

IceSked

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Newsletter of Te Puna Pātio—Antarctic Research Centre
Te Herenga Waka—Victoria University of Wellington

A word from our Director

From major international collaborations to the achievements of our students, staff and partners, this issue of IceSked reflects the breadth of ARC's contribution to understanding a rapidly changing cryosphere and Antarctica's role in Earth's future — from boots on the ground field work success, through to leadership in international programmes and conferences. I hope you enjoy this snapshot of the exciting work taking place across our institute over the past few months.

Rob McKay

WCRP Climate and Cryosphere Open Science Conference (CLiC) 9-12 February, Wellington

Tim Naish

The 2026 World Climate Research Programme's Climate and Cryosphere (CLiC) Open Science Conference, themed "The Changing Cryosphere: Science, Impacts, and Adaptation", was hosted by the ARC, with support from Business Events Wellington and Tourism New Zealand. This once-a-decade gathering brought more than 400 scientists from 37 countries to Wellington, with strong representation from NZ, Australia, Canada, the US, the UK, China and Switzerland, among others.

The conference programme spanned polar, mountain and global cryosphere science, with sessions on ice sheets and sea-level rise, sea ice, glaciers, snow, permafrost carbon and infrastructure, and climate teleconnections. A special issue of *Advances in Atmospheric Sciences*, guest edited by CLiC, will capture the conference science.

Highlights included an opening plenary by Minister of Science, Dr Shane Reti, and sessions on how indigenous peoples, including from NZ, the Arctic and the Himalaya, are using their own knowledge systems to deal with the impacts of changes in the cryosphere. Early career researchers were central to the meeting, making up roughly 100 of the 400-plus attendees. They presented lightning talks, attended a dedicated networking evening at Carter Observatory, and took part in the "Polar Early Career Workshop: From Priorities to Action", which focused on shaping their involvement in IPY-5 (the fifth International Polar Year).

Laren Vargo and Dao Polsiri joined me on the local organising committee and are thanked for their huge effort in bringing this conference to New Zealand. Lauren and ex-ARC researcher Andrew Mackintosh led an excellent post conference field trip to the Southern Alps.



Clockwise from top:

Prof. Tim Naish, presenting at the CLiC Opening Ceremony;

Prof. Nick Golledge presenting at a CLiC plenary;

*Dr Lauren Vargo greeting Prof. Shin Sugiyama of the Institute of
Low Temperature Science, Hokkaido University, Japan.*

Photos by Matt Wood, CLiC OSC 2026



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Record-breaking sediment core provides unprecedented evidence of West Antarctic Ice Sheet retreat

Huw Horgan

The third season of SWAIS2C drilling saw the successful recovery of a 228 m long geological core from beneath Crary Ice Rise in the deep interior of West Antarctica. This great success was due to the hard work and commitment of numerous on-ice and off-ice partners including Websters Drilling and Exploration, Antarctica New Zealand, Earth Sciences New Zealand, alongside ARC engineers and scientists from all over the world.

The 2025/2026 season started with excellent support from Antarctica New Zealand's traverse and planning teams and the United States Antarctic Program's fixed wing team which meant some terrible flying weather didn't jeopardise the program. Once on site the hot water team quickly accessed the base of the ice, then smoothly integrated with the Antarctic Intermediate Depth Drill (AIDD). The AIDD team led by Tony Kingan from Websters Drilling and Exploration then started bringing core to the surface during 24-hour operations.

Drilling into permafrost conditions the team achieved 96% recovery through a diverse range of lithologies. The on-ice science team was on hand to log, photograph, x-ray, and curate every core. This included smear slides of key lithologies with on-ice and off-ice analysis informing initial age estimates of the recovered core.

After nine days of coring beneath the ice rise the team exceeded its target depth and pushed on to drill beneath a seismic reflector identified during site survey work. At 228 m beneath the ice base drilling operations ceased. One disappointment was a curtailed borehole logging program due to premature detachment of the bottom hole assembly, but this was overshadowed by the overwhelming success of the drilling program.

The season's end saw the recovery of geophysical equipment from across the ice rise and deployment of a fibre-optic observatory in a hot water drilled hole to the ice sheet base. Returning to Scott Base the team experienced more flight delays, but with the core in hand these passed relatively easily. Once the final flight departed the Antarctica New Zealand traverse team finalised the camp pull out and began the long drive home.

Associate Prof. Huw Horgan was Co-Chief Scientist on the 2025-2026 SWAIS2C drilling expedition. Contact Huw: huw.horgan@vuw.ac.nz



Tony Kingan (Webster Drilling) and James MacPhail (ARC) extract core splits from the drill. Photo by Ana Tovey / SWAIS2C

Crary Ice Rise core analysis reveals Ant

Rob McKay

Just five months after a highly successful drilling campaign at Crary Ice Rise, Antarctic Research Centre (ARC) and Earth Sciences NZ scientists were back at the heart of the SWAIS2C project, helping lead the first detailed examination of the 228 m sediment core recovered from beneath the West Antarctic Ice Sheet.

In June, around 30 scientists from seven countries gathered at Otago University's Repository for Core Analysis (ORCA) to split, scan and describe the core, which is providing an unprecedented record of how the West Antarctic Ice Sheet responded to past periods of warmth. The workshop highlighted ARC's leadership in SWAIS2C, with project co-leads Huw Horgan (ARC) and Richard Levy (ARC/Earth Sciences New Zealand) joined by ARC researchers Rob McKay, Linda Balfourt and Gavin Dunbar, alongside ARC alumni Georgia Grant (Earth Science NZ) and Molly Patterson, now a US-based SWAIS2C Co-Chief Scientist.

Our involvement was largely involved in identifying sedimentary features in the core to recreate past depositional environments that reveal changing Antarctic conditions through time. Using high-resolution imaging, X-ray scanning, spectrometry and other analytical techniques, the international team established the core's major lithostratigraphic units and developed the first age and environmental interpretations. These results will guide further sampling later this year as more than 120 SWAIS2C scientists work to answer one of Antarctica's most important questions: how did the West Antarctic Ice Sheet respond to past climate warming?

Prof. Richard Levy honoured with Antarctica namesake

Named in Richard's honour by Ngā Pou Taunaha o Aotearoa New Zealand Geographic Board, Mt Levy is a double peaked mountain rising to 1586 m in Friis Hills, McMurdo Dry Valleys on the Antarctic continent.

The location of Mt Levy is significant to Richard's leadership of the 2016/2017 Friis Hills Drilling Project in the McMurdo Dry Valleys. The Project recovered and described several drill cores from the Friis Hills, which are arguably the best studied and most well-dated and complete geological records at a time of global cooling, and have enabled a better understanding of the geological, biological, and climate history of the site and region.

A stratigrapher and paleoclimatologist, Richard has undertaken 15 expeditions in Antarctica, over 30 years. He was a key leader in the New Zealand ANDRILL project in McMurdo Sound in the mid-2000's, has published over 100 papers in peer-reviewed journals, and won the Sir Peter Blake Leadership Award in 2022. In his joint roles at the ARC and Earth Sciences NZ, he co-leads the SWAIS2C international drilling project - Sensitivity of the West Antarctic Ice Sheet under +2 degrees Celsius of global warming.

Richard (below left) joins a distinguished group of ARC staff with Antarctica namesakes:

Prof. Peter Barrett (below centre) : Barrett Glacier

Prof. Tim Naish (below right) : Naish Peaks

Alex Pyne (not present) : Pyne Glacier



L-R: Richard, Peter Barrett and Tim Naish. Copyright VUW Image Services

Antarctica's warm past

Early results indicate that much of the core spans the Miocene Epoch (23-5 million years ago), recording open-marine conditions, major climate transitions and extensive periods when a nearby ice sheet influenced sediment deposition.

Perhaps most striking is the realisation that the site where researchers stood atop over 500 metres of ice during the 2025-26 field season was once open ocean during a period only modestly warmer than today, providing powerful insights into Antarctica's future in a warming world.



Above: Marking and measuring the core.

Below: Core workshop team at the Core Repository, Otago University.
Photos by Ana Tovey / SWAIS2C



Antarctic Field Season 2025-2026

ASP 'Sense of Place' — Pursuing Mātauranga Māori in Antarctica

Natalie Robinson



Four members of the Antarctic Science Platform (ASP) leadership team, led by ARC's Natalie Robinson, spent two weeks at Scott Base during the 2025/26 field season to initiate Phase 2 of the Platform's Mātauranga Māori programme. The deployment aimed to strengthen the capability and confidence of ASP's Mātauranga Māori leadership and prepare them to plan and manage future Māori-led or Māori-initiated Antarctic fieldwork.

The team experienced Antarctic operations through Mātauranga Māori and tikanga lenses and contributed to base life through acts of manaakitanga, including blessing the SWAIS2C traverse team, a whakaeke and site blessing for the Scott Base Redevelopment, and Armistice Day karakia and karanga.

The team is now developing guidance for researchers, Māori researchers and Antarctica New Zealand, alongside training resources and wānanga to support culturally safe, tikanga-informed Antarctic research and Māori-led expeditions.

L to R: Delane Luke, Sandy Morrison, Aimee Kaio, Natalie Robinson visit and offer a karakia to Scott Base's pouwhenua, 'Te Kaiwhakātiri o Te Raki – the Navigator of the Heavens'.

Tirotiro Tohu ki Te Tiri o Te Moana: Observing environmental change through a Māori lens at Scott Base, Antarctica

Alyssa Thomas and Holly Winton

ARC / Te Kawa a Māui PhD candidate Alyssa Thomas spent a month at Scott Base in late 2025 alongside Dr Holly Winton and Prof. Ocean Mercier, practicing tirotiro—a Māori method of observing and attuning to environmental rhythms—to better understand Antarctic change through a Māori perspective. Observations focused on tohu (environmental signs/indicators) informed by interacting relationships of the sun, moon, tides, sea ice, weather and local fauna.

The team conducted observations from Scott Base, Observation Hill and Crater Hill, including daily walks around pressure ridges to record tohu rangi (of the sky), tohu moana (of the ocean) and tohu whenua (of the land). The research aims to establish baseline tohu data and explore the application of maramataka, the Māori ecological calendar, in Antarctica. Scott Base winter staff will continue observations to build a longer-term record. Early analysis suggests links between seal behaviour, sea-ice movement and moon and tides, as one example.



*Alyssa practicing tirotiro near Scott Base.
Photo by Ocean Mercier*



James and Darcy working with the Eclipse drill in front of Scott Base. Photo by Matt Harris

ASIS Drilling Season Planning

Darcy Mandeno

The Antarctic Sea-Ice Switch programme (ASIS) field season, in early 2026, moved the project closer to field-ready capability. Darcy Mandeno (ARC), Matt Harris (Earth Sciences NZ), and James MacPhail (ARC) prepared and tested the ASIS Ice Field Instruments Eclipse 102 mm shallow ice core drill.

Setup and process testing began at Scott Base, then moved to Square Frame Hut. The team drilled to around 25 m, testing drilling performance, core recovery, and field procedures in Antarctic conditions. While the loss and recovery of a core barrel down hole highlighted improvements needed in equipment handling, contingency planning, and operating procedures, confidence in the system improved. James and Matt were trained on the "Hans Tausen"-style Eclipse drill, and ASIS progressed towards ice coring capability for the 2027/2028 field season.

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Near Upper Priestley Glacier, Victoria Land. Photo by Holly Winton