

# IceSked

Issue 10: June 2008

Newsletter of the Antarctic Research Centre  
Victoria University of Wellington

In March/April we celebrated the achievements of Prof Peter Barrett, as he stepped down as Director of the Antarctic Research Centre. We also report on the events of the past season in Antarctica, highlighting the achievements of the ANDRILL Southern McMurdo Sound project and other projects on the ice.

## A Celebration of the Achievements of Professor Peter Barrett

On the 26th March there was an official opening and unveiling of ARC meeting room – named the Beacon Room in honour of Prof Peter Barrett, the first Director of the Antarctic Research Centre from 1971-2007 in recognition of his work and discovery of the first tetrapod remains in the Beacon Supergroup, a succession of Devonian to Triassic (420-200 million years old) sedimentary strata that stretches the length of the Transantarctic Mountains. The following week, on the 2nd April, there was a celebration to formally mark the stepping-down of Peter as the ARC Director and to highlight his achievements during this time. The Vice-Chancellor, Prof Pat Walsh, opened the ceremony, and speeches were given by Prof Tim Naish, who has taken over the role of ARC Director and Alex Pyne, who told some interesting stories on Peter's earlier adventures in Antarctica such as...

"This occasion would also not be complete without relating at least one Peter Barrett story. In December 1997 Peter was a member of a VUWAE group heading to Allan Hills, a remote area over 150 km away from Scott Base at the edge of helicopter range. Peter was responsible for bringing the First Aid Box, a plywood box about a foot cubed that was awkward to carry. Peter was obviously in a hurry carrying the box to the helicopter, was wearing mukluks which are like blankets tied to your feet, and the laces may have been undone. He slipped over on the icy ramp, landing on the hard edge of the box, but quickly picked himself up before anyone noticed, and got onto the helicopter to fly to Allan Hills. When Peter, Cliff Atkins and Vanessa Thorn reached Allan Hills, Cliff noted that Peter was struggling to help unload the helicopter, so Peter fessed-up that he had fallen over and was 'slightly' sore. Cliff and Peter shared a polar tent and for the next 3 days, in which Cliff learnt new life skills as a manservant, dressing

Peter in the morning and removing his boots in the evening. Eventually the team with Peter's reluctant agreement requested a medivac helicopter flight which picked up Peter and took him to the McMurdo Station Hospital where x-rays revealed cracked ribs and major bruising. Peter was told to

take it easy and not exert himself, prescribed Voltarin and sent to Scott Base for rest, recreation and recovery.

Apparently the next day he was spotted on the Scott Base Ski Field and managed six down hill runs of superhuman endurance. We suspect the drugs!"

*Extract from Alex Pyne's speech*



*Official opening of the Beacon Room, 26th March 2008*

## A Word from the New Director

Although it seems like just yesterday since Peter and I switched offices, it is now going on six months that I've had my hand on the ARC tiller. For me it is great privilege to be given charge of Peter's legacy and to lead the ARC forward. Peter's leadership and the special qualities he brought to the job can never be emulated, and the ARC team have done well adjusting to the style of the new Director. Peter will remain as an active researcher in the ARC. He continues to manage the Centre's endowments and relationship with the Victoria University Foundation, while also spending a third of his time working in the newly developed Climate Change Research Institute led by Prof Martin Manning.

The last six months have seen a number of exciting events, many are reported on in this IceSked. I just want to make brief mention of a few other highlights. Dr Brian Anderson has been appointed as a permanent Research Fellow in glacier modelling and Michelle Dow, the Centre Administrator, has also started in a new permanent position four days a week - welcome to both. The ANDRILL McMurdo Ice Shelf science results are beginning to be published and are shedding new light on the past variability of the West Antarctic Ice Sheet.

Finally, I'd like to finish by saying, "Thank you Peter for your considerable contribution, you leave the ARC in good shape and I am honoured to lead the Centre forward with your continued support".

*Tim Naish*



*Peter's Celebration Function, 2nd April 2008*

## ANDRILL Continues Remarkable Drilling Success

The ANtarctic geological DRILLing Program (ANDRILL) successfully completed the drilling phase of its second project in early December 2007. This new drillcore in the western Ross Sea complements and expands the results from ANDRILL's first successful drilling season (see IceSked Issue 8) back in time to about 20 million years ago. Co-chief scientists David Harwood (USA) and Fabio Florindo (Italy) and the more than 60-strong science team of the Southern McMurdo Sound (SMS) Project are excited about the initial results that were recently presented during the post-drilling workshop at the Antarctic Core Facility, Florida State University, Tallahassee, in May. The 1138.54 m-long core of glaci-marine sediments was recovered from a floating sea-ice platform over 380 m of water in central southern McMurdo Sound. The sediments provide a remarkably well-dated history of oscillations in the size of the East Antarctic Ice Sheet (EAIS). The cores preserve a particularly detailed record from an interval of global warmth 17 to 14 million years ago when the coastal glaciers retreated back into the Transantarctic Mountains, and the interior EAIS may have been substantially smaller, through to a major cooling step between 14 and 13 million years ago when the EAIS cooled and expanded to roughly its present configuration.

As for the predecessor McMurdo Ice Shelf Project, a science team of about 35 from New Zealand, USA, Germany and Italy participated on-ice, where they worked in the Crary Laboratory, McMurdo Station, doing the initial characterisation



*VUW ANDRILL staff send a message home*

and description of the cores. ARC on-ice researchers included Cliff Atkins, Gavin Dunbar and Mike Hannah. The warm Miocene interval of the core is yielding a bonanza of undescribed marine algae microfossils for Mike and his team to work on, that together with a pollen record of beech forest vegetation suggests a substantially warmer climate perhaps akin to southern Chile today. Gavin will continue his work with Joel Baker's mass spectrometry facility at VUW, to reconstruct past sea-surface temperatures using geochemical techniques. Cliff is working on the contribution of wind blown dust to the sediments recovered in the drill core (see related article in this issue).

The drilling and engineering team coordinated through Antarctica New Zealand and supported by ARC's Scientific Drilling Office was yet again able to go beyond target drilling depth and deliver excellent quality core with 98% recovery. ARC's Alex Pyne assisted by Tamsin Falconer oversaw the drilling operation on-ice and are justifiably proud of ANDRILL's operational and technological achievements during the programmes first two drilling projects that include the two deepest drillholes on the Antarctic continent. *Tim Naish*

## ANDRILL Celebratory Function

Antarctica New Zealand and Victoria University of Wellington hosted a function at Rutherford House on the 27 May to celebrate the scientific and technical achievements of both the ANDRILL McMurdo Ice Shelf (MIS) and Southern McMurdo Sound (SMS) drilling projects. Guest speakers included Hon Pete Hodgson, Minister of Research, Science and Technology; Murray Bain, Chief Executive, Foundation for Research, Science and Technology; and Dr Alex Malahoff, Chief Executive, GNS Science. Presentations were also given to Jim Cowie, Project Manager and Alex Pyne, Drilling Science Manager for their outstanding contributions to the ANDRILL project.

## The Answer is Blowing in the Wind: Investigating Aeolian Sediment on Sea Ice in McMurdo Sound, Antarctica

During the ANDRILL SMS drilling project in late 2007 we noticed a surprising amount of aeolian sediment ("dust") blowing around on the sea ice and decided to try and quantify the amount. The reason for our interest is twofold. First, the dust that accumulates on the sea ice for most of the year is dumped into the ocean when the ice breaks up in spring. Knowing the mass and particle size distribution of this material helps us understand sedimentation patterns on the seafloor and in the SMS drill core. Second, and perhaps more intriguing, is the possibility that this dust is the source of the nutrient iron which stimulates vast algal blooms in the Ross Sea following sea ice break-up.

Our pilot study consisted of three 2 km<sup>2</sup> grids spaced 5 km apart in a north-south (wind parallel) transect reaching from the edge of the McMurdo Ice Shelf "dirty ice", north past the drillsite and out toward the ice edge. Within each grid we collected a 50 x 50 cm sample every 500 m by digging out snow down to the ice surface. We melted the snow, siphoned off the water and dried and weighed the remaining dust.

Initial results show the average weight of sediment extracted from the snow samples declines quickly from 6.13 g per sample near the McMurdo "dirty-ice" to 1.94 g per sample in the northern grid closer to the ice edge. When these weights are extrapolated, they indicate that there is between 7.7 and 24.0 tons of dust per km<sup>2</sup> in this area. We hope to measure grain size and some magnetic properties, which may help us determine the iron content, in the near future.

*Cliff Atkins and Gavin Dunbar*

*Cliff Atkins, Dave Witkowski and Gavin Dunbar with their trusty steeds while out sampling on the sea-ice*



## Six Weeks on the Ice

This Antarctic season I joined Dr Nancy Bertler, Davie Robinson and Matt Watson as the fourth member of the Ko49 team. Our objective was to carry out reconnaissance at two prospective NZ International Trans Antarctic Scientific Expedition (ITASE) ice core drilling sites: Skinner Saddle to the South of the magnificent Byrd Glacier, and Gawn Ice Piedmont to the North. Ground penetrating radar surveys were carried out along several transects to map the internal structure of the ice and the topography of the bedrock beneath. We endured -30°C temperatures, crevasse-ridden terrain, week-long katabatic storms, frozen Speights and BBC World radio for six of the most exciting and challenging weeks of my life. The locations of suitable ice accumulation domes were successfully identified and a 15 m deep ice core drilled at each site. These will be

analysed for stable isotopes and major ion chemistry to reveal a snapshot of the retrievable climate record.

My PhD research focuses on the Mt Erebus Saddle ice core, also part of NZ ITASE. Fifty metres of ice has been processed using the Continuous Melter system at the NZ Ice Core Research Laboratory, GNS Science. Work has begun in earnest to analyse the samples generated for stable isotopes at GNS Science and trace elements at VUW.

*Rachael Rhodes*



*Rachael Rhodes records details of the ice cores as they are extracted*

## Glacier Accumulation in the Southern Alps

The objective of my PhD research is to better understand spatial and temporal controls on glacier accumulation in the Southern Alps of New Zealand, with a particular focus on the Tasman Glacier. At present we do not adequately understand how synoptic-scale climate variability influences snow accumulation in the Southern Alps, or how this snowfall is distributed in space and time. I have already conducted extensive field work, and have to date two seasons' net accumulation data derived from crevasse stratigraphy, a year of mass balance measurements along the glacier trunk and climate data from a weather station situated on the glacier surface. Working in collaboration with GNS Science and the University of Maine, USA, annual accumulation layers and age dating from the Tasman ice core will be used to extend my accumulation record back in time, and enhance investigations into the influence of atmospheric circulation patterns, on glacier accumulation. By including ice core data, such relationships might be considered on decadal timescales, greatly enhancing modelling and the ability to predict glacier behaviour with future climate change.

This winter I am planning an intensive winter snow monitoring survey to be conducted simultaneously in the névés of both Tasman and Franz Josef Glaciers during July/August. Yes, I am going to live in a high mountain hut for a month in the middle of winter on purpose! The data will assist in determining the present day signal of synoptic storm types in accumulated snow and will be compared to data derived from the Tasman ice core to see if longer term variations in climate can be determined. I am working on this project with my supervisors, Dr Andrew Mackintosh (SGEES) and Dr Brian Anderson (ARC), as well as Assoc Prof Wendy Lawson (University of Canterbury).

*Heather Purdie*



*Vernon Reid (left) and Heather Purdie (right) measuring net annual accumulation in the Tasman Glacier névé, March 2008*

## Recent Visitors

Dr Alun Hubbard from the University of Wales, Aberystwyth visited Andrew Mackintosh between January and March 2008 as part of Andrew's Marsden project. Alun and Andrew worked on a high-resolution three dimensional ice reconstruction for the Southern Alps for the Last Glacial Maximum. They discovered that a large cooling of more than 7°C is required to cause these ice advances around 20,000 years ago.



*Alun Hubbard*

Dr Reed Scherer, an ANDRILL colleague and diatom palaeontologist, has been with us over the last 4 months on a Fullbright Fellowship working with Gavin Dunbar and others on an intriguing interval of Southern Hemisphere warm climate about 1 million years ago. Sediments of this age have been recovered now by both the Cape Roberts and ANDRILL McMurdo Ice Shelf projects and indicate open water in the Ross Embayment at this time when temperatures were a few

degrees warmer than present. This research is changing the way we think about Antarctica's response to orbital climate cycles.

*Reed Scherer*



# OTHER ACTIVITIES

## S.T. Lee Lecture in Antarctic Studies

This year's S.T. Lee Lecture "Through a Crevasse Darkly: An Update on the Future of the Antarctic Ice Sheet", presented by Richard Alley, Evan Pugh Professor of Geosciences, The Pennsylvania State University, was brought to us via live video-link. Richard has been particularly successful in advancing understanding of the behaviour of ice sheets, glaciers and ice shelves and is very candid about the many unknowns concerning global warming and its effects, earning him respect from those on both sides of the issue. His dynamic presentation highlighted many new discoveries that show that elements of Antarctic ice cover are surprisingly sensitive to warming and could accelerate sea-level rise. Yet, translating these new results into accurate projections for use by policy makers remains a major challenge.



Prof Richard Alley  
(Photo courtesy of the BBC)

Richard's presentation was followed by questions from a panel consisting of Dr Nancy Bertler, Antarctic Research Centre; Prof Jonathan Boston, Institute of Policy Studies; Dr Andrew Mackintosh, School of Geography, Environment and Earth Sciences; and Prof Martin Manning, Climate Change Research Institute. Prof Peter Barrett, Antarctic Research Centre and Climate Change Research Institute chaired the

session. The talk can be downloaded from our website at [www.victoria.ac.nz/antarctic/about/lee-lecture/lecture2008.aspx](http://www.victoria.ac.nz/antarctic/about/lee-lecture/lecture2008.aspx).

## A Job Well Done!

In January, MSc student Dhiresh Hansaraj, completed his thesis titled "Late Cenozoic Stratigraphy of the Southern Terror Rift, Antarctica: Implications for Tectonic and Climatic Evolution." Dhiresh is now working in the gold mining industry in Western Australia, we wish him all the best.

At the end of May, Rob McKay submitted his PhD thesis titled "Late Cenozoic (13-0 Myr) glacial marine sedimentology, facies analysis, and sequence stratigraphy from the Western Ross Embayment, Antarctica: Implications for the variability of the West Antarctic Ice Sheet", he remains at the ARC on a four month Research Assistant contract continuing research on ANDRILL.



March Madness

## ARC Weekend Retreat

From the 27-28th March, the staff and students of the Antarctic Research Centre headed off for a 'retreat' at Paraparaumu Beach, on the Kapiti Coast. Apart from the strategic meeting discussing the future directions of the Centre, the retreat involved optional activities including kayaking, sailing, and fishing.

## Looking Back: Photo from the Archives



John McPherson (left) and Barry Kohn (right) "Chess Challenge" (Photo: Barrie Kohn, VUWAE-15, 1970-1971)

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