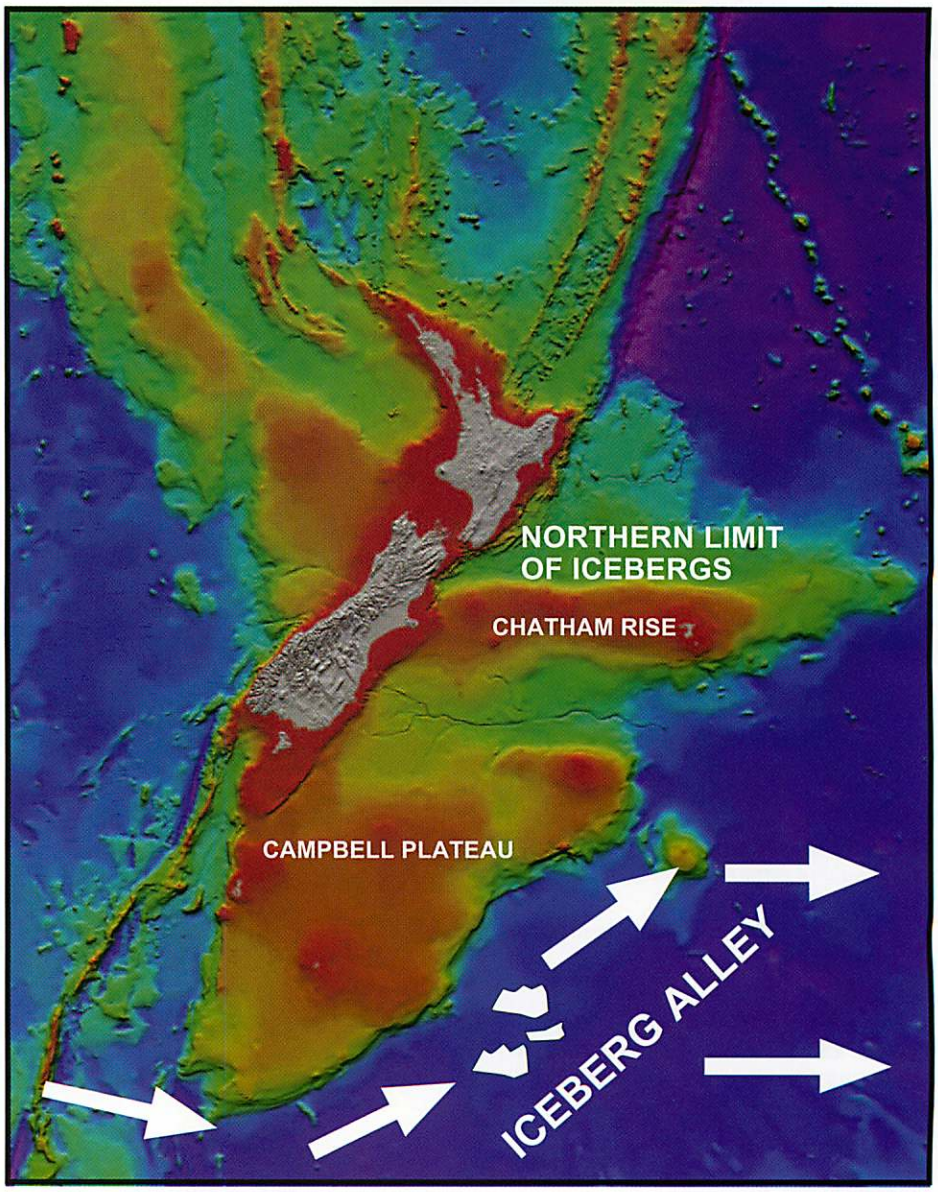
The presence of icebergs is of concern to the Vendee Globe yachtsmen who are presently picking their way through the icy flotilla.

The icebergs have been transported from Antarctica in the fast flowing Antarctic Circumpolar Current. This is the planet's longest current and the only one to connect all the major oceans, according to Dr Lionel Carter, a principal scientist at National Institute of Water and Atmosphere (NIWA).

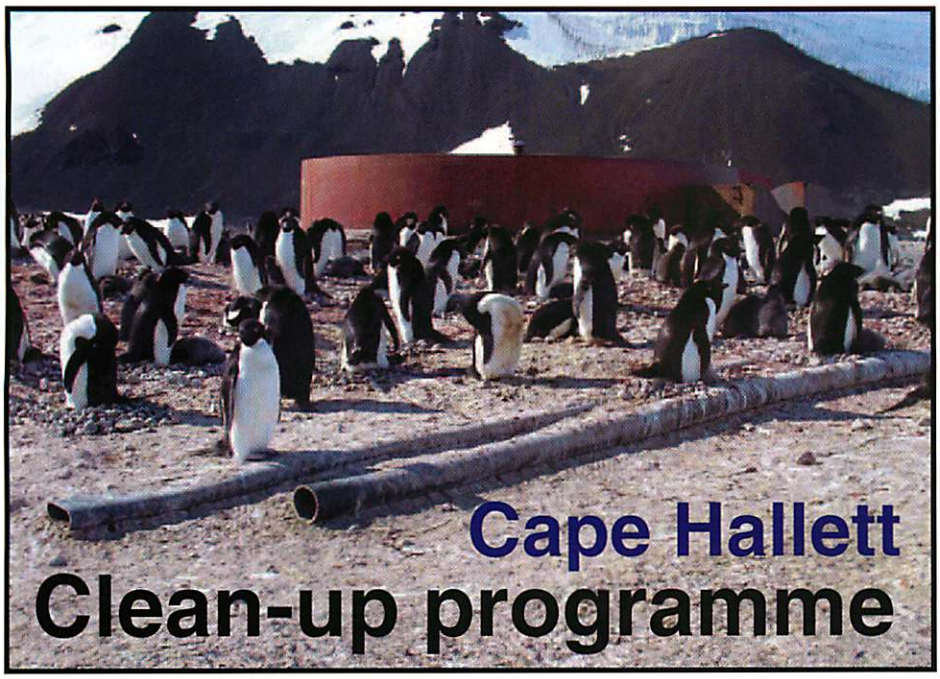
The precise location where the icebergs were calved is unknown, but they may be related to the major collapse of the Larsen Ice Shelf in 2002. Clearly large quantities of ice were originally involved for the icebergs to survive the many thousands of kilometres journey in water temperatures of 5 to 8^{0}C. While uncommon, icebergs do periodically enter New Zealand waters. Various recordings were made in the 1890s, early 1920s, 1930s and in 1948.

In 1892 icebergs extended as far north as Chatham Rise and in 1931 as far as the latitudes of Dunedin. Such incursions are a response to local winds and currents. But mainly the icebergs follow the main path of the Antarctic Circumpolar Current and move towards South America at about latitudes 55-60^0 south.

Is this latest flotilla of ice the result of global warming? We cannot say for certain because we have had a number of iceberg incursions going back to at least 1892, well before significant warming of the climate. However, the coincidence of major collapses of the Antarctic ice shelves with a rapidly changing climate cannot be dismissed, which is why considerable effort is going into identifying the causes of ice shelf collapse and its downstream effects on global ocean.



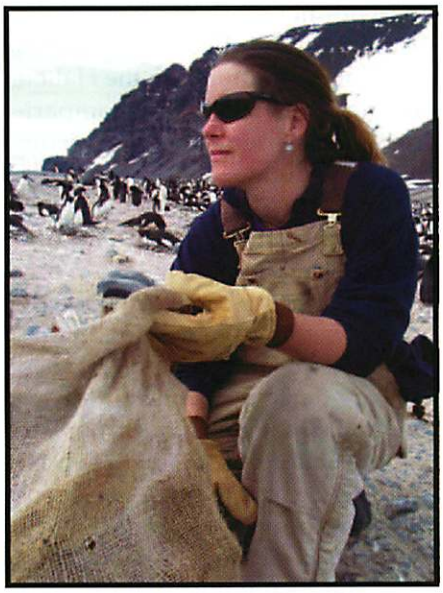
Iceberg Alley: The Antarctic Circumpolar Current (large arrows) is the carrier of icebergs past New Zealand.



Cape Hallett Clean-up programme

The Cape Hallett clean-up programme continued this season with three Antarctica New Zealand staff working in the area for a month. With the help of Latitudinal Gradient Project (LGP) support, the team removed rubbish from the former joint US and New Zealand research station, abandoned in 1973. Much of the debris collected – including items like wire cables, stakes and rusty drums – were things that could be harmful to the Adelie penguin population that breeds in the area.

The Italian Antarctic Programme vessel, *Italica*, picked up 28 metric tonnes of material from the site, which included three small huts and a geomagnetic dome that was disassembled by remediation teams last year. Next summer, the remaining bulk fuel storage tank will be removed to complete the main remediation effort.



Antarctica New Zealand Environmental Compliance Officer, Miranda Huston, removing materials from the Cape Hallett site, (pictured with penguins, above). Photos from Antarctica New Zealand pictorial collection.

Scholarship winner announced

Antarctica New Zealand is pleased to announce that Nathanael Maxwell is our Mauriora ki te Ao Scholarship recipient for 2005. The Mauiora ki te Ao scholarships were set up to increase participation of Maori in the public sector, especially in the land and natural resources departments. Nathanael has just returned from the ice with K065 looking at the physiography, flow characteristics and vulnerability of the Southern McMurdo ice shelf. He has also just completed his second year of his Geology degree, which forms part of his double degree in Surveying and Geology. His sights are set on a career in the geological and resource management sector.

Youth on Ice Pilot

Four Project K graduate students visited Antarctica this season under a Youth on Ice pilot as part of Antarctica New Zealand's education programme.

Project K is a youth development programme that works with 13-15 year-old students to build self-confidence, teach life skills and promote good health and education. Antarctica New Zealand CEO Lou Sanson said Project K was selected because it has a proven track record in youth development initiatives.

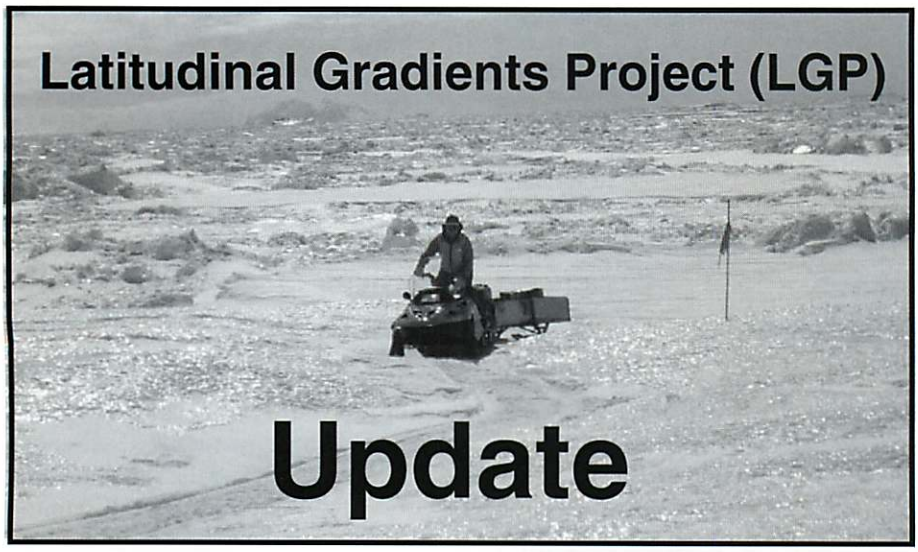
"Project K inspires young New Zealanders to reach their full potential so we wanted to offer their graduates an opportunity to visit Antarctica and foster a lifelong passion for Antarctica and its environmental and conservation values," said Lou.

Project K co-founder, Jo-anne Wilkinson, accompanied Kimberley Cross, Richard Hills, Gina Hoeft and Joshua Thomson to Scott Base for a week in January.

The students conducted a research project focused on the International Geophysical Year (1957/1958) and participated in a physical sled challenge which gave them a taste of what the heroic era explorers faced while travelling on the ice.

Nigel Watson and conservators from the Antarctic Heritage Trust, assisted the Project K students during their visit. Nigel said it was great to see the interplay of youth and older people. "The value of the legacy of early Antarctic exploration is in inspiring young people to explore the world and extend their boundaries. To see this firsthand with Project K participants was very positive."

Wilkinson said it was a fantastic opportunity for the graduates. "This trip confirms for our students that anything is possible. It also builds on what the students have learnt through Project K; goal setting, teamwork, perseverance and self-reliance."



The LGP camp at Cape Hallett has completed a successful second season. The international and interdisciplinary nature of the project was exemplified again this year with five NZ and two US events supported.

Flying to camp along the Edisto Inlet at the start of the season in early November, showed the put-in team that conditions were going to be very different to last year. The sea ice in Edisto Inlet had re-frozen as a churned up mess of ice, with very few flat areas for landing on and for skidooing across. A reminder to all, that no two seasons are ever alike.

Despite the sea ice conditions, the science prevailed. With the skill and determination of the camp staff, Gus and Rachel, the sea ice was negotiated carefully, affording access around the inlet to K024 fromWaikato University who were studying the mosses and lichen in the area. Their work was also supplemented by helicopter support from the Italian's to enable them to get further a field. One student braved the camp for the entire season, conducting regular measurements on growth cycles of mosses in the Cape Hallett Specially Protected Area.

The early season marine groups of Ken Ryan (VUW) and Mary Sewell (Auckland) enjoyed a long sampling period, with little interruption from the weather. Ken conducted experiments on live sea ice algae and bacteria to determine their responses to changes in salinity, temperature and light that they would encounter during ice formation. His student, Andrew Martin, who was awarded the New Zealand Post postgraduate scholarship also made some interesting discoveries about the bacteria that live in the sea ice. Mary continued with her work to quantify the distribution and abundance patterns of larval communities in the Hallett area and will be making comparisons with her findings from McMurdo Sound.

Landcare's Adelie penguin population dynamics event studied the Hallett penguins for the first time this year. They researched the behaviours of certain colonies, took stomach content samples and attached tracking devices to some birds.

Our US collaborators from the Long Term Ecological Research group were on site for a week continuing their work on the soil biodiversity at Hallett, conducting some snow sampling on the nearby Towles Glacier, and checking on their automatic weather station. This meteorological data is freely available through the LGP's website.

Last but not least, the LGP postgraduate scholarship winner, Erica Hofstee of Waikato University, spent most of the season at the camp, studying the hydrology and soils of Seabee Hook for her Masters thesis.

Life at Cape Hallett wasn't all work. Any occasion that could be celebrated was pounced on with the usual kiwi ingenuity. Summer Solstice, Christmas and New Years were the main events with good food and entertainment. The LGP is much indebted to the Italian Programme for all their logistics support provided, and to the camp staff, Gus and Rachel, who provided fantastic support for the second year running.

The Hallett camp will run for one more year in 2005/06 before it moves onto its next destination further south.

Further information on the LGP can be found at www.lgp.aq.

Above: Erica Hofstee surveying on Seabee Hook. Below: Phil Lyver and Brian Karl weighing a penguin chick. Photos from Antarctica New Zealand pictorial collection.

South Pole Station Dismantling

Winter work at the Amundsen-Scott South Pole station will include dismantling of the buildings under the aluminium dome of the station. With the South Pole modernization programme well advanced, work is now turning to dismantling and removing the old wooden buildings that have been housed under the dome since the mid-1970s. The South Pole winter manager reports that the galley is now dismantled and its component parts are being stacked, awaiting removal during the 05/06 summer season.

From the inside of the US Amundsen-Scott South Pole Station.

Traverse Update

The team marking a haul route to the South Pole from McMurdo pulled onto the polar plateau on Jan. 4, 2005. Their farthest south point, stands at 480km from the South Pole (1,187kms from McMurdo). It was farther than they expected to get during the 2004/05 season, not only getting onto the Leverett Glacier, but to the polar plateau for the first time in this traverse history.

The goal of the South Pole Proof-of-Concept Traverse project is to test the feasibility of hauling cargo from McMurdo to Amundsen-Scott South Pole Station, in order to take some of the burden off the limited flights. The planned route crosses the Ross Ice Shelf, climbs the Leverett Glacier through the Transantarctic Mountains, then continues across the plateau to the pole. It's a total of 1,600km with 3,000m elevation gain. This season the traverse team made it three-quarters of the way. The traverse team and planners hadn't expected to make it so far this year. Last season they faced problems with sleds wallowing in deep, soft snow on the Ross Ice Shelf and made it 684km along the route before turning back.

Korea to build second station

Korea has announced its plans to build a second station in Antarctica.

A report to the Ministry of Maritime Affairs and Fisheries (MOMAF) said the ministry is cooperating with government agencies to conduct a feasibility study for the station, which will be located on continental Antarctica.

Korea is proposing to build the new station because the location of the King Sejong Base in the South Shetland Islands of the Antarctic Peninsula, is not good for a number of research areas studies.

The new facility will be dedicated to better astronomical studies and research on the movement of glaciers and physical changes of the earth.

Ministry officials said the government will draw up a plan for the construction this year with construction starting in 2007.

The ministry has placed an order for a 6,000-ton vessel with ice breaking capability. The vessel will be built by 2008 and be dispatched there to help in the construction of the research facility, ministry officials said.

Researchers miss fresh food

At least 31 researchers at an Australian base in Antarctica went without fresh food for at least four weeks in early 2005 after thick ice prevented a relief ship from getting through.

The ice-breaking supply ship, the *Vasiliy Golovnin*, carrying personal effects, food and fuel, could not get within 30kms of Mawson station, Federal Environment Minister Ian Campbell said.

Mawson station leader, Graham Cook, said contingency supplies meant the base could operate without fresh deliveries for a year, but fresh food would make life more pleasant at the station where researchers woke to temperatures of -6 degrees C in February.

"We'd manage for the year, but it would be nice to see what a tomato looked like," he said.

Supplies were delivered instead by Australia's Antarctic flagship, the 3,600-tonne *Aurora Australis*, in March.

Summer researchers left the station by air in early February, leaving 16 people to brave out the winter together.

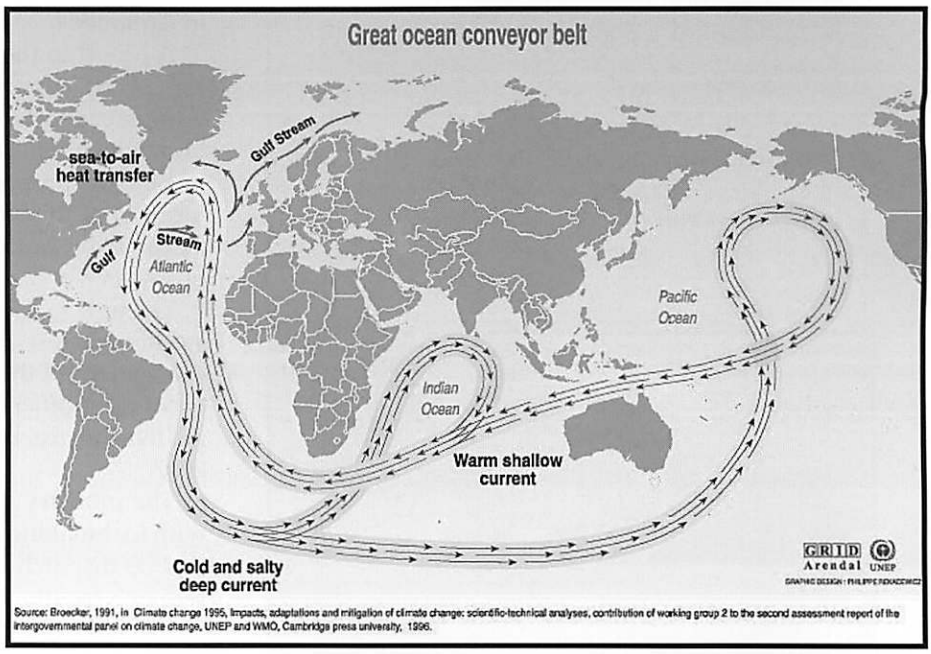
Antarctica's ocean link with New Zealand

By Lionel Carter
Principal Scientist, NIWA

Although an ocean apart, Antarctica exerts an icy control on the waters flowing past New Zealand, with effects that are felt from the coast to the deep ocean.

Ever since James Cook sailed deep into Antarctic waters on his second voyage of 1772–75, New Zealand has kept close ties with the "White Continent". Ross, Shackleton, Scott, Hillary and others relied on New Zealand to help them mount expeditions to the ice.

New Zealand has also fostered exploration and scientific research of its own, a commitment cemented with the building of Scott Base in 1957. Such historical links span 230 years, but environmental ties extend far down the path of geological time.



Source: Broecker, 1991, in Climate change 1995, Impacts, adaptations and mitigation of climate change: scientific-technical analyses, contribution of working group 2 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge press university, 1996.

THE BIG BREAK-UP

Antarctica and ancestral New Zealand were originally part of the vast continental jigsaw of Gondwanaland. This super-continent began to break-up in earnest about 140 million years ago, and by 90 million years, Antarctica had separated from Australia, New Zealand and South America. Around 33 million years, a deep seaway had formed between Antarctica and Tasmania. A similar seaway later developed off southernmost South America to complete a pathway for the 24,000 km-long Antarctic Circumpolar Current (ACC).

As the ACC developed, it isolated Antarctica making it colder and allowing the ice sheets to expand. Cooling also increased the temperature difference between the pole and equator, causing winds to strengthen.

This in turn, strengthened the ACC. As the ice sheets grew, nearby waters became colder and denser and began to sink. Through forming "density currents" the cold water then spread north into the ocean basins.

Because the Earth's rotation forced these currents along the western sides of the ocean basins, they became known as Deep Western Boundary Currents (DWBC). Initially these currents were strong enough to erode the seabed. Off eastern New Zealand, where the Pacific DWBC flows into the Pacific Ocean, four erosion periods have occurred in the past 33 million years, all coinciding with major advances of the Antarctic ice sheets.

THE CIRCULATION NOW

As the eastward moving ACC circles Antarctica, it encounters two prominent constrictions: the Drake Passage off South America, and the submarine continent off New Zealand. Like rocks projecting into a stream, these constrictions force the ACC to ride well north of its usual path.

Off southern New Zealand, the interaction between current and seabed is dramatic.

As the ACC strikes the massive Campbell Plateau, large eddies form and migrate north along the plateau edge, stirring sediment in water depths exceeding 3000 metres.

Water as cold as 5°C is transported near to Chatham Rise.

Below 2000 metres, the DWBC and ACC flow together alongside the Campbell Plateau. But once the ACC leaves the scene, only the boundary current passes northwards into the central Pacific.

DISTANT SIGNAL

When the climate and ice sheets of Antarctica change, the signals ripple through the ocean and atmosphere to New Zealand and beyond. The timing and size of the signals, like everything else in nature, are highly variable. Large-scale changes caused by continental drift happen over millions of years, whereas the great ice ages occurred at time scales of tens of millennia.

Then there are the more frequent Antarctic-related weather and climatic disturbances, which affect New Zealand on scales of decades to days.

The ice ages were particularly influential. As polar ice sheets ex-

panded, sea level dropped to expose the continental shelf. Off New Zealand the shelf became a poorly vegetated, shingle-covered coastal plain, that was blasted by icy, dust-laden winds.

These strengthened winds also pumped up the ACC. Not content to skirt around the edge of Campbell Plateau, part of the invigorated ACC branched towards Dunedin bringing cold water close to the ice-age coast. There, coastal currents shifted the cold water north as far as East Cape.

And how do we know this? The answer lies in mud!

Sediment cores from offshore Hawkes Bay provide a climate record of unprecedented detail. Using the remains of plankton preserved in the sediment, NIWA researchers have compiled a detailed record of the ocean's temperature.

Ice age temperatures at the surface were 7°C colder than now, and the patterns of change matched those recorded in Antarctic ice cores thus highlighting the New Zealand -Antarctic connection.

Of special note is the identification of the **Antarctic Cold Reversal.** Following the peak of the last ice age, about 23,000 years ago, climate entered a warming phase accompanied by a retreat of the ice sheets. However, this trend reversed from 14,600 to 12,800 years ago when the ice sheets expanded again. At the same time, the ocean cooled off the eastern North Island, the change affecting surface and deep waters as well as climate. This rapid top-to-bottom response is revealing, for it shows the **Cold Reversal** signal was transferred rapidly through the deep ocean. It confirms the importance of the ocean in controlling climate.

ICEBERGS TRAVEL NORTH

One of the more direct ice age connections with the "White Continent" was the flotilla of icebergs reaching New Zealand via the ACC. These carried rocky debris, which accumulated on the seabed as the ice melted. Analysis of this debris in sediment cores records repeated iceberg invasions over the millennia. Locally, the northern limit of iceberg invasion was the warm, shallow waters bathing the crest of Chatham Rise. Today, this crest is marked by grooves and pits gouged by entrapped icebergs while the surrounding seabed is littered with Antarctic debris .

Also feeling the cold was the DWBC. As Antarctica expanded, more dense cold water formed to intensify these currents. Off eastern New Zealand, cores of mud show silt-rich layers corresponding to the ice ages, when finer grained clay particles were winnowed out by the faster currents. A polar connection is also verified by a simultaneous influx of Antarctic diatoms – single-celled algae that grew around the sea ice and sank to be entrained by the DWBC.

The repercussions of the faster DWBC on New Zealand were restricted mainly to the deep ocean, but globally it meant a change in the great **Ocean Conveyor** system with Antarctica taking control while the other great driver, the North Atlantic Ocean, temporarily took a back seat.

Superimposed on these large-scale changes are short-term variations like the **Antarctic Circumpolar Wave**. Occurring about every 4 years, the Wave is recognised by ocean temperature and sea-ice fluctuations that ripple eastward around the Southern Ocean. This trend suggests strong ties with the ACC, but the precise nature of the connection is not well understood. That aside, the Antarctic Circumpolar wave appears to affect New Zealand rainfall.

Finally, there are those all-too-frequent events, winter polar storms. These disturbances create swell that sweeps north to pound the New Zealand coast en route to fuel the summer surf beaches of Hawaii and California.

All in all, when it comes to feeling the effects of the Antarctic environment, the cliché "It's a small world" is exactly right.

Vanda Station Reunited

A reunion of Vanda Station staff, scientists and visitors will be held at the MacKenzie Country Inn in Twizel, New Zealand on Friday 22 and Saturday 23 April.

Over 100 people have already registered to attend; the four former Victoria University of Wellington students, Peter Webb, Barrie McKelvery, Colin Bull and Richard Barwick, who were first to explore the Wright Valley in Dec 1958-Jan 1959, and members of the 1968 Traverse party who brought the station across McMurdo Sound.

Antarctic historian David Harrowfield is arranging a display from his collection of Antarctic memorabilia. Antarctica New Zealand, who is sponsoring the Friday evening woolshed barbeque, is also supplying artefacts for display, including a sign that hung over the door of the main Vanda Station building.

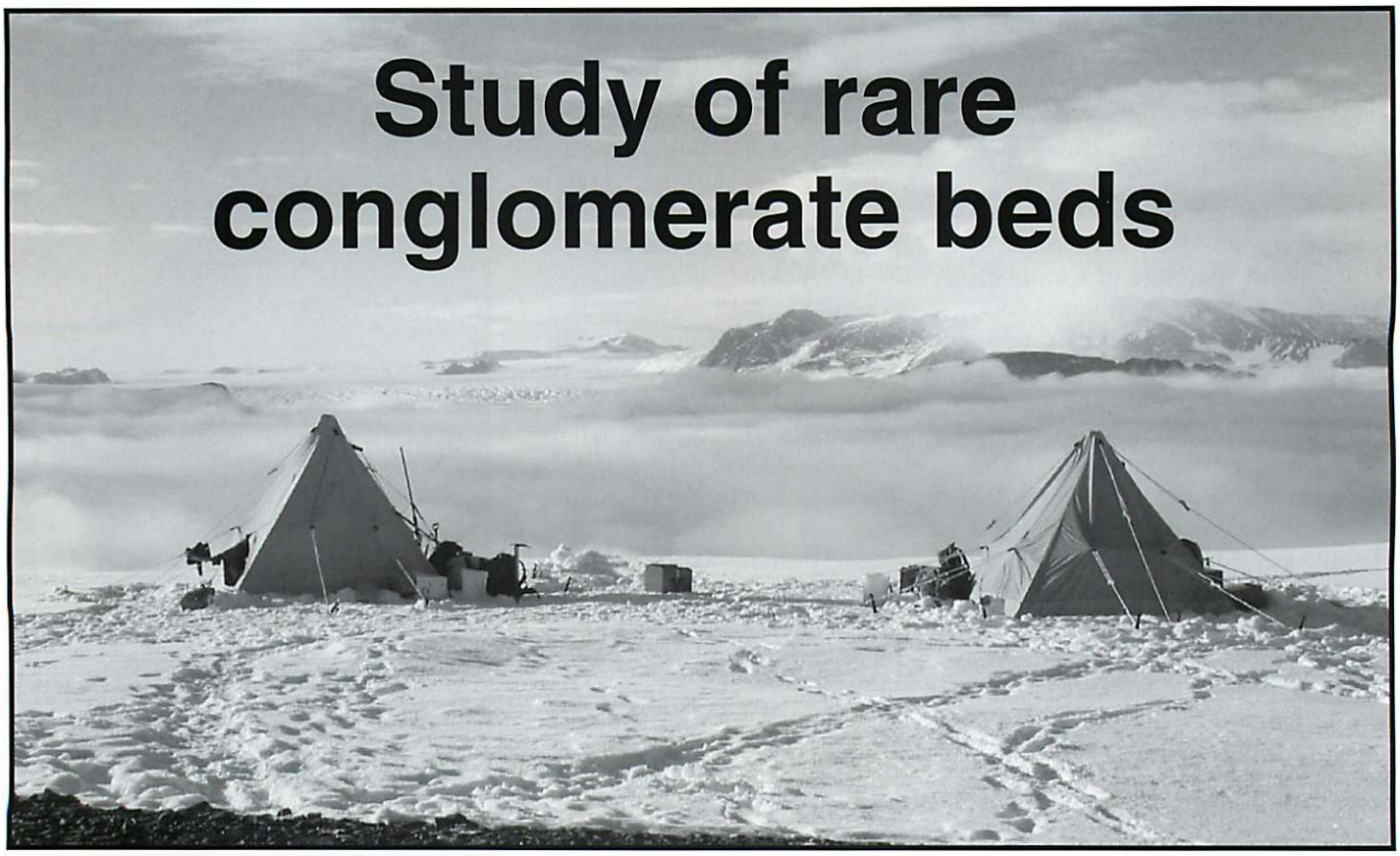
The station existed at the eastern end of Lake Vanda in the Wright Valley of the Antarctic Dry Valleys from 1968 to 1994. It served as a scientific base for meteorological, geophysical, hydrological, geological and zoological studies. Vanda Station developed its own unique Antarctic culture, built on Kiwi hospitality and the friendly rivalry between staff and hydrologists.

The station also became a popular stop-off place for passing helicopters that often dropped in to give their passengers a swim in the lake, for which they received a coveted Royal Vanda Swim Club patch, and a cup of soup and a scone.

The station was removed in the 1994-95 summer because it was threatened by flooding from the rising waters of Lake Vanda.

To attend the reunion, email vandareunion@yahoo.co.nz or phone John Alexander on (03) 442-6902.

Study of rare conglomerate beds



By Margaret Bradshaw

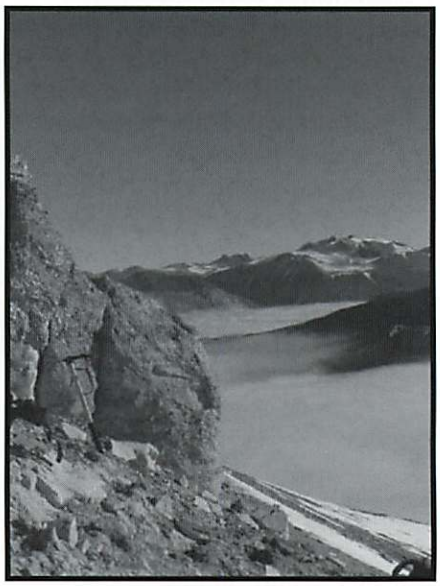
Analysis of data and rocks collected in early 2004 by a University of Canterbury geological party have progressed steadily. The group spent a month studying rare 400 million year old (Devonian) conglomerate beds (gravel size sediments) in the Beacon Supergroup rocks of Southern Victoria Land (SVL).

The fieldwork was a part of a continuing programme on terrain co-relations between New Zealand and Antarctica led by Prof. John Bradshaw and supported by the University of Canterbury.

Conglomerate (ancient gravel beds) contain rounded boulders to pebbles of older rocks that were part of the landscape being eroded at the time.

Analysis of the pebble types provides a geologist with a 'snapshot' of the surface and clues to the relief and uplift history of the source area. Isotopic (radiometric) dating of pebbles, combined with geochemistry and details of minerals and texture, provides a fingerprint of the parent rocks.

Plate tectonics can displace blocks of continental crust thousands of kilometres over time and old continental configurations were quite different from those of today. The fingerprints help with identifying sources and sources and movement tracks. Conglomerate studies can be viewed as forensic geology applied to large scale crustal movements.



Above: Conglomerate outcrop on Mt Suess, looking South. Photo by Kari Bassett.

Top: Camp near Queer Mountain looking towards the Mackay Glacier. Photo by Kari Bassett.

Devonian sediments are found sporadically in the lower part of the Beacon Supergroup throughout the Transantarctic Mountains, their age confirmed by the rare occurrence of fossil fish.

Conglomerates are rare in the Beacon Supergroup, particularly in the Devonian portion. Earlier reports of conglomerate in the MacKay Glacier area provided an opportunity to test rival theories about the geological history of Victoria Land.

A party, comprising Dr Margaret Bradshaw, an expert on the Devonian of Antarctica, Dr Kari Bassett and Duncan Ritchie, who had both been involved in conglomerate work in Northern Victoria Land and M.Sc student Jeni Savage, visited five sites between the Mackay Glacier and the Wright Dry Valley.

Camps were established on ice or snow at Mt Suess, Sperm Bluff, Queer Mountain, the Ringer Glacier and on Mt Cerberus.

The work follows on from previous studies in Northern Victoria Land (NVL).

Here the rocks show strong similarities with Australia and New Zealand and it is clear that all three regions were part of a single active continental margin in the Cambrian period, 500 million years ago. Studies of conglomerates show that the strikingly different belts of rock that make up NVL had amalgamated by 500 million years or a little later. Southern Victoria Land is geologically very different, but if the rock belts of Northern Victoria Land are projected south, they would lie close by beneath the western Ross Sea.

The question is: *do these belts continue south and did they contribute Devonian sediments of the Dry Valley area?*

Duncan and Jeni working on an outcrop of conglomerate at Sperm Bluff. Photo by Kari Bassett.

Pebbles of distinctive Cambrian and Devonian volcanic rocks of NVL would be very significant. Devonian times saw active volcanism in NVL and detection of material from these volcanoes would better constrain the age of the sediments.

Most of the sites visited were at high altitude and, as the work was done in January, by the end of the month temperatures were getting low and the shadows long.

The research requires careful identification of all pebble types present, statistical counts of the relative proportions of each type and the making of representative collections. In addition the sedimentology of the enclosing sandstone was studied in order to place the conglomerates in context. Several of the best sites were in shadow areas and subject to cold diurnal winds that made work very trying.

Since returning Jeni has focussed on geochemical analysis, petrographic description and the making of stratigraphic sections to place the conglomerate in a regional context.

This month (December) the critical geochronology of the pebbles is being determined at ANU, Canberra, and the thesis will be completed by mid-year.

Iceberg defies predictions

The B15 iceberg which broke off the Ross Ice Shelf in 2000 has become a nuisance to both humans and wildlife in Antarctica.

The largest portion of this berg, named B-15A, is the largest moving object on the planet.

The iceberg has been floating around the area near Ross Island for almost 5 years and has been causing problems with both the US and the NZ Antarctic programmes, as well as disrupting penguin populations, and playing havoc with sea ice conditions in that area.

It was predicted by scientists charting its movements, that it would run into the 70km long Drygalski ice tongue, sometime in December of 2004 or in early January 2005.

However, this did not happen, as the B-15A berg grounded a few kilometres away before collision. The iceberg has recently been moving around freely again, creating its own local weather patterns.

Other smaller icebergs are moving around the area too. These include B-15K, C-16 and B-15J.

On April 20, 2005 B-15A did hit the Drygalski ice tongue.

See images at www.natice.noaa.gov.

A White Christmas

Aerial view of the GCAS camp on the McMurdo ice shelf, December 2004. Photo by C. Dolder.

By Linda Lilburne

Not much can be guaranteed in Antarctica except for one thing: a white Christmas. This was experienced by twenty students and four tutors from the University of Canterbury.

The Graduate Certificate in Antarctic Studies (GCAS) course is a 14 week course which includes a field trip to Antarctica for two weeks. Camped in tents on the Ross Ice Shelf, 8 km from Scott Base, their Christmas started with 'Carols by Primus' on Christmas Eve. This was followed by some cross-country skiing under the midnight sun.

Preparations for Christmas day had in fact started several days earlier with the design and excavation of the Christmas table. The 6-metre round ice-table seats 24 people, each with their own seat and leg space carved into the snow. The four sets of ice pillars topped with flags mark the entrances to the table. Beyond is the carved yeti mascot standing proudly in front of Mt Erebus.

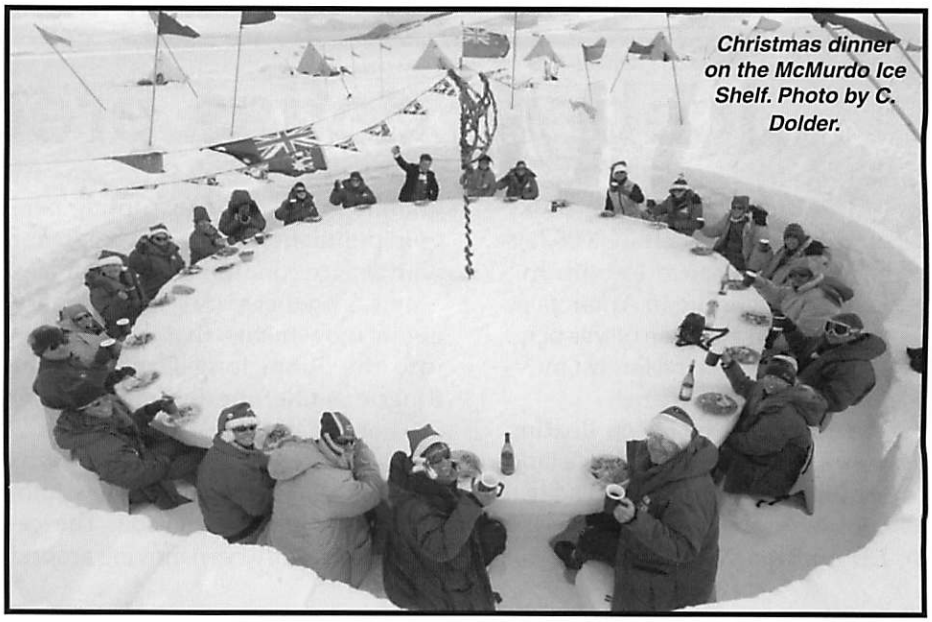
The team were busy in the morning finishing the table, and using primuses to reheat the food provided the night before by the chef at Scott Base. It was a challenge to get everyone's food dished out and all 24 people at the table for grace before the food started to freeze! An air temperature of -5.8°C and a wind chill factor of -11.2°C were not conducive to removing one's hat and gloves for the meal, but the laughter and high spirits kept everyone warm. Particularly entertaining was a $5 gift exchange game. Dessert was quite magnificent and well worth the chilly wait.

Replete with food, the 24 were about to start the Antarctic Olympics when Santa Claus arrived from the south in a motorised sledge. Dispensing lollies he then showed his lack of practice in the mukluk-throwing event. The sledge racing degenerated somewhat as competitors resorted to unfair tactics, but Antarctic pictionary allowed the less athletic to show off their drawing talents on the snow.

Winners and losers then set to and started filling in or demolishing the various snow constructions around camp. All the tents were packed away on Boxing Day morning, ready for the eagerly awaited showers back at Scott Base. This was truly a uniquely special Christmas that the group were extremely privileged to experience.

Linda Lilburne works at Landcare Research and was a student on the 2004/05 Graduate Certificate in Antarctic Studies Course.

Much to the delight of the GCAS group, Father Christmas pays the camp a visit on Christmas day. Photo by C. Dolder.



Christmas dinner on the McMurdo Ice Shelf. Photo by C. Dolder.

Global warming 'not cause of ice shelf collapse'

By Pelle Neroth Taylor

The high-profile collapse of some of Antarctica's ice shelves is likely to be the result of natural current fluctuations, not global warming, says a leading British expert on polar climates.

This finding is supported by analysis of data from the European Space Agency's ERS-1 satellite, according to Duncan Wingham, Professor of Climate Physics at University College London. The data, measuring changes in ice thickness across the Antarctic ice sheet using the polar orbiting satellite, show areas of growth from snowfall are as common as areas of decline.

This is a contrasting picture to one based solely on the northern Antarctic Peninsula - land jutting out from the body of the continent, and reaching to just 750 miles from Chile - where there has been a drastic increase in temperature, thinning of ice sheets and collapse of ice shelves.

The Larsen A ice shelf, 1600 square kilometres in size, fell off in 1995. The Wilkins ice shelf, 1100 square kilometres, fell off in 1998 and the Larsen B, 13,500 square kilometres, dropped off in 2002.

Meanwhile, the northern Antarctic Peninsula's temperatures have soared by six degrees celsius in the last 50 years.

"A lot of attention and research has focused on this relatively accessible area of the Antarctic Peninsula, but satellites are giving us a picture of the continent as a whole."

This broader picture shows evidence of growth and decay from place to place, a picture more in line with natural variations in snowfall and ocean circulation. The Antarctic is to some extent insulated from global warming because to its north are zonal flows in the atmosphere and ocean, unimpeded by other landmasses. This insulates the continent from warmer events further north and leads one to suppose it is better protected from global warming.

"Taken as a whole, Antarctica is so cold that our present efforts to raise its temperature might be regarded as fairly puny. Change is undoubtedly occurring: in the collapse of the northerly Peninsula ice shelves, and elsewhere in the West Antarctic Ice Sheet, where the circumpolar current appears to have reached the ice edge and is eating away drastically at the ice shelves. One cannot be certain, because packets of heat in the atmosphere do not come conveniently labelled 'the contribution of anthropogenic warming'.

"But the warming of the Peninsula has been going on for a considerable time, and the pattern of regional change is variable, and neither of these is favorable to the notion we are seeing the results of global warming".

At the US South Pole station, average temperatures have in fact fallen by a degree since 1957. "The Antarctic Peninsula is exceptional because it juts out so far north," Wingham explained.

"I am not denying global warming. For instance, Greenland, in the northern hemisphere, does seem to be going."

"But Greenland's ice cap is quite far south - a last survivor from the ice age and only its height protects it. The more that cap melts, the more it will continue to melt as it gets lower and warmer. Antarctica is different. Even in the Arctic I am sceptical of some claims that 40% of the sea ice has already vanished, and that what remains is drastically thinning."

"Sparse data from subs in some parts of the Arctic do seem to show a thinning trend, but our preliminary observations using satellite data point to large growth and decay from year to year and place to place, by as much a metre in just a few years. Here too natural variability is considerable. No one doubts that the ultimate fate of Arctic ice looks a grim one, but I believe we have too few data to be confident of how fast it will meet its fate."

Professor Wingham, who is the Director of the UK's National Environmental Research recently attended a European Union Space Conference in Brussels. In his capacity as the Project Scientist of the European Space Agency's 130M Euro "Cryosat" satellite mission, to be launched later this year and dedicated to spotting climate change in the polar zones.

Earlier media reports after a conference on climate change in Exeter suggested it was "unclear" whether the collapse in the Antarctic ice shelves was due to global warming or not.

Although the melt and collapse of the ice shelves does not raise sea levels initially, there is fear these shelves act as corks whose disappearance could lead to an outflow from landbased glaciers - which would increase sea levels.

Film Season on Antarctica in Argentina

Argentina treated scientists in Antarctica to 24 films in the first season of a 50-seat theatre in February.

Argentina's National Institute of Cinema and Audiovisual Arts built the theatre on Jubany Base, on May 25th Island, conveniently located near the scientific bases of Brazil, Chile, China , Germany, Poland, Russia , South Korea and Uruguay.

The theatre includes a reception room and toilets.

The theatre showed Argentine films with English subtitles during the season in February, the height of Antarctic summer.

Astronomy on Ice: Observing the Universe from the South Pole

By Martin A. Pomerantz
Publication Date: December 22, 2004.
Trade Paperback; $21.99. 289 Pages; 1-4134-6860-8. **Cloth Hardback;** $31.99; 289 pages; 1-4134-6861-6.

Martin A. Pomerantz, accomplished physicist and astronomer, tells his story in his engaging new book 'Astronomy on Ice', published under the auspices of The American Polar Society

'Astronomy on Ice' chronicles how Martin Pomerantz established the South Pole as one of the world's premier sites for astrophysical research.

It begins in 1930 during his first visual contact with Commander Richard Byrd and Eagle Scout Paul Siple in a ticker-tape parade honoring their return from their first trip to Antarctica.

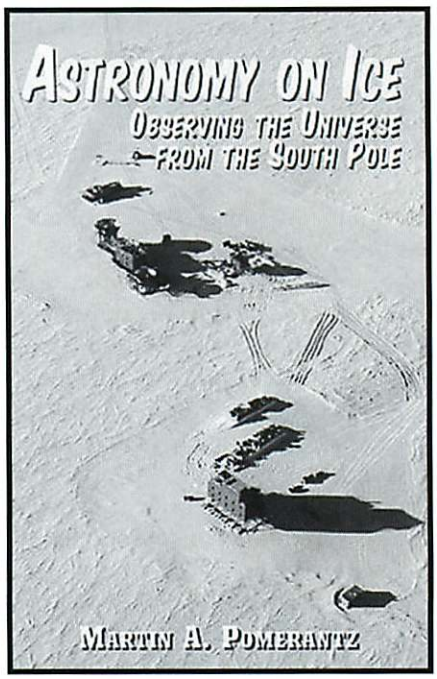
It ends in 1994 during his final observing campaign at South Pole Station and the dedication of an observatory in his honor.

Following a combination of propitious events and personal choices, Dr. Pomerantz set out to arouse interest within the astronomical community in the unique scientific resource available at the pole.

Despite the initially cool reception of his idea, Pomerantz spearheaded a succession of pivotal projects at the U.S. Amundsen-Scott South Pole Station.

Starting with the first observations of the solar interior, and extending through and beyond our galaxy to the beginnings of structure after the Big Bang, Dr. Pomerantz inaugurated studies that are still being carried on and are essential for understanding how our Universe evolved.

After initially bootlegged tests, these pioneering projects were ultimately rewarded with the dedication of the Martin A. Pomerantz Observatory during his twenty-sixth trip to the pole.



Astronomy on Ice records and shares with others a unique experience while increasing public awareness and pride in the United States Antarctic Program.

From Dr. Pomerantz's first taste of physics to his last trip to the South Pole, this book presents, at a level aimed at an educated public, the scientific research the author carried out over fifty years, concentrating on his efforts to arouse interest within the astronomical community in the unique scientific resource offered by this unlikely site.

ABOUT THE AUTHOR

Physicist and astronomer Martin A. Pomerantz is director and president emeritus of the Bartol Research Foundation of the Franklin Institute, his scientific home for more than half of the twentieth century.

Leader of many cosmic-ray expeditions, especially to both the north and south polar regions, Dr. Pomerantz has received numerous honors for his pioneering astrophysical research at the South Pole, where he spent twenty-six austral summers.

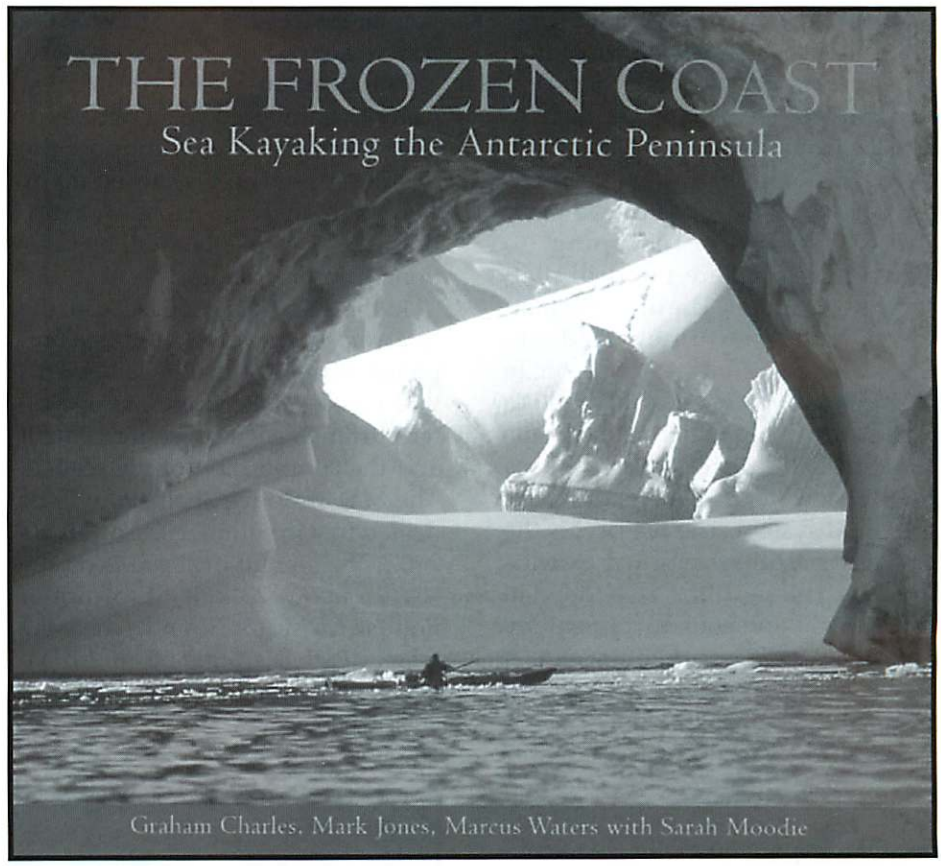
Dr. Pomerantz has served on national and international boards on space science, geophysics, and polar research, and was chairman of the U.S. Committee for the International Years of the Quiet Sun, 1964 to 1965. He lives in San Rafael, California.

Aurora over Amundsen-Scott South Pole Station.
Photograph by Ethan Dicks, US National Science Foundation.

The Frozen Coast

By Graham Charles, Mark Jones, Marcus Waters with Sarah Moodie.

A Review by Paul Barr



Many books on Antarctica tell of tales of adventure from the early 20th Century, when little was known about the continent or the conditions experienced there. They tell daring stories of a battle with the elements with rudimentary technologies and of venturing where no one has ever gone before.

Well this book is no different, but now it is the 21st Century, the clothing and gear is state of the art, yet the risks are still there. The expedition is polar sea kayaking from the tip of the Antarctic Peninsula south to the Antarctic Circle. The adventurers, three intrepid Kiwi's, Graham, 'Jonesy' and Marcus, each with a strong background garnered in the outdoors of New Zealand and the World. Kayaking the Peninsula had never been done before; people, some scientists, many tourists may visit the Antarctic Peninsula each season, but from the safety of a sailing ship or cruise liner, never has a journey of such magnitude been attempted so far south, from the vulnerable position of a kayak a mere foot above the waves.

The book begins by introducing the three souls who are brave (or was that insane) enough to attempt the task, to paddle from the tip of the Antarctic Peninsula to the Antarctic Circle, a trip of some 500km exposed to freezing temperatures and potentially lethal katabatic winds and rapidly changing seas. It gives an insight into their motivations for the trip and their reasons behind starting the Adventure Philosophy Trust, to encourage the youth of New Zealand to set challenges for themselves and get into the outdoors.

The remainder of the book covers the journey itself, describing all manner of things from the phenomenal to the mundane. Combine this with the stunning full colour photography spread through out the book and the reader is given a very vivid image of what life can be like as an Antarctic adventurer.

The book ends with a final chapter added almost as an after thought, which covers the journey from Antarctica back to Ushuaia in South America. As irony would have it and the reason this chapter was included, even though the adventure was over, was that it turned out to be one of the most eventful and hazardous legs of the trip.

The format of the book had me sceptical at first. It is split into three sections, each covering a third of the journey and written by a different one of the adventurous team. I enjoyed the first section but was sceptical of whether the book would continue to flow as the authors repeatedly changed. I must say this was not the case and the book flows well. The three sided approach does justice to the different perspectives each of the trio brought to, and took from, the expedition, without boring the reader by repeating the same material from a different angle.

All up, it makes for a pleasurable and interesting read and I recommend the book to those interested in tales of Antarctic adventure. The stunning pictures on almost every page and the story of another 'Antarctic First', this one in modern times make this book a great addition to any Antarctic collection or coffee table of an Antarctic aficionado.

Paul Barr is a G.I.S. Technician / Cartographer with Gateway Antarctica, Centre for Antarctic Studies and Research at the University of Canterbury.

ANDRILL Update

The multinational Antarctic drilling programme, ANDRILL, is on track for drilling to begin in October 2006. The project was delayed a year to allow project partners more time to approve science and logistics funding, as well as providing sufficient lead time for the new drill system to be designed and built.

The drill rig itself has just been completed by a Brisbane company and is ready for shipping to Christchurch, where the drill platform is being built. The drill and platform will be integrated in Christchurch before testing later in the year and then shipped to McMurdo. Other major components currently being developed are the sea riser, a hot water drill (HWD) and the drill fluid system. The sea riser is the part of the drill system that extends from the drill rig and is embedded in the sea floor and consists principally of very strong pipe and buoyancy. A German company is contracted to manufacture the pipe which has to withstand sea currents at water depths of up to 800m. The selection of the pipe was only made after extensive computer modelling was conducted.

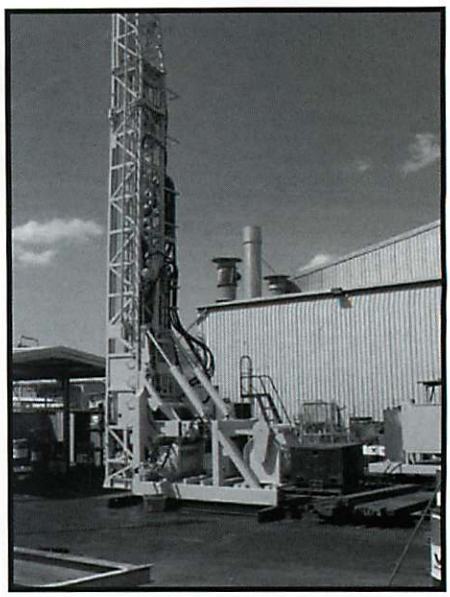
Designing and building the HWD component of the drill system is probably the most challenging task for the ANDRILL team. The HWD will be used at the McMurdo Ice Shelf drilling site near Williams Field where the shelf ice is about 170 metres thick. The drill has to melt a hole, about 1 metre in diameter, through the ice shelf and then keep it open for the two to three months that drilling takes place. If the hole was to refreeze the sea riser would almost certainly be damaged and probably lost.

Webster Drilling Ltd, a specialist drill company with Antarctic experience, is currently rebuilding the Cape Roberts Project drill fluid or 'mud' system. The new system is bigger because it has to cater for the greater depths ANDRILL will attempt to reach. Closed-circuit fluid or 'mud' circulation to the bottom of the drill hole is essential for the successful recovery of high quality rock cores for scientific study.

A new drill site camp and laboratory for the drill project was built last year and shipped to Scott Base on the American resupply ship in January.

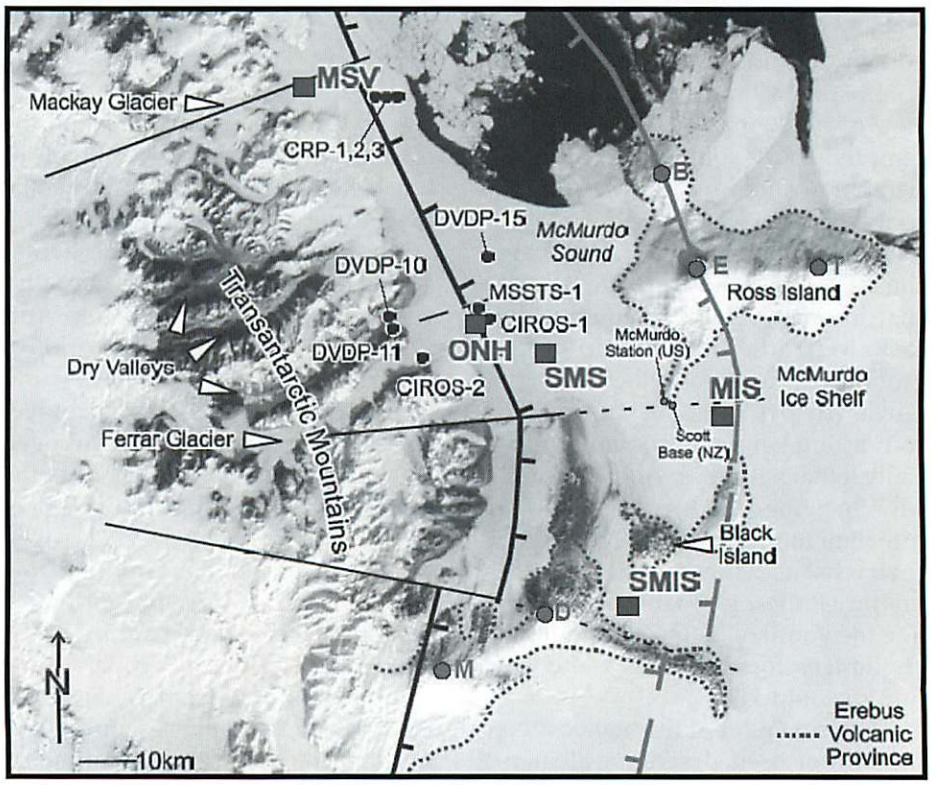
The drill site camp, constructed from 13 converted insulated shipping containers, will support the drilling system and is backed up by a larger, main camp capable of supporting 40 people that will be positioned closer to shore.

In the 2005/2006 field season, the final site survey work will be completed at the two drilling sites. This will involve collecting data on water currents, surface ice movement and the composition of the seabed. The McMurdo Ice Shelf site will be drilled first in summer season 2006/2007. The second drill site is on the sea ice about 20 kms SE of Butter Point in McMurdo Sound, where the water depth is around 500m. All going well this site will be drilled in 2007/2008.



ANDRILL Project Manager Jim Cowie says progress on the ANDRILL project is good. "Things are ticking along. We on schedule for getting the rest of the gear down on the resupply ship in January 2006 so that drilling can begin in October that year."

For more information see www.andrill.org.



Above: Map showing the MIS site that will be drilled in 2006/07 and the SMS site which will be drilled in 2007/08. Top right: The ANDRILL Drill rig, which will be shipped to Antarctica during the 2005/06 season. Top right:

Polar Projects:
Exhibition by Phil Dadson

Polar Projects, a body of work produced by Phil Dadson during his 2003 Artist Fellowship in Antarctica was shown in January - February 2005, at The Physics Room in Christchurch.

The exhibition explored Antarctica's extraordinary Dry Valleys through a unique selection of sound and video works, along with a suite of rock drawings that record the surface of the stones and boulders of the Dry Valleys.

Dadson's vision of Antarctica challenges our perceptions of this unique environment in this subtle, playful investigation into the sonic properties and visual polarities of this landscape.

In *Flutter*, a single red flag is battered by a howling wind producing interesting tonal effects and creating a poetic display of Antarctica's intense environmental affects.

Similarly, *Aerial-Farm* presents an aerial-mast with multiple wires that are activated by the wind, producing an intense phonic resonance as the image fades in and out through the interference of the snow storm.

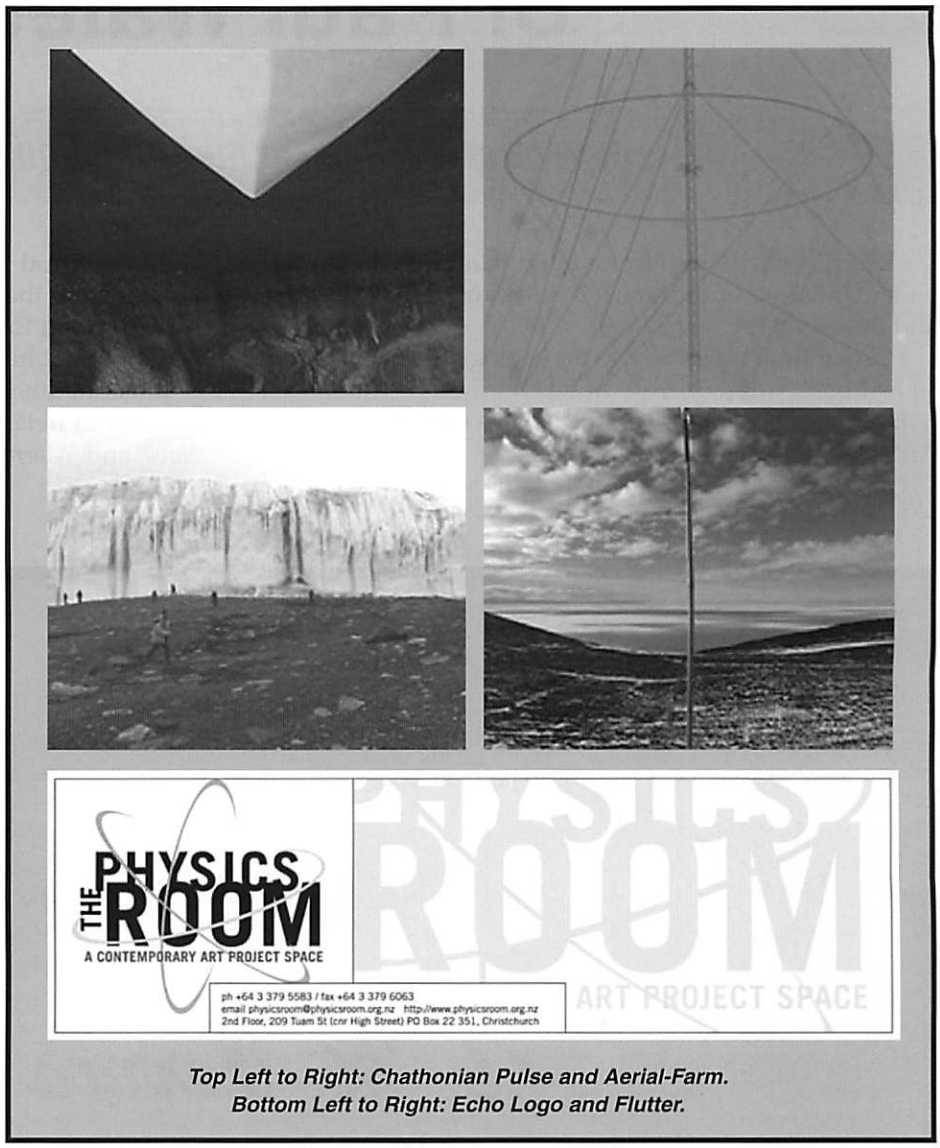
"Mostly the valley seems silent, with only a background hiss of pink noise to accompany the intrusive sounds of my body, my footsteps.

No bird or animal noises, only occasional ice snaps and explosive retorts from the splintering glacial-face and the lakes of frozen seepage from the melt" - Extract from Phil Dadson's diary, Dry Valleys, Antarctica, January 2003.

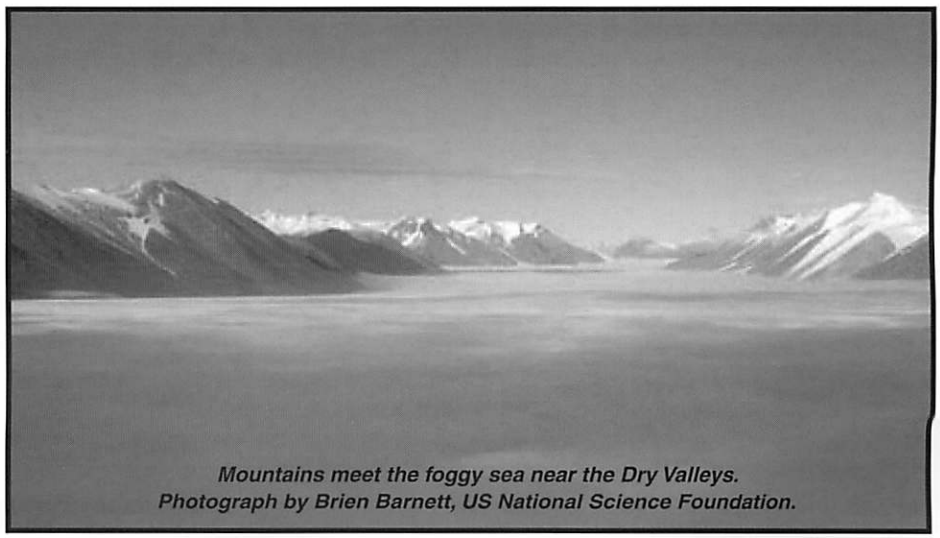
Phil Dadson is a sound and intermedia artist based in Auckland.

He is the founder of "From Scratch", an innovative rhythm/performance group and has exhibited and performed widely in New Zealand and internationally.

In 2001, Dadson was awarded the New Zealand Arts Foundation Artists Laureate.



Top Left to Right: Chathonian Pulse and Aerial-Farm.
Bottom Left to Right: Echo Logo and Flutter.



Mountains meet the foggy sea near the Dry Valleys.
Photograph by Brien Barnett, US National Science Foundation.

Another 'Heroic Era' Letter from the collection of Paul Wales

The envelope has been in my collection for some time.

Recently a fellow collector in England sent me the letter and it wasn't until I saw it that I realised that the letter and this envelope were a pair.

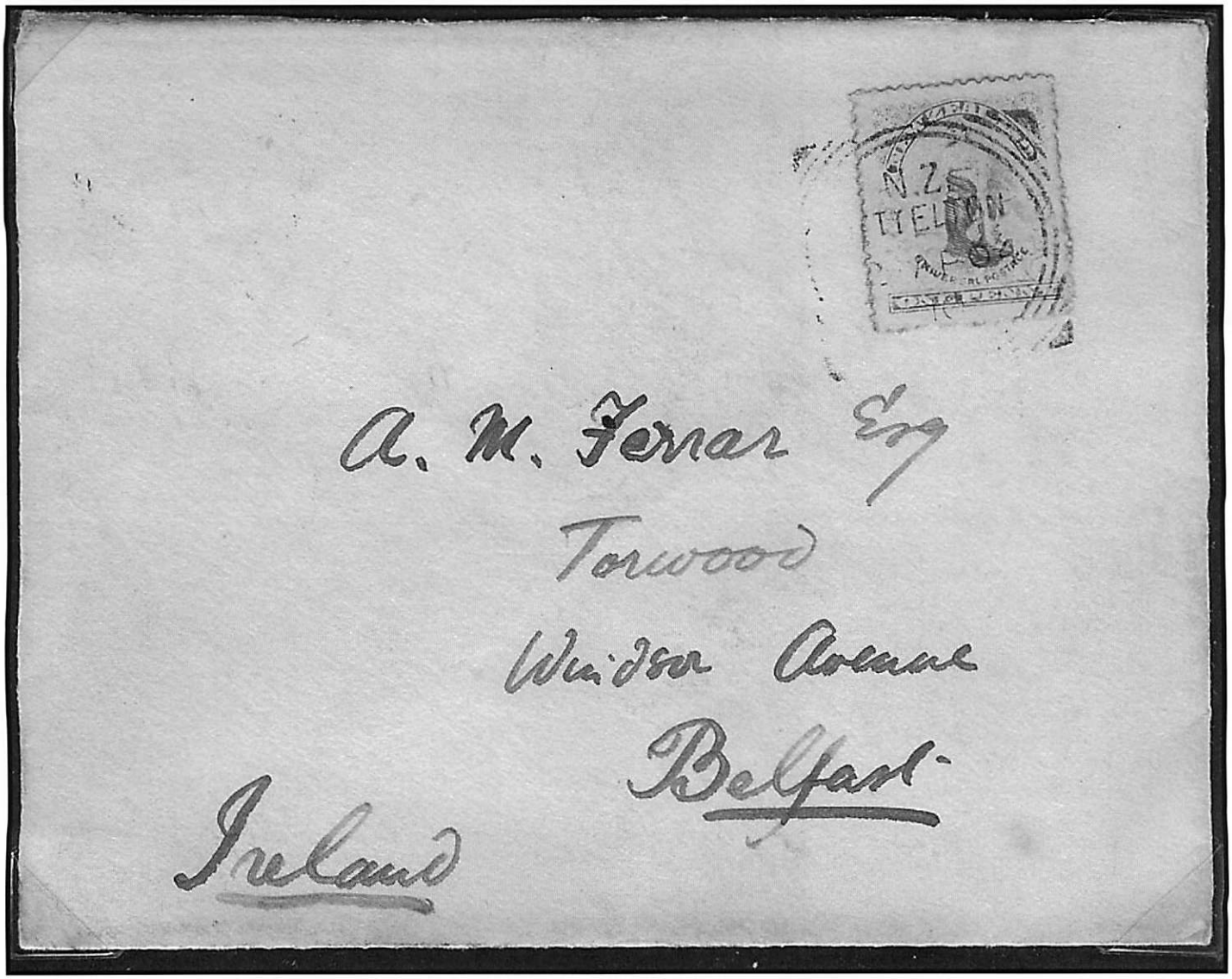
Hartley Travers Ferrar, was the geologist on Scott's 1901-14 National Antarctic Expedition.

Born in Ireland, he spent much of his early life in South Africa before joining the expedition.

On returning from the Antarctic he went to Egypt for eight years and then to Christchurch, New Zealand.

Following the First World War (when he served in the New Zealand Expeditionary Forces) he remained in New Zealand until his death in 1932.

Illustrated here is the letter and envelope he wrote, to his aunt in Ireland, on the 11th February 1904 when *'Terra Nova'* and *'Morning'* were just 5 miles from *'Discovery'*.



Discovery
Winter Quarters
February 11th 1904

My dear Aunt Jettie

Many thanks for your letter and all the Torwood News contained in it. I am glad to hear you are in touch with the Australasian branch of our clan for I was quite surprised to find a cousin when I arrived in New Zealand in 1901. When I get back there I will see exactly what relation she is to me. She wrote to me by the second mail the 'Morning' brought and was very pleased with a small piece of rock I slipped into the envelope before closing it.

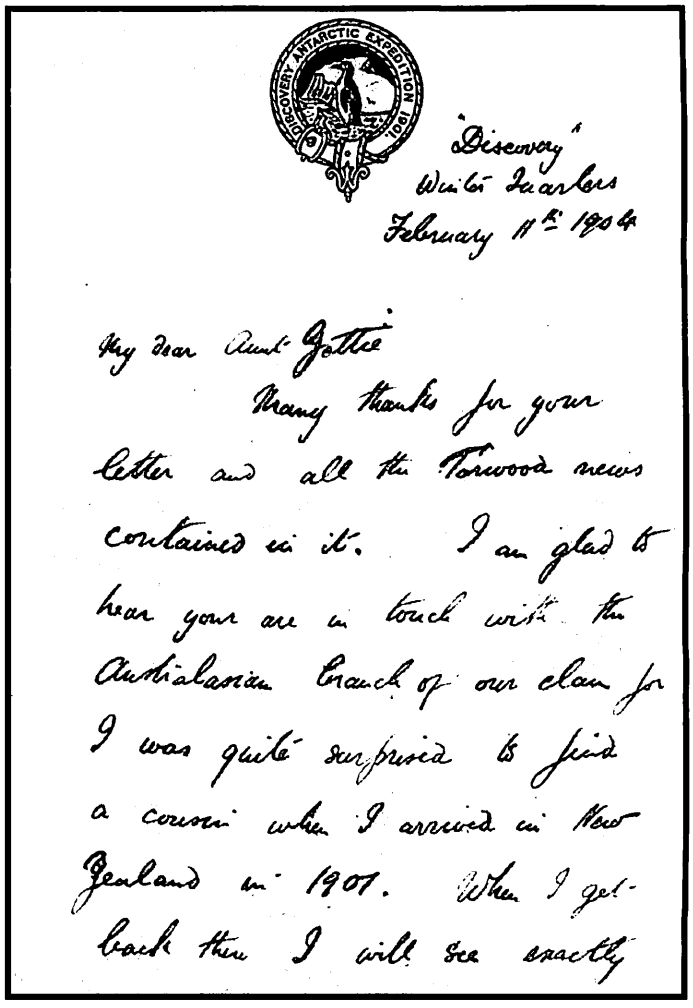
You will see by the telegram in the papers that all is well, and you will also see whether the "Discovery" gets out or not. At present the open water is five or six miles away and in much the same condition as when the Morning left us in 1903.

We got through a good deal of sledging in the first part of the summer and the last part of the summer was occupied in sawing and blasting the ice with gun-cotton.

I have made a very important find in the shape of the plant remains mentioned in the telegram.

Glad to hear you have been gadding about among the soldiers over at Torwood. My mother is doing her best with 'Old [word not known]' out in Johannesburg.

With love,
I remain
Your affectionate nephew
Hartley. T. Ferrar



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Top and Right: Pages of the letter.

Murray Roland Ellis

1924 - 2005

By John Claydon Wg.Cdr.

Murray Ellis, B.E (Mech), Polar Medal (1958), New York Explorers Club medal (1959), died in Dunedin after a short illness on 2 February 2005.

Sir Edmund and Lady Hillary farewelled their old friend at the Dunedin funeral where more than 400 attended to pay their respects. Sir Edmund in a later interview said he felt "great sadness" as he paid tribute to his friend's integrity and to the important work done by him during several expeditions, and to his leading contribution to the Himalayan Trust, a charitable body founded by Sir Edmund. He said Murray was very strong and brave and determined to succeed in any job he was doing, both in the Antarctic and in the Himalayas.

Born in Dunedin, Murray was educated at Waitaki Boy's High School and Canterbury University College, 1948-50. A keen footballer, he played rugby for the University and for Otago in 1951. During World War 2, he joined the Navy and served in the Fleet Air Arm (Sub.Lt.(A)), flying Corsair fighters from aircraft carriers.

Murray married Shirley in 1952 and they had two children, Janet and David. A love of the outdoors encouraged him to become a keen mountaineer, climbing with his father Roland who became President of the NZ Alpine Club and who was influential in pressing for two New Zealanders to be included in Shipton's 1951 Everest expedition. Hillary was later chosen as a member of Hunt's successful 1953 expedition.

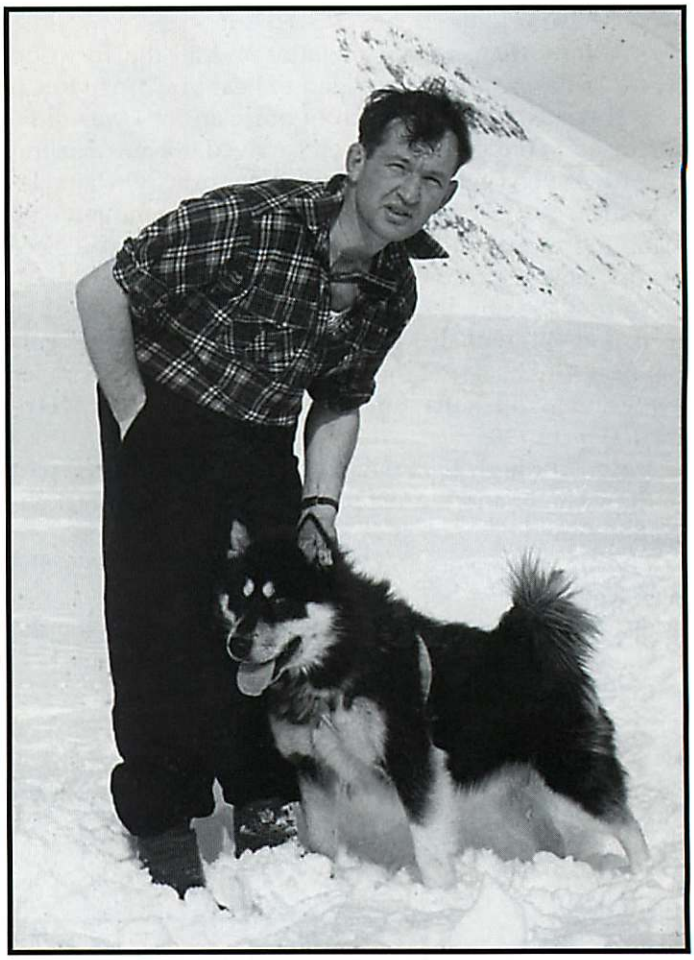
Murray was prominent in Dunedin and Otago business circles as Manager and later Managing Director of the family firm Arthur Ellis & Co. who produced the famous "Fairydown" sleeping bags and Polar clothing, as used by Hillary on Everest and in the Antarctic.

Murray was selected as Engineer for Hillary's Ross Sea party of the Commonwealth Trans-Antarctic Expedition 1956-58. During the winter of 1956, expedition members spent several months at a training camp on the Tasman Glacier with all learning to handle the teams of Husky dogs which had been brought down from Greenland.

When the expedition ship *HMNZS Endeavour* arrived at McMurdo Sound on 4 January 1957, Murray with three others and two dog teams headed off to explore the Ferrar Glacier to prove a suitable route up to the Polar Plateau. Access up the glacier became impossible for the dog teams, as would have been the planned descent of the British crossing party's Snocats at the end of the expedition.

This was one of the reasons why Hillary made the dramatic decision to abandon the proposed Butter Point site below the Ferrar and build Scott Base on Ross Island.

Hillary had different views regarding travel in the Antarctic. Perhaps it was his experience the previous year in the Weddell Sea with the British party where he spent a great deal of time on the Ferguson tractors, taking sledge loads of supplies from the *Theron* to the supply depots for Shackleton Base and this may have given him a preference for tractors rather than dogs.



Murray Ellis with Greenland husky at TAE winter training camp, Tasman Glacier, 1956.

He persuaded Murray and base engineer Jim Bates to prepare tractors to assist in depot laying on the Polar Plateau.

Using the Kiwi "No 8 wire" prescription they modified three tractors for more arduous work. Improvised canvas covered cabs fitted with crash bars and perspex screens provided some degree of comfort from the elements and considerable modifications were carried out on the metal ribbed tracks.

A canvas covered plywood "caboose" on skids was constructed for the sophisticated radio gear and two bunks. Test runs were made to Cape Crozier and to the Western side of McMurdo Sound.

The tractor journey across the Ross Ice Shelf, up the Skelton Glacier and along the Polar Plateau was plagued by hidden crevasses.

Hillary's original plan after reaching the last depot, D700, was to await the arrival of the crossing party and to return

to Scott Base with them but as the British were one month behind schedule he decided to press on to the South Pole. Additional aviation fuel was flown down from NZ by USAF Globemaster to enable the expedition Beaver to fly in sufficient tractor fuel and supplies to D700 for the Pole journey.

Murray had planned to join Miller and Marsh with the dog teams after reaching D700, exploring and surveying the unexplored territory between Mt Markham and the Beardmore, however, after reaching D700, he and Jim conceded to Hillary's request and continued on to the Pole.

In the event, the "Heath Robinson" tractor outfit proved it's worth. One of the tractors is now on display in the Antarctic Hall of the Canterbury Museum, as are bronze busts of Murray, Hillary and Sir Vivian Fuchs, overall leader of TAE.

Murray's love of Nepal and the Himalayan mountains began when he was invited by Sir Edmund to lead a construction team to the Solu Khumbu region of Nepal in 1963.

There he built Thame and Pangboche schools and a water pipeline for Khumjung. With the formation of the Himalayan Trust, Murray became a foundation member of its Executive Council and he made a huge contribution over the years within the Trust.

He returned to Nepal many times and in due course, all his family came to share his love of Nepal. The Sherpas respected Murray's strength, his old fashioned values and high standards. Sherpas are very good judges of character and they quickly detect inconsistency and patronisation. Murray scored top marks with them...as he did with everyone.

Murray held many posts in community organizations: past member, Manufacturing Development Council; President, Otago-Southland Manufacturers' Assn; Executive, Otago Employers' Assn; Area Co-ordinator for Otago Duke of Endinburgh Award Scheme; Vice President of the Alpine Club; director of Dunedin Rotary Club; Life Member of the NZ Antarctic Society and member of the Otago Brevet Club, Fleet Air Arm Assn., and Waitaki Old Boy's Assn.

He will long be remembered by the Antarctic Society.

Frank Kazukaitis

By Mike Crean of The Press

The walls of Frank Kazukaitis's home were hung with black-and-white photographic prints.

The large, framed images came from diverse places and times but had two things in common. Each photo was taken by Kazukaitis, and each was a masterpiece of the art.

The finger that clicked the shutter button was stilled when American-born Kazukaitis died in Christchurch, which he had adopted as his home. He was 77.

Asked which was his favourite picture, Kaz would barely hesitate before nominating several.

In one, the door of a hut at Cape Evans, in Antarctica, is squeezed open for the first time since Scott's 1911 expedition, revealing stalactites hanging from the shelves and drawers that had been undisturbed for 50 years.

Success in capturing images from Alaska to Antarctica was as far from his beginnings as the son of poor Lithunian immigrants and from his retirement, confined to a wheelchair in Ilam, Christchurch his big chance but, in the midst of it, his camera flash failed.

He worked in several Asian countries after the Korean

Continued to Page 20

King George airstrip lifts parking spaces

Chile has considerably increased the operational airstrip capacity of its main base in Antarctica by adding parking spaces for three Hercules C-130 aircraft.

The improvements which cost US$2m were done at the Teniente Marsh landing strip, beside Chile's main facility at President Eduardo Frei Base on King George Island.

The project was co-funded by the Chilean Ministry of Public Works Airports Administration and the Magallanes Region Business Promotion and Development Agency.

Work began late in November 2004 and was finished at the end of February 2005. The additions are now waiting official inauguration.

"All the necessary inspection and certification has been carried out so this means that up to three Hercules C-130 can be parked while another aircraft lands or takes off", said Patricio Riquelme of Chile's Magallanes Region Airports.

"Before, when an aircraft was operating, for security and safety reasons no other aircraft could be on the ground. The new facilities are a great step forward."

Frank Kazukaitis
Continued from Page 19

War, before an urge for new challenges in a different environment led him to volunteer for Operation Deep Freeze, Antarctica, in 1958. His first visit to the Ice included a 17-month stay, including wintering-over, at McMurdo.

He returned for three more summer seasons. Kaz returned to the US in the mid-1960s and was seconded to the White House in Washington DC as official photographer. His duties included work for Ladybird Johnson, wife of President Lyndon Johnson.

He married Maxine, an Australian, and wanted to retire in Christchurch. Operation Deep Freeze had introduced him to Christchurch, site of the US Navy's New Zealand base.

"The minute I saw the place, I thought this is for me," he said. He was struck by the hospitality of Christchurch people towards American servicemen. "The people were absolutely the greatest. They always took us in."

He moved to Christchurch with his wife in 1968.

They raised three children, while Kaz worked as a new cameraman for TVNZ.

A severe stroke in 1999 consigned Kaz to a wheelchair.

The inveterate traveller and photographer took it hard. He had been fiercely independent, to the point of cantankerousness.

He was blunt. He would swear wonderfully on the job and never suffered fools gladly.

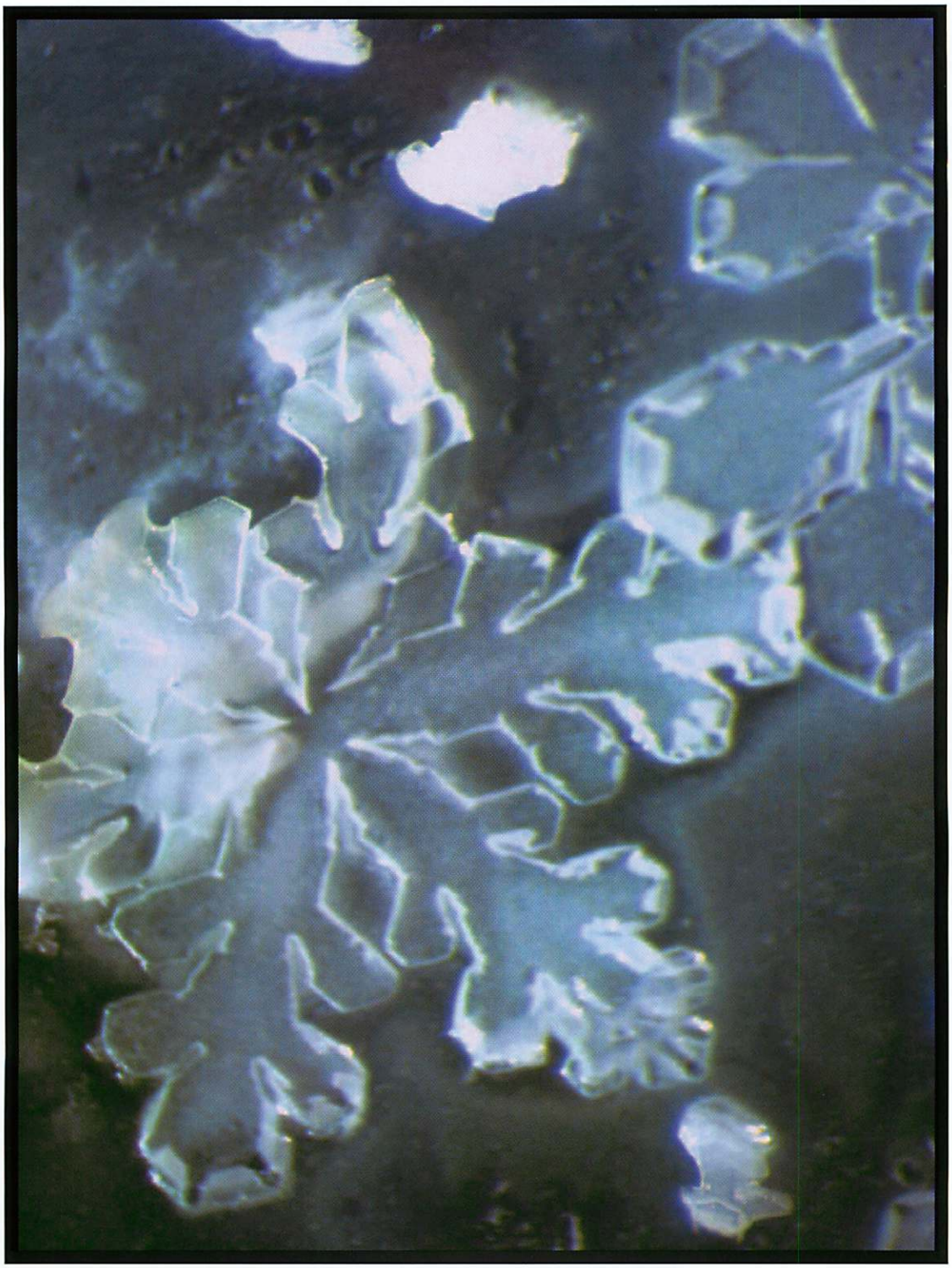
But even in his dark days, he kept a dry sense of humour. He insisted the stroke was caused by giving up smoking and drinking a couple of years previously.

For more than five decades, he documented his experiences of people, places, and events, many of which shaped the course of the last century.

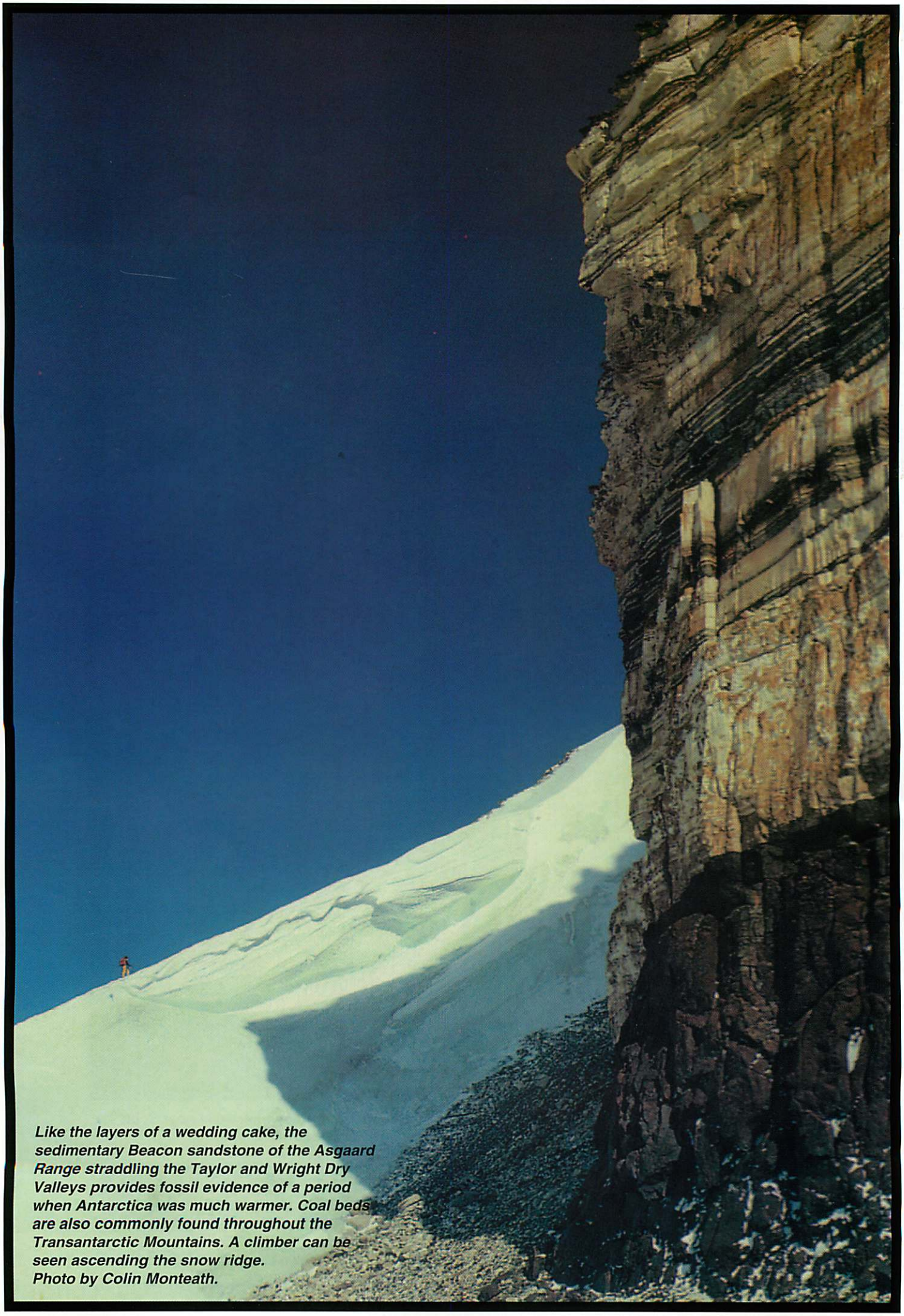
He was privy to some significant, spectacular, and intimate moments.

The results featured in newspapers and magazines around the world and were exhibited in the US and New Zealand.

Frank (Kaz) Kazukaitis, born St Louis, Missouri, 1927. Died in Christchurch, February 15, 2005. Survived by wife Maxine, daughters Christine and Tayna, son Craig and seven grandchildren.



Microscopic photograph of a preserved snow crystal, captured in December 2004 near Scott Base. The crystal was captured, preserved and photographed by Narelle Baker.



Like the layers of a wedding cake, the sedimentary Beacon sandstone of the Asgaard Range straddling the Taylor and Wright Dry Valleys provides fossil evidence of a period when Antarctica was much warmer. Coal beds are also commonly found throughout the Transantarctic Mountains. A climber can be seen ascending the snow ridge. Photo by Colin Monteath.