

IceSked

Issue 32: June 2019

Newsletter of the Antarctic Research Centre
Victoria University of Wellington

A new ARC director

Associate Professor Rob McKay was recently appointed as the new Director of the Antarctic Research Centre (ARC). Rob is a former student and long-standing member of the ARC. He completed a PhD in 2008 under the guidance of Tim Naish and Peter Barrett, and was offered a permanent Lecturer position in 2012. Rob is course co-ordinator for two courses in the School of Geography, Environment, and Earth Sciences as well as contributing to other courses and supervising postgraduate students. In addition to an extremely successful research career, he has held numerous leadership roles including being chief scientist on the International Ocean Discovery Program (IODP) Expedition 374 to the Ross Sea and acting as Chair of the Australian and New Zealand International Ocean Discovery Program Consortium (ANZIC) Science Committee for several years. Rob brings with him considerable expertise in developing successful engagement relationships to support science and the work of the ARC.



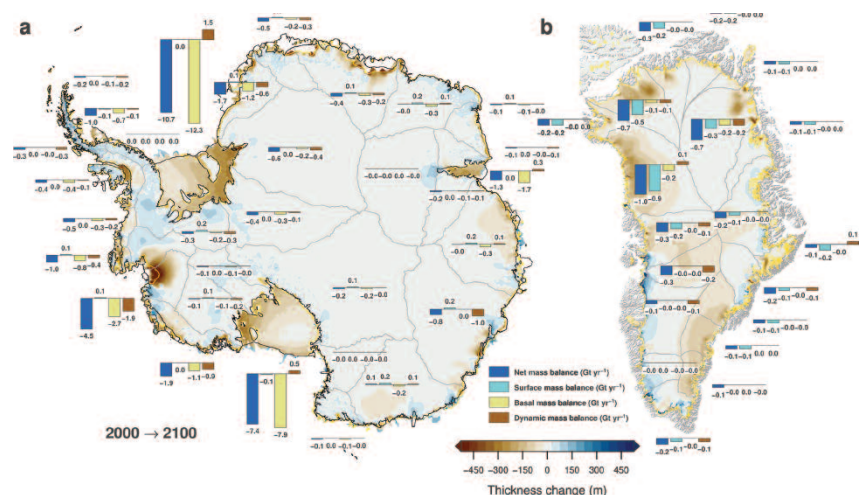
"A Science Story" – Melting ice melts more ice

In February of this year, Nick Golledge and his collaborators published two new papers in the journal *Nature* (February 2019, vol 566). The first of these, led by Nick and bringing together a team of climate and ice sheet modellers from New Zealand, the UK, Canada, the USA and Germany, presented results from simulations of the Greenland and Antarctic ice sheets under low and high greenhouse gas emissions scenarios forecast for the 21st century. The culmination of three year's work, the model experiments used observational data to constrain all parts of the mass budget of the two ice sheets. That is, the models correctly simulated the balance between accumulation, calving of icebergs, and melting of floating ice. By also running climate model experiments in which ice sheet melt influenced oceanic conditions, Nick and his team explored a positive feedback effect that previous work had suggested could lead to accelerated ice sheet retreat. Nick's results showed that this feedback could almost double the amount of ice loss, substantially alter ocean

circulation, and disrupt global climate. But the results also predicted less sea level rise by 2100 than some previous studies.

In the second paper, Tamsin Edwards (King's College London) and Nick used a statistical approach to reassess one such study, showing that the mechanisms previously invoked were not actually necessary for explaining past, or present, ice loss. Without those mechanisms the predicted sea level contribution from

Antarctica reduces considerably. Despite this 'good news', the models also predicted that even under a mitigated emissions scenario and immediate stabilization of global climate, parts of West Antarctica will still most likely collapse. Since this process of self-sustaining retreat has already been initiated, our best hope to limit the scale and speed of this retreat is to implement rapid and widespread emissions reductions, across the world.



Patterns of changes in ice-sheet thickness by 2100 compared to 2000 in Antarctica and Greenland

We remember Barrie McKelvey 1937-2019

(VUWAE 1 1957/58; VUWAE 2 1958/59; VUWAE 13, 1968/69; VUWAE 22, 1977/78; VUWAE 24, 1979/80; VUWAE 26, 1981/82)



Barrie left us after a short illness, on 7 March, at Armidale, NSW, Australia, and is remembered with great affection by all of us who knew him, in part because he and

his fellow student Peter Webb laid the foundation for the Victoria University Antarctic Expeditions (VUWAE), which have continued annually to this day.

Barrie was a third-year geology student here at VUW when he and fellow student Peter Webb, decided to present themselves at the New Zealand Trans-Antarctic Expedition offices in Wellington as potential polar explorers for the International Geophysical Year (IGY 1956-58). The offer was initially turned down, but then accepted, albeit reluctantly, after it became known that the pair had approached the US Embassy to go south as part of the US Antarctic Program.

Barrie and Peter's arrival at Scott Base was grudgingly accepted, in the words of the IGY NZ Science Leader, Dr Trevor Hatherton, "uninvited, unheralded, and unwanted". However, their first presence, which included the first geological foray into the McMurdo Valleys, and astute observations and publications that followed, led to Hatherton concluding with the words "to the pioneers Webb and McKelvey, to the succeeding teams and to the general, Professor Clark, I offer my congratulations on a remarkably long-sustained endeavour in exploration and research".

Barrie completed his MSc thesis on his work with Peter in the McMurdo Dry

Valleys in 1960, and immediately took up a junior position on the lecturing staff at the University of New England, Armidale, New South Wales. Aside from teaching, his geological focus was the Devonian and Carboniferous sedimentary strata in northern New South Wales, completing his PhD thesis in 1967. After this his interests in working with others to interpret Gondwana sedimentary strata took him back four times to Antarctica with VUWAE between 1968 and 1982. However, his interests then led to pioneering studies of the Neogene glacial history of the Prince Charles Mountains through the Australian Antarctic Programme between 1982 and 1998, interleaved with several Ohio State University expeditions with Peter to the glacial sediments of similar age in the central Transantarctic Mountains.

Barrie's diversity of geological interests and his enthusiasm for team work also took him offshore to participate in two ocean drilling legs (DSDP 26 to the Indian Ocean and ODP 145 in the North Pacific) and two oceanographic cruises with CCOP/SOPAC in 1984 and 1986 studying the seafloor around Samoa, Fiji, Vanuatu and Tonga. It's no surprise that for two decades after retiring in 1996 he returned annually to the Antarctic margin as a very popular tour guide on Antarctic cruises, with a memorable circum-navigation of the continent.

Barrie's breadth of knowledge and experience, and unfailing good humour in all situations, will be missed by us all.

Peter Barrett & Peter Webb

[Click here for Peter Webb's eulogy for Barrie.](#)

Farewell to Andrew Mackintosh

We farewelled ARC Director, Andrew Mackintosh, on 4 April, who left Victoria University after 17 years in the the ARC and the School of Geography, Environment and Earth Sciences (SGEES), to take up a position as Head of the School of Earth, Atmosphere and Environment at Monash University, Melbourne.

When Andrew was employed as a lecturer in SGEES in 2002, he came with an excellent pedigree in glacial geomorphology, mentored by David Sugden; and in glaciology, mentored by Hans Oerlemans. These two strands of research intertwined throughout Andrew's time at SGEES and the ARC.

Highlights of Andrew's time here include the start of the Brewster Glacier mass balance programme in 2004; publication of one of the first examples of using glacier models and geomorphology in examining the climatic significance of the Waiho Loop glacial moraine (*Geology*, 2006); and a long association with George Denton, Aaron Putnam and others mapping and modelling the glacial geomorphology of the central Southern Alps - now one of the best dated regions in the world. In the Antarctic space, Andrew pioneered the use of 'mountain dipsticks' - using boulders left at the margins of ice sheets to date their thinning - and thence gain insights into the origin of meltwater pulses, and the stability of marine ice sheets. However, for Andrew, the most rewarding aspects of his time here were working with students on their projects in the Southern Alps and Antarctica, and close collaborations over many years with Brian Anderson, Kevin Norton, and others at Victoria University.



Kevin Norton, Andrew Mackintosh and Brian Anderson at Andrew's farewell function

This is Your Life – Alex Pyne: The VUW Years

On the 13 June, the ARC celebrated the career of Science Drilling Office Director, and ARC Projects Manager, Alex Pyne at his retirement function based on the TV series *This is Your Life*.

Alex began as a geological assistant in 1977, but quickly took a broader interest in all aspects of Antarctic field operations, including sea ice traverses, site surveys and offshore drilling, and in recent years, deep ice coring on land. In 1983, he obtained a permanent position with the Antarctic Research Centre.

Alex's first trip to Antarctica was as a third year BSc student with VUWAE 22 in 1977/78 to assist Barrie McKelvey. Among other things, Barrie and Alex measured and sampled the overlying coal measures near the head of Taylor glacier for Alex's Honours project. As Antarctic research interests broadened at VUW to study glacial history through offshore drilling, the expeditions required a part-time Expedition Manager with practical and organisational skills, but not too expensive, Alex was the obvious choice.



Testing equipment

During the NZ-led McMurdo Sound Sediment & Tectonic Studies (MSSTS-1) drill hole in 1979/80, Alex was completing his MSc field work that season but showed a keen interest in the discussions and planning, so as Expedition Manager and Core Logger he oversaw the whole operation. Sadly, drilling ended with the drill string jammed at 230 m below the sea floor. Fortunately though, Alex figured out why and encouraged us to try again.

CIROS-1 was the big one - to be drilled 15 km offshore in 200 m of water. By this time, Alex had acquired several years of sea ice growth data, along with tidal and current data for drill system design.



Drilling terminated on 14 November 1986, at a depth of 702 m below the sea floor with a remarkable 98% core recovery.

Following this success, The Cape Roberts Project (1997-1999) was designed to core thicker, more complete and older sequences than CIROS-1. It also attracted wider international interest, with Italy partnering with NZ and the US to form the big three, and with German, UK and Australian scientists also involved. A lot of operational decision-making came down to Alex with his 20 years of experience. The result was the successful coring of 1500 m of strata from 34 to 17 million years ago, paving the way for the ANDRILL project a decade later to capture the younger story.



Andrill McMurdo Ice Shelf Project

The scientific discoveries based on the ANDRILL McMurdo Ice Shelf Project have been truly significant. This is in no small part due to the commitment and ingenuity of Alex's work - in understanding the scientific priorities (and uncertainties), and in leading the drilling to produce 1285 m of high-quality

continuous core. The record-breaking drilling revolutionised our understanding of the vulnerability of the West Antarctic Ice Sheet during past warmer-than-present climates.

In between sediment coring, Alex also began working on developing ice coring capabilities. After several successful smaller projects, the next goal needed a big investment - a New Zealand built intermediate depth ice core drill. The drill - Te Wāmua Hukapapa (Ice Cores that Discover the Past) was developed on the much-proven Danish Hans Tausen drill, but Alex and engineer, Darcy Mandeno, added a good portion of ingenious in-house design. In 2011/12 and 2012/13, after spending almost 8 months in the field, they drilled the 784 m deep RICE ice core, the backbone of a 9-nation collaboration.

Since that first trip to Antarctica 42 years ago, Alex has spent 36 seasons on the Ice. He has played a unique role in organising field operations and adapting drilling technology for high quality sampling of earth and ice history in the Antarctic and beyond. We wish him well on his retirement.



Tim Naish presents Alex Pyne with his "This is your life" book

NZ & Antarctic glaciologist Arnold Heine donates to the ARC

The Arnold Heine Antarctic Research Award was established in 2018 with a generous donation from Arnold Heine to support future generations of Antarctic researchers. The fund will be held as an endowment by the Victoria University of Wellington Foundation.

Arnold Heine began his career as an Antarctic with the Department of Scientific and Industrial Research (DSIR) during the first IGY year. Originally selected to spend the 1958 winter at Scott Base, he headed south in December 1956 to familiarise himself with all “things” Antarctic before returning to spend 1957 in New Zealand planning the logistics, however, he ended up on the 1957/58 New Zealand Geological Survey (NZGS) Tucker Glacier Expedition. He returned the following summer as a member of the NZGS Wood Bay Expedition, and while at Scott Base had the opportunity to work with the resident US glaciologist, Al Stuart. Learning the skills of interpreting the



Arnold Heine on the North Victoria Land traverse in 1959 - Photo: Arnold Heine

annual layering of snow pit stratigraphy proved useful in collecting nuclear fallout samples for Athol Rafter, Director of DSIR Nuclear Sciences. It also saw the beginning of the McMurdo Ice Shelf Project. After spending the 1959 winter at Scott Base, he joined an international team for a traverse of North Victoria Land as assistant glaciologist. He transferred to the new Antarctic Division of the DSIR in 1962 as the Field Officer.

For his work in the Antarctic he was awarded the Polar Medal in 1969. Later, he was part of the team to measure the effect of heavy loading on sea ice. After retiring in 1970, he continued working until 2016 as Secretary of the Trans Antarctic Association NZ that allocates funds to aspiring Antarctic researchers.

The inaugural Arnold Heine Antarctic Research Award was awarded in May 2019 to PhD student Lauren Vargo. Lauren is an outstanding student and her research involves the development of a new method to quantitatively measure changes in New Zealand glaciers from historic aerial photographs. In particular, Lauren is applying this method to measure changes in length and snowline elevations for Brewster Glacier, South Island. The Arnold Heine award will enable Lauren to write a paper on the climatic drivers of New Zealand glacier mass balance.

Ray Dibble's generous bequest

Ray Dibble (1928-2018), the geophysicist who pioneered “listening to volcanoes”, has given \$20,000 through his will to the ARC's Endowed Development Fund.

Ray Dibble was employed straight from school in 1946 as a cadet in the Public Works Department, pursuing studies at Victoria University College part time. He completed a BSc in geology in 1952 and an MSc in 1956, based on a gravity survey of the northern South Island. His first visit to Antarctica in 1962 was to try out a slow speed tape recording seismograph that he had designed for measuring ice quakes.

In 1965, he joined the Geology Department as the inaugural Lecturer in Applied Geophysics and began a PhD project on “The seismometric study of volcanic activity - to increase the knowledge and understanding of volcanic mechanism and behaviour, and to search for warning indications of

potentially disastrous eruptions.” His thesis was based on monitoring the volcanos of Ruapehu, White Island, Kilauea and Stromboli, refining his recording seismograph in the process.

In 1974, Ray returned to Antarctica to the more substantial physical challenge of understanding the eruptive behaviour of Erebus volcano (77°S; 3794 m above sea level), leading to a further 14 visits to the Ice. In 1981, he set up an array of seismographs and other sensors with the help of Phil Kyle and the US Antarctic Program. As part of the New Zealand Antarctic Programme, he installed a video monitoring system of the volcano's lava lake. This almost year-round data was telemetered to Scott Base, giving critical insights into characteristics of the frequent eruptions from the Erebus lava lake. His insights into the plumbing of the volcano and his ability to set up electronic equipment around Erebus



Ray Dibble on Erebus Crater 1980/81

summit in sub-zero conditions were legendary.

Ray was a much-respected colleague at Victoria University for many decades. He was innovative, versatile and at times very humorous. He continued to visit the Antarctic Research Centre until last year. Ray's generous bequest to the ARC's Endowed Development Fund will provide support for future ARC students as they pursue their research.

