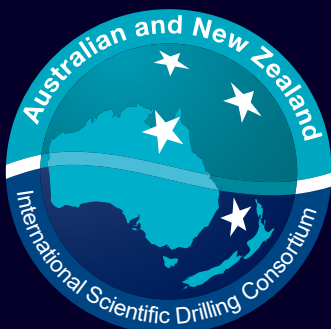




ANNUAL REPORT



Australian & New Zealand International Scientific Drilling Consortium

2025

ANZIC is the Australian and New Zealand International Scientific Drilling Consortium. We equip scientists in Australia and New Zealand with the skills, global connections, samples and data they need to explore Earth's interconnected processes, past and future.

Through our membership to key international research collaborations, we give scientists access to billion-dollar, state-of-the-art scientific drilling infrastructure so they can study samples from deep within the Earth, both on land and under the ocean.

These precious samples reveal insights into geohazards, environmental change, ocean circulation, our coastal zones, and the limits of life, contributing to a resilient and sustainable future.

Acknowledgement

ANZIC acknowledges the Traditional Owners and Custodians of Country across Australia, and the mana whenua of Aotearoa New Zealand. We honour their continuing connection to land, waters and community, and pay our respects to Elders past and present.

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Cover photos:
Front: The international SWAIS2C team in Antarctica. Photo credit: Ana Tovey, ICDP.

Back page: Hawfinch on Chikyu, offshore Japan. Photo credit: Andrew Roberts.

Photo credits, right: Janelle Kennard, Sarah Kachovich, Vale, ECORD, IODP³, NSF.



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ANZIC Chair’s Overview

2025 has been a year of transition for ANZIC, shaped by significant shifts in global scientific collaboration and infrastructure during 2024. In this environment, ANZIC has strengthened its international position while continuing to deliver value to members through engagement, scientific access, and capability development. We remain the regional interface to the international scientific drilling community and are well positioned to support future science investment in our region.

Engage

ANZIC’s core strength is its Australian-New Zealand partnership. In 2025, we renewed Consortium Agreements, providing a stable foundation to implement a refreshed organisational strategy aligned with a rapidly evolving global landscape.

Through the ANZIC Forum, we clarified strategic priorities and reinforced our role in delivering science that supports societal resilience and sustainability. This positioning is increasingly important as international programs shift toward mission-driven research.

ANZIC advanced toward associate membership of IODP³ – the International Ocean Drilling Programme – which brings together partners across 17 nations. Through IODP³ and membership to the International Continental Scientific Drilling Program (ICDP), we continue to provide direct access to international research programs, world-leading research infrastructure, and ensure ANZIC retains influence in shaping the future of global ocean drilling.

Explore

In 2025, ANZIC facilitated participation in three new ocean drilling expeditions and four continental projects, continued to support research stemming from past expeditions, and funded 10 new research projects, together enabling scores of Australian and New Zealand scientists to contribute to globally-significant research. The volume and breadth of the resulting publications is enormous (see page 76).

Integration of ocean and continental drilling is generating new collaborations and ANZIC is a key interface between marine and continental geoscience communities, with relevance to climate, energy transition, environmental change, and natural hazards.

Educate

Developing research capability remains a core priority. In 2025, ANZIC provided targeted training, including the Marine Geoscience Masterclass and ICDP and ocean drilling training programs.

These initiatives are building a pipeline of researchers equipped to lead future drilling programs and maximise returns from major infrastructure investments.

ANZIC is well positioned in an increasingly competitive global environment. Our focus is to translate international access into measurable scientific and national benefit.

I thank the ANZIC team, members, partners, and broader community for their continued contribution.



Jonathan Law
ANZIC Chair

ANZIC Director's Report

In 2025 ANZIC delivered many opportunities in scientific drilling for scientists based in Australia and New Zealand.

Explore

Our scientists joined scientific ocean drilling expeditions that explored the intrigue of offshore freshened groundwater aquifers, surprising petit-spot volcanoes that may influence earthquakes off Japan, and the incredible sedimentary record of earthquakes from the depths of the Japan Trench.

On land, the SWAIS2C project returned to Antarctica to successfully drill sediments below grounded ice of the southern Ross Ice Shelf. Elsewhere, our scientists are engaging with ICDP projects and proposals aiming to sample the ancient rock record to understand oxygenation and the early evolution of life.

Our carefully-targeted support continued to foster ground-breaking research with widening scope: ANZIC post-expedition funding enabled analytical work for participants; our Continent and Ocean Research and Education funding provided 10 small grants for projects that advance the field of scientific drilling; and this year we allocated long-requested funding to support participation in international proposal planning workshops.

Educate

Our ANZIC Marine Geoscience Masterclass commenced a new phase under the leadership of the University of Otago. It was truly a delight to engage with this year's enthusiastic cohort and join them in sinking my hands into rich, black organic mud from Doubtful Sound!

We supported a record number of participants in training courses run by our international partners that focused on growing skills in downhole logging, paleoclimatology and Southern Ocean and Antarctic science.

ANZIC played a key role in reinstating the CAPSTAN at-sea postgraduate training initiative which circumnavigated Tasmania on *RV Investigator*. My predecessor in this role, Prof Leanne Armand, who established CAPSTAN in 2017, would be proud to know that CAPSTAN is back.

Engage

ANZIC attended key international events, notably the Scientific Drilling Forum – an essential opportunity for global collaboration. The Forum highlighted a successful first year of IODP³, the latest on China's Deep Ocean Drilling Program, the establishment of the US Scientific Ocean Drilling Coordination Office, growing momentum for renewed Brazilian engagement, and efforts to bring the scientific drilling community together to discuss a global e-ODP initiative.

The future is bright for international scientific drilling!

A/Prof Ron Hackney
ANZIC Director



GeoDiscoveryNZ Report



Educate

A real highlight for 2025 was the ANZIC Marine Geoscience Masterclass, held in December in Fiordland and Dunedin, offering 21 emerging Earth scientists an immersive blend of field and laboratory training focused on climate and environmental influences on carbon cycling in New Zealand's fjords. Participants had a unique opportunity to learn and explore in an incredible natural laboratory and to contribute to an active ICDP project ('FACET').

We also supported five New Zealand students to attend overseas summer schools and workshops. You can dive into their feedback on pages 51-61.

ANZIC Distinguished Lecturer, Prof Laura Wallace, visited two Aotearoa and six Australian institutions. She shared her research focused on the Hikurangi Trench, along with leadership experience and skills.

Explore

This year, three GeoDiscoveryNZ expeditioners, all from the University of Auckland, joined voyages on deep-sea drilling vessel *Chikyu* – Lorna Strachan and Anthony Shorrock (Expedition 502) and Mila Huebsch (Expedition 503).

The Antarctic Intermediate Depth Drill (AIDD) system underwent a redesign, after an independent engineer review, followed by successful field testing in New Zealand. The ORCA lab at the University of Otago tested cutting and scanning processes, in preparation for a successful deployment in Antarctica during the

third and final field season of the ICDP project SWAIS2C (read about the success on page 32!).

GeoDiscoveryNZ was also pleased to award CORE funding to Dr James Muirhead (University of Auckland) to investigate biological-environmental interactions.

Engage

GeoDiscoveryNZ engaged attendees at the Geosciences Society of New Zealand conference, holding a workshop: *Shaping the Future of Aotearoa New Zealand's Involvement in Global Scientific Drilling Programs*. It was great to hear about several proposals in various stages of development, including that FACET would be submitted to ICDP in early 2026. A key aim of the workshop was connection, linking hydrogen researchers with those pursuing geothermal energy, and connecting several proposals keen to use giant piston coring to achieve their objectives.

The Aotearoa New Zealand geoscience community was thrilled to see past GeoDiscoveryNZ Chair, Dr Stuart Henrys, awarded the Science New Zealand Individual Lifetime Achievement Award in recognition of his groundbreaking research on the Hikurangi subduction zone. In August, he was elected as a Companion (Ngā Takahoa Te Apārangi) by the New Zealand Royal Society Te Apārangi. As new chairs, we have big shoes to fill!

Dr Phaedra Upton & Dr Joshu Mountjoy,
New Zealand Lead Representatives &
GeoDiscoveryNZ Co-Chairs

Year at a glance

ANZIC continued to expand scientific opportunity, capability and international engagement across Australia and New Zealand in 2025.

7 International scientific drilling campaigns open to Australian and New Zealand scientists

See pages 22-33 →

13 New research & education projects: over \$250,000 invested

See pages 38-39 →

26

International specialist training places

See pages 51-61 →

82

Significant scientific research papers

See pages 76-87 →

12

Scientists supported in international proposal planning

See pages 18-21 →

12

International scientific panels & committees with local representatives

See page 71 →

21 Masterclass students inspired & skilled

See pages 42-47 →

26 CAPSTAN students equipped & trained

See page 50 →

New ANZIC initiatives for 2025

'Shaping the Future' NZ Workshop

Developing and coordinating new drilling proposals for our region.

See page 17 →

Distinguished Lecturer Program

Sharing scientific drilling research, connecting our consortium members and enhancing science leadership skills.

See page 49 →

Best Student Publication Prize

Supporting, celebrating and recognising early career scientists.

See page 48 →

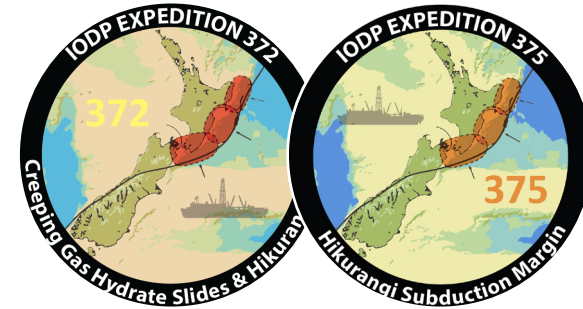
Scientific drilling impact: Benefits to Aotearoa New Zealand from refined earthquake hazard assessment

Dr Stuart Henrys (Earth Sciences New Zealand) shares how years of painstaking analysis of samples and interpretation of data from deep beneath the seafloor have illuminated crucial elements of earthquake risk from New Zealand's largest fault.

IODP Expeditions 372 and 375 (2017–2018) provided unprecedented insight into slow slip events, which involve fault movement that unfolds much more slowly and over longer timescales than regular earthquakes. The expeditions targeted the Hikurangi subduction margin, where the Pacific Plate dives beneath the Australian Plate, and was the first scientific ocean drilling campaign to sample an actively slow-slipping plate boundary.

Scientific drilling showed that the plate boundary offshore northern Hikurangi is far more variable than previously thought. A diverse mix of sedimentary and volcanic rocks is carried into the slow-slip region, creating strong contrasts in rock strength and structure along the fault. This complexity helps promote slow, stable slip rather than large, sudden earthquakes. Recovered cores revealed that regular earthquake slip and slow slip can occur on the same fault surfaces, overturning the long-held idea that faults are either 'creeping' or 'seismic'.

Laboratory experiments on the drilled fault rocks show that resistance to slipping depends on slip rate, rock type, and fluid conditions. At very slow slip rates, many materials strengthen as they slide and recover strength only slowly, suppressing runaway rupture. Together with high fluid pressures



and strong lithological variability along the plate boundary, these properties favour repeated slow slip at shallow depths on the Hikurangi megathrust.

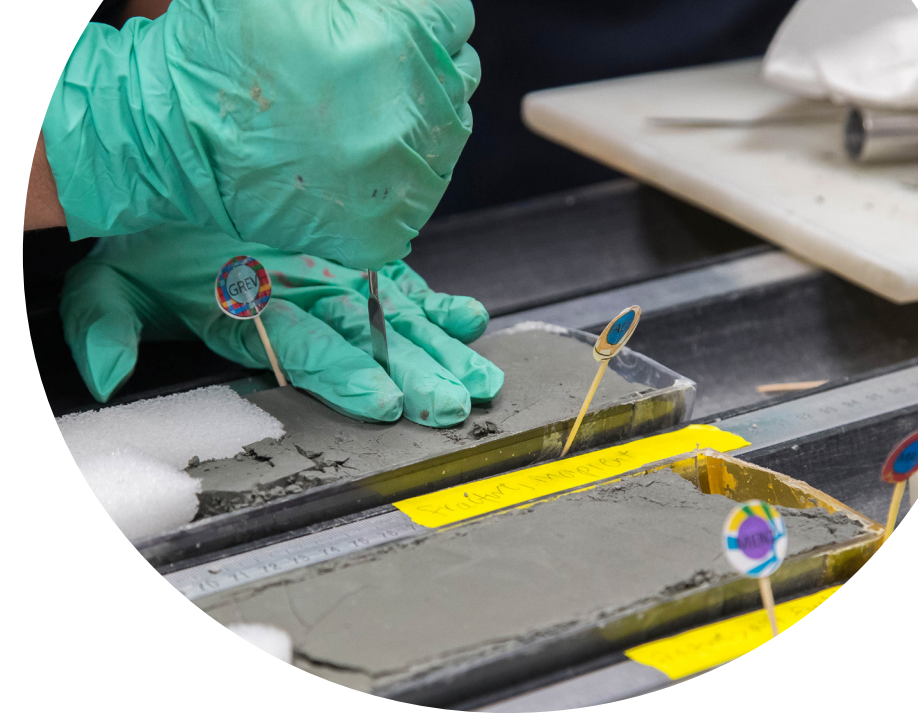
IODP Expedition 375 also installed subseafloor observatories offshore Gisborne, creating New Zealand's first long-term offshore monitoring network and revealing slow slip in finer detail, including trenchward deformation and small events missed by land-based networks.

The Hikurangi IODP drilling campaign has transformed understanding of subduction zone slip behaviour and strengthened the scientific basis for earthquake and tsunami hazard assessment, helping communities better understand and prepare for these risks.

The results were incorporated into the 2022 National Seismic Hazard Model, revising earthquake probability estimates and ground-motion predictions for communities along the Hikurangi margin. These improved hazard assessments have informed tsunami evacuation planning, emergency response exercises, and infrastructure resilience strategies by local and national agencies, including National Emergency Management Agency and regional Civil Defence groups.



Photo Credits: Tim Fulton, Damien Saffer, IODP JRSO, Janelle Kennard.



From analysing Hikurangi Trench core samples and deploying sub-seafloor observatories to tsunami evacuation plans.



About ANZIC

OUR VISION

ANZIC-led deep Earth discovery underpins a resilient and sustainable society

OUR PURPOSE

ANZIC equips scientists in Australia and New Zealand with the skills, global connections, samples and data they need to explore Earth's interconnected processes, past and future.

OUR VALUES



Our Funding

In New Zealand, GeoDiscoveryNZ facilitates ANZIC participation, gratefully funded by the NZ Ministry of Business, Innovation & Employment.

In Australia, ANZIC is enabled by AuScope, through the Australian Government’s extensive National Collaborative Research Infrastructure Strategy (NCRIS). We are indebted to the Australian Research Council’s Linkage Infrastructure, Equipment and Facilities (ARC LIEF) scheme, which funded ANZIC for decades, prior to our full transition to NCRIS funding in 2025.



ANZIC membership

Hosted by the Australian National University, ANZIC is a strategic collaboration between 16 of Australia and New Zealand’s leading universities and scientific organisations.

Our thriving and passionate community is highly engaged, working in unison to advance geoscience in our region and beyond.

ANZIC Members



Access International Infrastructure & Global Collaborations

ANZIC’s participation in international scientific drilling collaborations ensures scientists at our member institutions can access state-of-the-art scientific drilling infrastructure and samples from deep within our Earth, providing insights into geohazards, environmental change, ocean circulation, our coastal zones, and the limits of life.



EXPLORE

Beneath the Earth's surface lie the records of millions of years of Earth's climatic, biological, chemical, and geological history – just waiting to be explored!

ANZIC, through international scientific drilling programs, gives scientists access to these deep Earth records, gathering sub-surface data and core samples of sediment, rock, fluids and living organisms.

Studying these, we can transform our understanding of Earth's dynamic history, its interconnected processes and complex structure and so inform a resilient future.

ANZIC facilitates this deep Earth discovery by funding and supporting scientists in Australia and New Zealand to:

- develop proposals for drilling new sites to address globally significant scientific questions
- actively participate in international scientific drilling expeditions and projects, ensuring strong representation from our region
- undertake post-drilling research and collaborative analysis of new and legacy samples and data, fostering integration of results into broader Earth science outcomes and global impacts.

Photo credits:
Le Ber, ECORD, IODP³, NSF (left)
Diekamp, ECORD, IODP³, NSF (centre)
Yakutchik, ECORD, IODP³, NSF (centre)
L Stokes (right)



Preparing to drill

Scientists at ANZIC member institutions continue to lead and contribute to the preparation of new international scientific drilling plans and proposals. Their significant expertise continues to be at the forefront of ambitious discovery projects which will benefit our region.

Scientific drilling begins long before a drillship arrives on site.

It starts with researchers developing ambitious ideas, building international collaborations and navigating a rigorous proposal evaluation process. In 2025, the global scientific drilling community continued this work through ICDP, and the newly established IODP³ proposal system, ensuring that momentum built during the International Ocean Discovery Program (IODP) was carried forward into the next phase of international collaboration.

A key milestone in 2025 was the establishment of the IODP³ Science Evaluation Panel (SEP), which assumed responsibility for reviewing and advancing proposals inherited from the IODP era while evaluating new submissions developed under the IODP³ framework. The new SEP introduced updated review procedures, a revised evaluation framework and a strengthened integration of safety and environmental assessments through the newly established Safety and Environment Advisory (SEA) Group. Existing proposals were transferred into the new system, ensuring continuity for the scientific community while creating pathways for new drilling, observatory, land-to-sea and archive-based projects.

The transition to IODP³ brought renewed momentum to the global proposal portfolio. Throughout 2025, the SEP reviewed 30 proposals across three meetings. This included 17 full proposals reviewed at the inaugural meeting, followed by a further 11 proposals in May spanning full, preliminary, land-to-sea and SPARC categories, and two additional proposals reviewed in September.

Australian and New Zealand scientists continued to contribute strongly to international proposal development and review. The participation of ANZIC representatives on IODP³ and ICDP advisory panels (see page 71 for details) helped ensure that Australasian scientific priorities remained visible within the international drilling community.

ICDP's proposal pathway remains highly competitive, with all Pre-, Workshop and Full Proposals undergoing rigorous scientific assessment by the Science Advisory Group (SAG), an independent international panel that evaluates scientific merit, technical feasibility, outreach potential and expected impact.

In 2025, ANZIC-affiliated researchers continued to play an active role in internationally significant ICDP proposals spanning climate change, tectonics, Earth resources and human evolution. Australian and New Zealand scientists contributed to several proposals reviewed during the year, including the Turkana Basin Drilling Project (TARGET), Geological Research through Integrated Neoproterozoic Drilling (GRIND-CRY) and MEME – Fucino Paleolake Project.

Our support helped strengthen community participation in proposal development. ANZIC'S CORE funding scheme provided NZ \$25,000 to further refine the TARGET. Our proposal and build international collaboration. The team plans to resubmit TARGET in 2026, highlighting the long-term, collaborative effort required to develop major international scientific drilling projects.

Future scientific drilling for our region

ANZIC fosters the creation and coordination of Australian and New Zealand proposals

New Zealand workshop brings together ideas

In November, ANZIC and GeoDiscoveryNZ hosted a workshop prior to the Geoscience Society of New Zealand 2025 Conference in Auckland.

The workshop, titled Shaping the Future of Aotearoa New Zealand's Involvement in Global Scientific Drilling Programs, welcomed 25 in-person attendees and 12 online participants. An information pack was shared beforehand, outlining available drilling infrastructure and funding opportunities – critical for guiding future project priorities.

Short introductions from Phaedra Upton and Joshu Mountjoy (GeoDiscoveryNZ co-chairs), and Ron Hackney (ANZIC director) set the stage, followed by a series of rapid-fire proposal updates from experts on a range of science and drilling opportunities including geothermal, paleoclimate, subduction dynamics and offshore groundwater drilling.



Participants then split into groups for breakout discussions. Highlights included synergies between geothermal and hydrogen drilling interests, and a strong focus on giant piston coring in ocean and online discussions. A full [workshop report](#) has been published and further events are planned for 2026 to continue creating compelling and coordinated scientific drilling proposals in Australasia.

International proposal planning workshops

To ensure Australian and New Zealand scientists help shape future international scientific drilling projects, ANZIC actively supports participation in international proposal-planning workshops. These forums bring together researchers to develop concepts, build collaborations, and align regional priorities with global science goals.

ANZIC Travel support

In 2025, we launched a new ANZIC Travel Support program, offering competitive grants to assist attendance at these workshops. A total of \$22,000 was awarded for 12 scientists to take part in key international meetings. This program will continue to support community involvement in the years ahead.

These workshops are a critical step in the pathway to developing successful proposals for IODP³ and ICDP. They foster collaboration, strengthen skills, and create valuable connections across the global scientific drilling community. The reports from participants on the following pages highlight the lasting impact of these opportunities.

Photo credits: top to bottom
left: Lisa Smith, JAMSTEC
IODP³, Everest, ECORD,
IODP³, NSF, Sarah Kachovich



Past Ocean Oxygen Workshop

Dr Sarah Kachovich, Australian National University &
James Berg, University of New South Wales

In December, Sarah and James took part in the PO2 workshop, Notable Hypoxic Events of the Geologic Past, in Raleigh, USA. Sarah reported that it was “a warm and stimulating experience, filled with sharp minds and lively discussion, and it came at exactly the right moment for my research as I work to better understand radiolarian stratigraphy and preservational challenges.”

The meeting brought together an impressive mix of palaeoceanographers, climate modellers and drilling scientists to explore some of the most dramatic oxygen-loss events in Earth’s history, from Ocean Anoxic Events and the Messinian Salinity Crisis to rapid warming intervals such as the Paleocene-Eocene Thermal Maximum and even the Pliocene and Miocene.

“What struck me most was the shared dedication to bridging proxy data and Earth system models. The past ocean is where we can test the future. Yet we also agreed that there is no perfect geological analogue for what lies ahead.”

“Being there in person was essential for advancing the proposed Breathless Oceans SPARC (Scientific Projects using Ocean Drilling ARCHives), which will focus on Cenozoic hypoxia and anoxia in the Pacific Ocean. These sorts of initiatives are built through conversation and shared vision and the workshop provided exactly that space.”

"Jamie Berg presented new work on Miocene marine oxygenation using combined model and proxy approaches. Our participation helped place Australia at the table as next steps are being shaped."



Land-to-Sea Shaking Studies Workshop

Prof Myra Keep, University of Western Australia

The Magellan Plus Land-to-Sea Shaking workshop in Taiwan brought together scientists from around the world to discuss palaeoseismology and develop proposals for future marine and continental scientific drilling. In the long-term tradition of IODP the workshop was truly collaborative, with wide-ranging discussions following keynote presentations and plenty of workshop opportunities to develop ideas.

The highlight for me was the field excursion to the Chelungpu Fault Preservation Park, where the entire museum is deliberately built around an active fault scarp, which has been trenched. The exposure was magnificent!

Discussion groups were planned by geographic location, and I found myself working with a group actively involved in various parts of the Caribbean system, which was fascinating. More importantly, I came away with data, support and a Masters student project (current) looking at the onshore earthquake record in Guatemala!

I've been invited to join and collaborate with my new colleagues, my student has brand new data never before seen or published, and the workshop has provided new opportunities for students in Australia to interact with exciting new projects (the Guatemala project is also an active ICDP proposal).

The spectacular Chelungpu Fault Preservation Park.
Photo credit: Lienyuan Lee



Workshop on Land-to-Sea proposal: Wilkes Subglacial Basin – Vulnerabilities and Global Consequence

Prof Rob McKay, Victoria University of Wellington (VUW)

An international group of Antarctic scientists met in Vienna in May to advance plans for a major new scientific drilling initiative aimed at understanding the future stability of the East Antarctic Ice Sheet offshore of Wilkes Land. This region overlies the vast Wilkes Subglacial Basin, a marine-based sector of the ice sheet that holds enough ice to raise global sea level by several metres if destabilised. Geophysical evidence shows the basin's bed deepens inland, making it particularly sensitive to ocean warming and ice-sheet retreat. Despite its global importance, the Wilkes Land margin remains one of the least explored parts of Antarctica, leaving major gaps in our knowledge of how the ice sheet has responded to past warm periods.

The workshop was convened by Nancy Bertler (Earth Sciences NZ and VUW) and Rob McKay (VUW), along with Laura De Santis (Italy) and Johan Etorneau (France). ANZIC was well represented across the workshop with Matt King and Linda Ambrecht (University of Tasmania), Richard Jones (Monash University), Nick Golledge (VUW) and Matt Harris (Earth Sciences NZ) all leading key discussions/presentations of existing or upcoming expeditions or modelling

initiatives led by ANZIC in this region.

A central outcome of the workshop was coordinated progress toward an IODP/ICDP 'Land-to-Sea' drilling proposal, planned for submission in early 2027. This project aims to recover marine sediment and ice-proximal records from the continental shelf and beneath the ice, linking offshore ocean history with onshore ice-sheet behaviour across past interglacial periods. By combining drilling with seismic surveys, ice-sheet modelling, oceanography, and ice-core studies, the project would provide the long-term geological evidence needed to test models of ice-sheet tipping points and improve predictions of future sea-level rise.

Delivering this ambitious vision will require strong international collaboration, innovative drilling technology, and careful coordination with national Antarctic programs, with the hope that the Wilkes Land 'Land-to-Sea' initiative could emerge as a flagship contribution toward Antarctic research priorities for the next International Polar Year in 2032-33.

The East Antarctic Ice Sheet holds enough ice to raise global sea level by several metres if destabilised.
Photo credit: E Claassen, IODP, TAMU.



Expeditions

By participating in international scientific drilling expeditions, scientists from Australia and New Zealand gain unparalleled opportunities to advance their research as part of an integrated science party, accessing international infrastructure. ANZIC nominates scientists with critical expertise and pertinent research focus to ensure the success of each expedition, and maximise the return on investment for our region.

ANZIC Expeditioners

From the coast of New England to the depths of Japan’s Hadal trench; from the red earth of Gabon to beneath Antarctic Ice, ANZIC-supported expeditioners retrieved and analysed critical core samples from some of the world's most important and challenging environments.

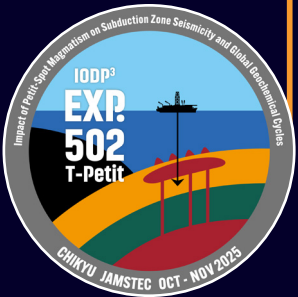
In 2025, ANZIC enabled Australian and New Zealand specialists to participate in seven expeditions:

- IODP³-NSF (US National Science Foundation) Expedition 501: New England Shelf Hydrogeology
- IODP³ Expedition 502: Impact of Petit-Spot Magmatism on Subduction Zone Seismicity and Global Geochemical Cycles
- IODP³ Expedition 503: Hadal Trench Tsunamigenic Slip History
- ICDP Project SWAIS2C: Sensitivity of the West Antarctic Ice Sheet to 2°C of Warming
- ICDP project GOE-DEEP: Gabon and Oxygenation of Earth - Drilling Early Earth Project
- ICDP project BVDP: The Bushveld Complex Drilling Project
- ICDP project WEIHE: Weihe Basin Deep Drilling Project (Phase I) Mio-Pleistocene Asian hydroclimate variability and dynamics.

These expeditions recovered precious core and recorded unique data that will continue to inform research for decades.

This year also saw two new World Records set: the longest core ever retrieved from below an ice sheet (228 metres) and the deepest scientific ocean drilling (total drill pipe length of 7,906 metres!).

Read the expedition reports on the following pages to learn more.



SWAIS2C

NSF-IODP³ Expedition 501

New England Shelf Hydrogeology

Fresh water hidden beneath the sea:
A new frontier for water security

Dr Sara Polanco
University of Sydney

Dr Sara Polanco was the only representative from the Southern Hemisphere on this Expedition, investigating a vast freshened-groundwater system beneath the New England continental shelf.

For the first time, a science team directly documented and extensively sampled a freshened groundwater system beneath the ocean floor, offering a new lens on how water, sediments, nutrients and life interact below continental shelves and why these processes matter for coastal communities that rely on groundwater. Long hypothesised since the 1970s, yet rarely explored directly, freshened-groundwater systems can extend beneath the seabed. During this campaign the science party documented and sampled freshened water across nearly 200 metres of section below the seafloor.

Led by Co-Chief Scientists Prof Brandon Dugan (Colorado School of Mines) and Prof Rebecca Robinson (Graduate School of Oceanography, University of Rhode Island), the expedition completed offshore operations between May and August and carried out onshore analyses at the Bremen Core Repository at MARUM (Germany), where 40 scientists from 13 nations worked side by side to open, describe and sample cores and fluids.

The expedition's findings will deepen our understanding of offshore freshened-groundwater not only off New England, but also in analogous systems worldwide – knowledge that is directly relevant to local coastal freshwater security, nutrient cycling, and the abundance and diversity of sub-seafloor microbes.

As part of the onshore science party, Dr Sara Polanco contributed to the expedition's effort to characterise the age and origin of the sub-seafloor freshwater system and to understand how sedimentary architecture might govern fluid storage and movement.

Her work connects land-to-sea geological evolution with offshore aquifer dynamics, bridging sedimentology, geochemistry, geomorphology, and stratigraphic modelling.

During the offshore phase, Sara discovered fossil root traces preserved in red clay, with grey halos produced by root-driven removal of iron and manganese – diagnostic features of paleosols that indicate former subaerial exposure and soil development prior to marine transgression. This interpretation was supported by the presence of tens of metres of mottled clays described during onshore operations. Chemical analyses

and pollen preserved within these horizons will help reconstruct the vegetation and terrestrial environments that existed millions of years ago. These ancient soils provide time-stratigraphic anchors that complement isotopic dating of fluids and help constrain when the shelf was exposed, recharged, and later buried – key to linking aquifer emplacement with sea-level lowstands.

In parallel with geochemical and stratigraphic analyses, Sara will develop 3D numerical models to reconstruct how the New England shelf evolved over geological time. These models will test how sea-level fall, sediment loading, and flexural isostasy influenced both shelf morphology and groundwater flow pathways beneath the seabed. The modelling will also evaluate how shelf exposure during lowstands facilitated recharge of offshore aquifers, and how subsequent burial affected storage and salinity.

“The relationship between sea-level change and shelf exposure plays a big role in how and where freshwater can accumulate,” Sara says. “When the shelf is exposed during lowstands, rainwater can seep into sediments and rocks, recharging offshore aquifers.”



Sara on deck of Liftboat Robert.
Photo credit: Yakutchik, ECORD, IODP³ NSF



Sara and the Expedition 501 Science Team.

Sampling offshore groundwater. Photo credit: Arnhardt, ECORD, IODP³, NSF

IODP³ Expedition 502

Petit-spot Magmatism, Seismicity and Geochemical Cycles

Onboard scientists:

Dr Louisa Stokes, Curtin University
& Prof Andrew Roberts, Australian National University

Louisa and Andrew were the onboard palaeomagnetists for Expedition 502, split between day and night shifts to keep the palaeomagnetism lab running 24/7, which included measuring and interpreting palaeomagnetic data for samples taken from the drilled cores.

The palaeomagnetic signal of a rock results from the alignment of magnetic minerals with Earth's magnetic field that develops during magma cooling and sediment deposition. The measured signals are then correlated with the known timescale of magnetic polarity switches (when a compass would have pointed either north, as it does at present, or south). Ages for the cores can be obtained by identifying this palaeomagnetic reversal sequence.

Individual samples were carefully taken from the core at 50 cm intervals downhole and measured for palaeomagnetic signals using specialised instruments in the onboard lab, which is a specially designed 'room-within-a-room' that is shielded from Earth's magnetic field with three layers of a ferromagnetic alloy.

Palaeomagnetic signals contained within the core samples were typically weak.

Despite this, the palaeomagnetic data collected onboard for Expedition 502 were astonishingly clear and provided the science team with accurate ages for the sediments and petit-spot basalts to ± 0.1 Ma. The resulting age model becomes part of the detailed understanding of the role of petit-spot volcanism on megathrust earthquakes and geochemical cycling over geological time.

The full findings of the research will be captured in a published scientific report.

Palaeomagnetism Dream Team!

Louisa and Andrew had never worked together, or indeed met, before Expedition 502, but they bonded instantly over similar work ethics and shared interests, such as Garmin watch statistics, Russian accents, and [Andrew's impressive bird photography](#).

Louisa reflected: "I was a little nervous about working with Andrew, who is not only an IODP veteran, but a world-renowned palaeomagnetist who could run the lab in his sleep! But I needn't have worried; we got on extremely well, and I am so lucky to have worked with Andrew, who taught me so much – not only about palaeomagnetism, but about working onboard a science vessel."



The onboard science party on deck. Photo credit: JAMSTEC, IODP³

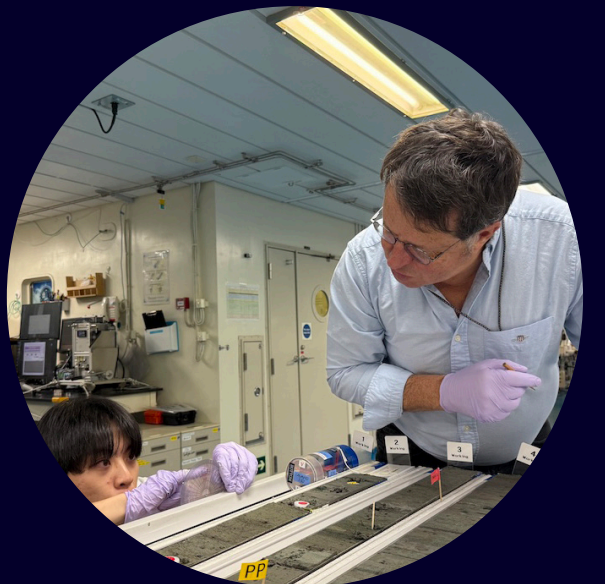
"It's very easy to stay in your particular bubble (primarily because you are so busy!) when, in fact, the more you talk to other members of the science and technical teams around you, the more you understand your own data. For example, I learnt a lot about the biostratigraphy of the cores because our palaeomagnetic data correlated beautifully with the findings of the biostratigraphy scientist. A highlight for me was when the teams came together to make sense of the rocks we were drilling for expert discussion among the different disciplines."

"And *Chikyu* is a science vessel like no other – it is simply outstanding! The seemingly effortless integration between the drilling, the laboratories, and the technical, engineering, and operations crews of a vessel of that magnitude never failed to leave me speechless!"

"It was an honour to be part of such an incredible international science team, and a privilege to have been chosen to take part in Expedition 502."



Andrew and Louisa in the lab on board. Photo credit: Louisa Stokes, JAMSTEC, IODP³



Examining cores. Photo credit: JAMSTEC, IODP³

Andrew capturing the local bird life. Photo credit: Louisa Stokes



IODP³ Expedition 502

Petit-spot Magmatism, Seismicity and Geochemical Cycles

Onshore scientist:
Mila Huebsch, University of Auckland

Being a remote participant in Expedition 502 was an exciting and inspiring experience! Although I wasn't able to be on board the *Chikyu*, it was very fun tuning in for regular team meetings over video call and learning about the progress of the voyage while it was underway. From the planning and preparation, to the first sediment and basalt samples, and learning about the stratigraphy as drilling advanced, there wasn't a dull moment (except for the poor drill bit tasked with the hard-rock drilling!).

Now, I have drill-core samples of pristine petit-spot basalts, recovered from ~60-95 metres

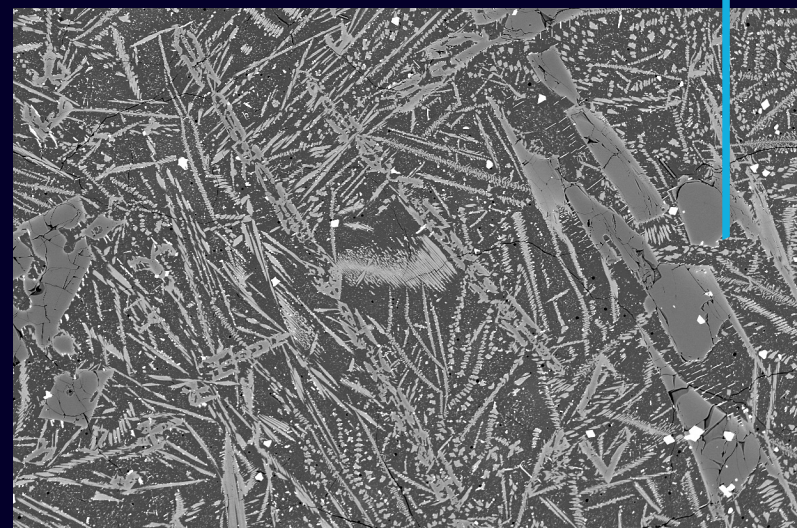
Mila polishing a thick section of sample in preparation for Electron Microprobe and Scanning Electron Microscope work. Photo credit: Mila Huebsch



below the sea floor near the Japan Trench, on my desk at the University of Auckland!

As I plan my next steps for contributing to the collective scientific mission, I am enjoying connecting with both on and offshore science team members – especially fellow ANZIC researchers. Next, I will prepare thin sections from my samples and examine their textures and geochemistry, as we work together to unravel the dynamics of petit-spot magmatism and its role in the global carbon cycle.

Backscatter electron image taken while measuring groundmass glass on the Electron Microprobe. Photo credit: Mila Huebsch



Sampling the Expedition 502 cores for onboard and on-shore scientists. Photo credit: JAMSTEC, IODP³

Onboard science communicator:
Sarah Barnes, Australian National University

I joined IODP³ Expedition 502 hoping to find interesting noises and I was not disappointed. While I had been on a much (much) smaller research vessel years ago, the volume of different sounds onboard the *D/V Chikyu* was something entirely new. In addition to the types of audio I had been expecting and planning on capturing – engine sounds, drilling equipment, PA announcements – I was delighted by the unexpected beauty I heard whenever the catwalk creaked in heavy waves and by the steady, rhythmic shuddering of the drill pipes rocking in their skyscraper tall cradles.

Some of the most fun recordings were the ones where members of the crew got involved to help out. One of the most requested sounds

was the tick-tack of table tennis that could be heard nearly every day in the rec room. My favourite collection day, though, came near the end. As the last bit of pipe was being withdrawn, we were gifted a near windless day where some of the drill crew could safely shepherd me around the drill floor and point out the best places to stand and record the industrial ballet that makes up the drill recovery operations. What an incredible experience!

Now that I'm back on land, my audio engineer and I will work together to turn these audio clips into a series of soundscapes and sick beats. I can't wait to share these science sounds with everyone!

IODP³ Expedition 503

Hadal Trench Tsunamigenic Slip History

A/Prof Lorna Strachan & Anthony Shorrock
University of Auckland

Two ANZIC expeditioners set out aboard the DV *Chikyu* as part of IODP³ Expedition 503 to reconstruct the long-term history of megathrust slip and associated hazards along the northeast Japan subduction margin. The expedition drilled deep-sea sediments within the Japan Trench to recover continuous records of earthquake-triggered turbidites from over 7,000 m water depth.

The expedition followed on from IODP Expedition 386 in 2021, which recovered a series of giant piston cores from multiple trench basins along the Japan Trench, capturing up to 38 m of upper Pleistocene–Holocene sediment containing numerous earthquake-triggered event deposits. These cores demonstrated that trench-fill sediments preserve detailed paleoseismic records, but the comparatively shallow coring restricted reconstruction of longer earthquake histories. The scientists and crew of *Chikyu* revisited Site C0028 and successfully drilled deeper (up to 180 m beneath the seafloor) to acquire much longer and more continuous sections of the trench-fill sequence, recovering the full stratigraphic archive needed to extend event chronologies further back in time and place recent megathrust earthquakes into a broader geological context.

A/Prof Lorna Strachan and PhD student Anthony Shorrock from the University of Auckland had an amazing experience as part of the science party on the expedition. “I’ve worked with IODP datasets for years, but you gain a whole new level of appreciation for the amount of work and dedication involved when you play a part in acquiring that data yourself on the ship,” said Anthony.

Lorna, who was one of the joint-leads of the sedimentology team, said “Participating in Expedition 503 was a career highlight I never imagined possible as a mid-career researcher. The sheer scale of the ship, its laboratories, and the coordinated efforts of the scientists, lab technicians, and co-chiefs were truly impressive.”

For Anthony, the voyage has been a springboard into the next step of his science career. He plans to focus on using the sediment cores acquired during the voyage as the foundation of his upcoming postdoctoral fellowship at JAMSTEC in Yokohama, Japan.

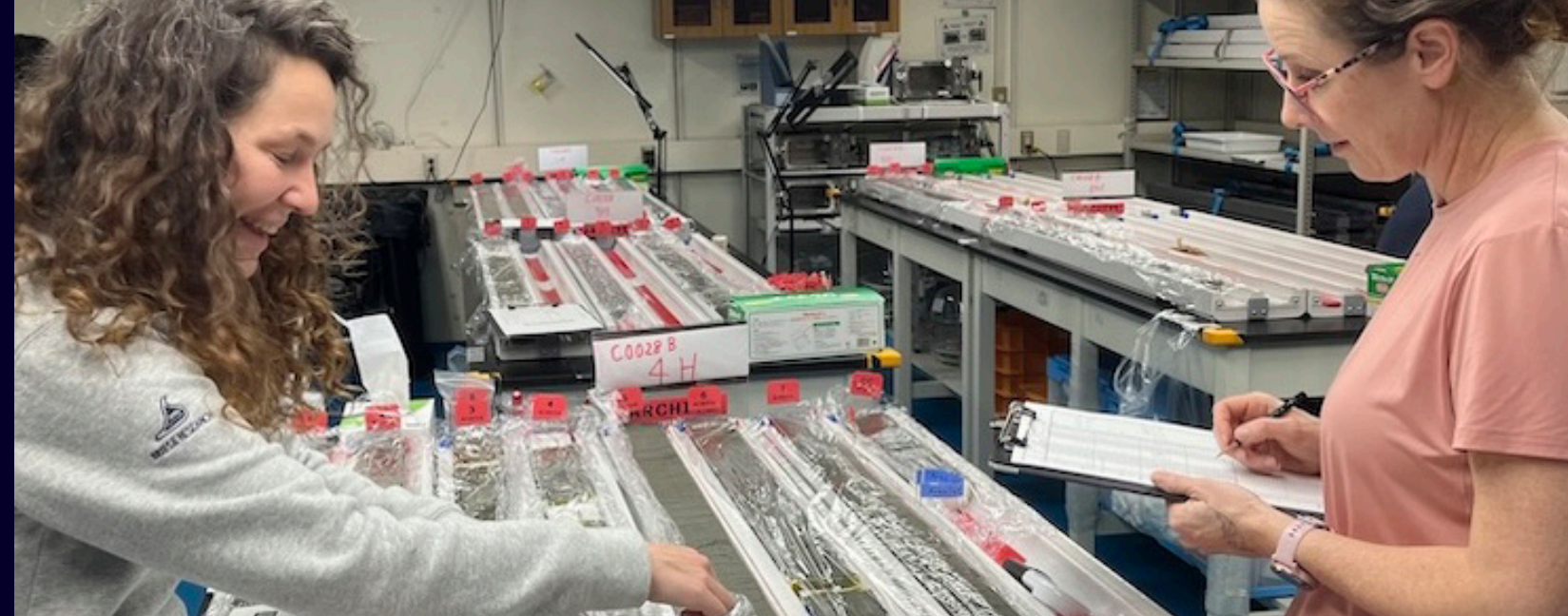
“This expedition has been such a great opportunity to meet new friends and colleagues, especially with how friendly and collaborative an

environment we had aboard the ship. Even with the huge amount of work we all did during our three weeks at sea, there’s still so much more to do and I can’t wait to keep being a part of it over the next few years.”

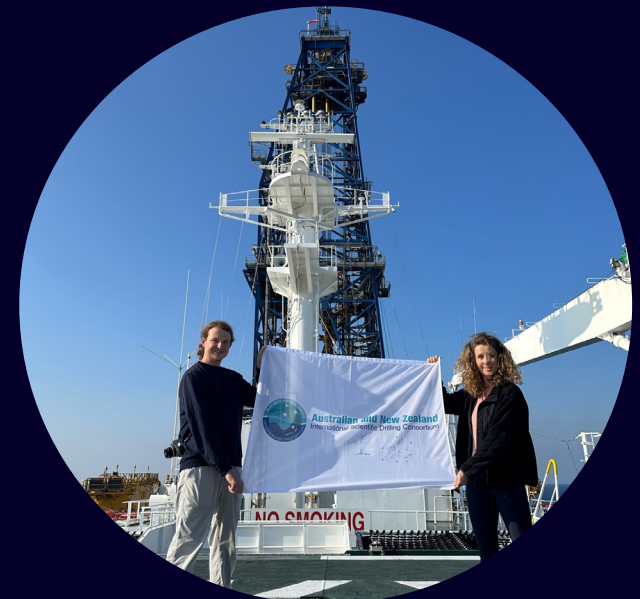
Alongside her work with the sedimentology team, Lorna plans to investigate extracellular polymeric substances (EPS), or ‘bio-snot’, and how it interacts with depositional processes. “These explosive turbulent flows suck in a lot of biological material – organisms living on the sea floor or those which have died and sunk along with surficial sediments,” explains Lorna. “It’s like a blender for all these nutrients. EPS can make up to 40% of the Carbon buried in these marine sediments. It can coat each grain of mud or sand and might even act as a lubricant, changing the behaviour of the flow.” Together with the rest of the science party, Lorna and Anthony were delighted to be aboard such a successful expedition – the team even managing to acquire more than 100% of the drilled depth of the core!

“One day, I hope to join, or even co-lead, a future expedition, continuing our exploration of the geological secrets preserved within this remarkable deep-seafloor archive,” said Lorna.

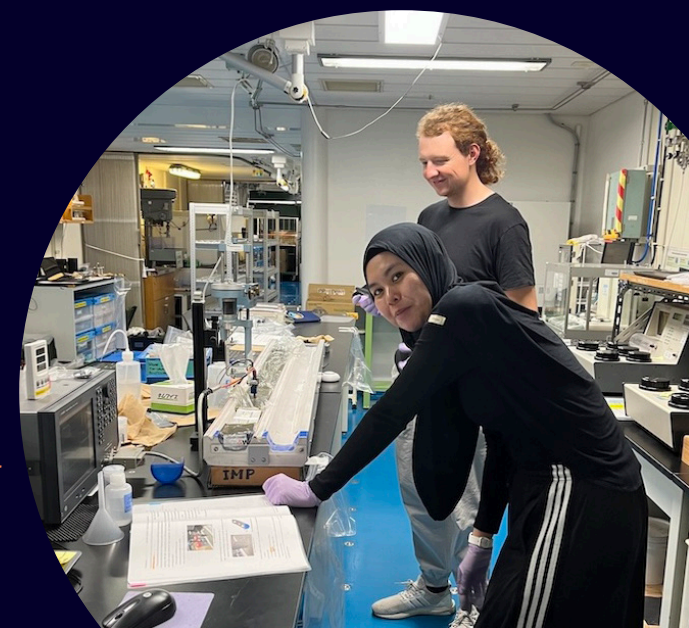
Anthony in the lab with former ANZIC student Dina Hanifah.
Photo credit: JAMSTEC, IODP³



Lorna Strachan (right), who co-led the sedimentology team, describing the newly drilled cores. Photo credit: JAMSTEC, IODP³



Lorna and Anthony proudly fly the ANZIC flag on board *Chikyu*.
Photo credit: JAMSTEC, IODP³



ICDP Project SWAIS2C

Sensitivity of the West Antarctic Ice Sheet to 2°C of warming

Dr Martin Tetard & Dr Georgia Grant
Earth Sciences New Zealand

Two ANZIC-supported scientists were part of the international team on ICDP's SWAIS2C project, aiming to recover sediments beneath the West Antarctic Ice Sheet to better understand how the ice sheet will respond in a rapidly warming climate.

In early December the team made their third expedition to the Ross Ice Shelf, in Antarctica, to drill through the grounded ice sheet and recover sediment cores. ANZIC Expeditioners, Dr Georgia Grant and Dr Martin Tetard from Earth Sciences New Zealand, were among the on-ice team of 27 including specialists in hot water and sediment drilling, geophysicists, geologist and facilities, communication and logistics management.

Georgia's mission was to describe the sediment and document the core sections, while Martin prepared smear slides to look at the microfossils in the core, as well as helping to X-ray the sediment.

This year, Martin was helped by machine learning algorithms he had spent months training to recognise microfossil remains of common Antarctica marine diatoms in order to determine an age and depositional environment for each recovered section.

"Different species thrive in different environmental conditions. Some like it colder,

others live in warmer waters; some live under ice sheets, others only in open water. By studying which species appear in each layer – at each point in time – we can learn what the climate was like and how the ice sheet responded," explained Martin.

On December 28 the hot water team successfully completed the hot water drilling down to 515 m below the grounded ice sheet. That allowed the sediment drilling team to start their rotary core drilling operation using a custom 'big rig' and riser, designed and reinforced for this season after challenges encountered during previous seasons.

A few days later, amid much celebration, the first 2.3 m sediment core was recovered, quickly followed by many others. At the end of the day, the team had already recovered more cores than during all the previous expeditions combined. During the fourth day of drilling, the team reached a significant milestone: 100m of core recovered. By the ninth day, on January 6, the drilling operation ceased with an impressive of 228 m of core – a world record for sedimentary cores recovered under grounded ice – and a stunning 96% recovery, exceeding all expectations.

"The team made drilling beneath a grounded ice sheet look easy! We had to remind



Georgia describes the first core!
Photo credit: Ana Tovey

ourselves that every step was a huge achievement, and are extremely grateful for the drill crew for this success," reflects Georgia.

Indeed, this was the third Antarctic season for the SWAIS2C project, a very stressful one as previous attempts ended in heart-breaking technical setbacks that halted drilling prematurely.

"Drilling and collecting the cores is just the beginning. The cores will be delivered to Otago, where the much larger international science party will gather in a few months, to reassess what we found and make plans on what science will be undertaken," said Georgia.

Preliminary results show that the majority of sediment recovered dates back to the Miocene, between 23 to 5 million years ago, and show periods of ice sheet expansion and contraction. This time period was generally warmer than today and will be used to test the validity of ice sheet model scenarios.

Georgia explains: "This site was targeted specifically by the co-chiefs A/Prof Molly



Martin looking at smear slides.
Photo credit: Ana Tovey.

Patterson and Dr Huw Horgan, to tie into other sediment records across the Ross Sea that will provide a complete record of Ross Ice Shelf and West Antarctic Ice Sheet retreat under warmer conditions".

Between the successful deployment of the 'big rig' and riser, the 200+ m of sediment core recovered, and the field testing of the Artificial Intelligence-assisted microscope camera, there is a lot to celebrate.

Post-drilling progress

In the years following expeditions, ANZIC continues to support expeditioners to collaborate on the outcomes of the scientific drilling project and analyse the samples and data collected.

IODP Expedition 389 Hawaiian Drowned Reefs

The science team gathered in Hawaii for their second post-cruise meeting, to share preliminary findings, refine analyses, and plan future publications. ANZIC supported expedition Co-Chief Prof Jody Webster (University of Sydney) to attend.

It was a great meeting, despite the added complication of a tsunami flooding several hotels, including our own! The team examined the H1 (~ 150 m water depth) and H2 (~400m water depth) reef terraces in detail, covering geology, chronology, sea-level changes, corallgal assemblages, reef development, microbialites, diagenesis, and geochemical proxies and paleoclimate reconstructions. Breakout sessions allowed thematic groups – Sea Level and Dating, Reef Response, and Paleoclimate – to collaborate closely, with volcanic studies featured as a cross-theme element.

The last day focused on thematic planning, integrating older reef terrace data, and publication strategies to maximise the value of our unique samples while advancing our understanding of past sea-level, paleoclimate and reef responses, as well as the volcanic history of Hawaii.

Expedition 389 post-cruise discussions.
Photo credit: Jody Webster

IODP Expedition 395 Reykjanes Ridge: Mantle Convection and Climate

Almost two years after Expedition 395 the science team, including Dr Katharina Hochmuth (University of Tasmania), supported by ANZIC, met again in Cyprus – one of the few places on Earth, where you can put your hand on mantle and oceanic crust without a large drillship! They had set out on board RV *JOIDES Resolution* (JR) to answer palaeoceanographic and mantle dynamical questions south of Iceland in the North Atlantic.

Katharina reports: We are interested in revealing the evolution of the ocean currents exchanging water masses between the Nordic Seas and the Atlantic to reconstruct paleoclimate since the Oligocene and are analysing the recovered oceanic crust to understand the interaction between the Mid-Atlantic spreading centre and the Iceland mantle plume and the crust's hydrothermal alteration.



Expedition 395 scientists enjoy a field trip and highly altered pillow lavas. Photo credit: Justin Dodd

We spent the first three days of our meeting presenting and discussing the work of the last two years. Excitingly, the publication of one of our first papers (Nature Communications), coincided with the meeting and we were able to celebrate. The publication showcases that the deep-water exchange between the Nordic Oceans and the Atlantic intensified prior to the full glaciation of the Northern hemisphere 2.7 million years ago. 'Our' newly recovered cores from Expedition 395 are the first cores to cover this transition across the entire North Atlantic, since previous scientific drilling efforts in the North Atlantic mostly focused on the timeframe of an intensely glaciated Northern hemisphere and assumed a co-evolution of these mechanisms.

Other research highlights included the presentation of ongoing microbiological work based on one of the most complete records of microbiological sampling ever collected on the JR and the mineral alteration patterns in a transect from the ridge axis to the Oligocene crust.

After the meeting, we embarked on an epic journey to visit the different layers of the ocean crust and mantle in the field within the Troodos UNESCO Global Geopark supported by the Cyprus geological survey. The Troodos mountains are well known for their excellent outcrops showing all layers of the oceanic crust as well as colourful hydrothermal alterations. We were able to see and compare our offshore observations with large outcrops finding some very familiar minerals such as the greenish mica celadonite, which was observed throughout our expedition in various fractures.

After five wonderful days together the science team had to fly off to all the various corners of the world, excited for more work on 'our' beloved cores as a wonderful team of colleagues and friends.

Post-drilling progress

IODP Expedition 399 Building Blocks of Life, Atlantis Massif

With ANZIC support, Professor Gordon Southam FRSC (University of Queensland) attended the Expedition 399 post-cruise meeting in Italy, in September, along with 23 participants from the 2023 expedition and eight shore-based participants and students working on Expedition 399 samples.

The meeting consisted of three days of science talks, posters, and collaboration discussions, centred on sharing new findings and defining additional research required to meet the expedition's objectives; plus some great field trips.

Gordon presented preliminary results of his unplanned sampling of hole 1309D that recovered iron oxide and sulfidic materials from the walls of the 1.4 km borehole after 19 years 'incubation'. Collaborative discussion of this site with Marguerite Godard, CNRS Géosciences Montpellier and Geoff Wheat, Moss Landing Marine Laboratories, centred on linking the aqueous geochemistry with microbial weathering of the borehole. Discussion of hole 1601C microbiology with Fengping Wang, Shanghai Jiao Tong University, targeted an unusual, deep bacterial signature that will require additional research to target the microbial populations and materials from this deep site.

Such exciting samples are going to keep the community engaged for years to come.



Gordon on Expedition 399.
Photo credit: Erick Bravo, IODP JRSO

IODP Expedition 400 NW Greenland Glaciated Margin

In mid-September, Dr Georgia Grant (Earth Sciences New Zealand) attended the Science Meeting for Expedition 400 which cored the NW Greenland margin in 2023, marking two years since the expedition. She reports:

The meeting was filled with robust discussions, sharing new science and interpretations of what we had uncovered during the voyage – over 2000 m of core spanning the Eocene (previously thought to be the Miocene) through to Pleistocene. I presented work on hole U1607 – the 980 m core (Eocene to Miocene) including lithofacies, grainsize distribution, depositional environments (shallow marine less than 200 m water depth) and preliminary orbital cycle assessment. I took away significant advances from the science team on ocean and sediment geochemistry, including provenance, and look forward to continuing collaborative efforts with the science party.

To begin each day, we watched a video of *JOIDES Resolution* hitting 'the wave' during our return to shore, accompanied by a soundtrack of books flying and mugs smashing shortly followed by an announcement that dinner would be delayed! On the last day we heard about recent and future Greenland Ice Sheet coring and modelling by Dorte Dahl-Jensen and Benjamin Keisling. This was a great way to finish the meeting with discussion on proxy-modelling integrations including the sediment processes we were seeing in the cores and how this may indicate instabilities in ice sheet growth and retreat.

The Expedition 400 science party, regathered.



IODP Expedition 405 Japan Trench Tsunamigenesis

The first post-expedition meeting for Expedition 405: JTRACK was held in Sendai, Japan in October. Initial outcomes from the expedition were discussed, including insights into the extreme localisation of the plate boundary fault that enabled slip to the trench during the 2011 magnitude 9.1 Tohoku-oki earthquake ([now published in Science](#)). However, the main purpose of the meeting was to bring together the full science team to forge new connections, discuss overlapping science goals, and establish new collaborative partnerships amongst the science team.

ANZIC science party member Ron Hackney (Australian National University) presented his current thinking around possible explanations for an observed correlation between forearc flexural rigidity and the extent of rupture during the 2011 magnitude 9.1 Tohoku-oki earthquake.

ANZIC expeditioners who travelled as an outreach officers also attended. Will Grant (Australian National University) presented an initial synthesis of his onboard research into how the science team approach communicating their science to a broad audience. Lisa Smith (Curtin University) took a lead on summarising science communication achievements from the expedition, which now include a [comic book](#) and a short documentary: [The Story of Stress](#).

Ron Hackney shares science insights at the Expedition 405 post-cruise meeting.



Legacy funding

ANZIC continues to provide funding for projects that advance scientific drilling.

In 2025, we announced 13 new and exciting projects to receive our Continent & Ocean Research & Education (CORE) Funding. We invested over \$250,000 to help the ANZIC science community make the most of the amazing archives of scientific drilling samples and data, from which there is still so much more to discover.

Successful funding recipients and projects for 2024:

An ultra-high-resolution record of Earth's magnetic field from Edisto Inlet, Antarctica
Agathe Lise-Pronovost, University of Melbourne

Leading the pathway for ICDP deep drilling at Lake Yamma Yamma, Queensland
Alexander Francke, University of Adelaide



Volcanism and Abrupt Paleoenvironmental Change: Insights from Mercury Isotopes and High-Resolution Tephrochronology in the HSPDP-WTK-13A Core, Turkana Basin, Kenya
Saini Samim, University of Melbourne

Do abyssal pyroxenites preserve a record of >6 kbar pyroxene fractionation during MORB petrogenesis?
David Murphy, Queensland University of Technology

ORDERS: Oceanographic responses and drivers of Antarctic deglaciation in the Ross Sea
Michael Bollen, University of Otago

Geophysical measurements to complete site survey for groundwater drilling in Taylor Valley, Antarctica
Rogier Westerhoff, Earth Sciences New Zealand

Thresholds for Antarctic ice sheet initiation: Reconstructing Antarctic environmental change across the Eocene/Oligocene transition
Bella Duncan, Victoria University of Wellington



Expanding the Southern Ocean Radiolarian Dataset for Proxy Calibrations
Patrick Moss, Queensland University of Technology

Site survey for future IODP drilling in the Southern Great Barrier Reef
Helen Bostock, University of Queensland

Uncovering the historical dynamics of fish populations in the Great Australian Bight using otoliths from deep sea cores
Joshua Barrow, University of Melbourne

ANZIC Foram Forum and Training Workshop
Juliet Sefton, University of Melbourne

Australian Biogenic Shelf Carbonates: Geochemical Characterisation and their Paleoenvironmental Implications
Harrison Jarman, University of New South Wales

Advancing our understanding of biological-environmental interactions in Turkana, Kenya
James Muirhead, University of Auckland



EDUCATE

ANZIC takes a multi-faceted approach to supporting science careers, building specialist skills and knowledge to ensure that our researchers are able to fully participate in scientific drilling now and into the future.

In 2025, we matched 67 exceptional students and early career scientists from our Australian and New Zealand member institutions with specialist training courses in seven countries. We created a new student prize, and shared expert wisdom with our Distinguished Lecturer Series.

Photo credits: Sarah Kachovich, Jess Henley, Carol Cotterill, IODP



ANZIC Marine Geoscience Masterclass

Convenors' Report

Hosted by:



ANZIC's 2025 Marine Geoscience Masterclass delivered practical training and synthesis skills that support ANZIC's goal of building marine geoscience capability and developing the next generation of scientific drilling-ready scientists.

Interest in the Masterclass was exceptionally strong, with ANZIC receiving 170 applications from across Australia, New Zealand, the Pacific, and international partner organisations. Following a highly competitive selection process, 25 students were invited to participate in the program.

Hosted by the University of Otago from 2–12 December, the Masterclass combined field-based marine data acquisition with IODP-style repository core processing and interpretation. The class travelled to Doubtful Sound (Fiordland) for fieldwork and then the Otago Repository for Core Analysis (ORCA) in Dunedin to complete core characterisation.

The course was organised around the central scientific theme of fjord carbon cycling, with students investigating how catchment inputs, fjord circulation, and sedimentary processes interact to control carbon burial and preservation in Fiordland – a topic closely aligned with the Fiordland Assessment of

Climate, Environment and Tectonics (FACET) ICDP scientific drilling proposal currently under consideration.

The University of Otago's *RV Polaris II* provided an excellent platform for practical marine geoscience in Fiordland, including acquisition of multi-channel seismic data, CTD water-column profiles and rosette sampling, and extensive sediment sampling using a Ponar grab, multi-corer, gravity corer, and 6 m piston corer. Onshore hikes complemented the marine programme, introducing students to native vegetation and Fiordland bedrock geology (and broader Zealandia context) as key end members for material entering the fjord system.

Student teams planned geophysical surveys and selected coring sites based on existing data and their own field observations, and each team was set a challenge: pitch your site as a future FACET drilling target, based on your initial core characterisation and other site survey data.

Coring complete, participants enjoyed a restorative cohort day featuring an Otago Peninsula albatross visit and a wildlife cruise of Otago Harbour before diving into core characterisation at ORCA.



Masterclass students and trainers overlooking Doubtful Sound.

Teams followed a core flow that replicates major elements of IODP processing, completing whole-core measurements on the Geotek MSCL-S, core splitting and imaging using a Geotek BoxScan, and high-resolution stratigraphic characterisation using BoxScan sensors and an ITRAX core scanner. Teaching emphasised non-destructive core scanning proxies for identifying rapidly deposited layers, alongside core logging, smear-slide sedimentology, and multi-proxy integration.

The Masterclass culminated in four high-calibre 20-minute group presentations, each proposing a future ICDP scientific drilling site in Fiordland and aimed at testing a hypothesis or answering a research question related to FACET.

We were very impressed by this year's student cohort and look forward to hosting the Masterclass again in 2026.

Prof Andrew Gorman, Prof Chris Moy &
A/Prof Christina Riesselman
Masterclass Conveners, University of Otago

With gratitude to all the educators, technical staff, vessel crew and volunteers who made the 2025 ANZIC Masterclass a success, including:

- A/Prof Ron Hackney, ANZIC
- Dr Sarah Kachovich, ANZIC
- Janelle Kennard, ANZIC
- Liz Arnold, ANZIC
- Dr Greer Gilmer, ESNZ
- Dr Sophie Briggs, University of Otago
- Bob Dagg, University of Otago
- Luke Whibley, University of Otago
- Mark Elder, University of Otago
- Adelle Heineman, University of Otago
- Amelia Morris, University of Otago
- Mel O'Brien, University of Otago
- Julie-Anne Parsons, University of Otago

ANZIC Marine Geoscience Masterclass

Student Reports

Wow—talk about the best fieldwork location I have ever experienced! Doubtful Sound was an absolutely magical place to undertake the 2025 ANZIC Marine Geoscience Masterclass. I feel incredibly grateful and privileged to have experienced the fjord system in all its glory, teeming with waterfalls (and carbon-loaded sediments!).

During the first part of the trip, aboard *Polaris II*, we collected grab samples, CTD data, seismic profiles, and piston cores. As a geophysics and Earth science student, safari geology and seismic surveying were particular highlights, revealing the structure and composition of the fjords. Through this work, we began to understand the historic processes of glacial erosion and deposition that shaped the region. Field hikes complemented the offshore work, showcasing modern processes such as freshwater discharge from the Manapouri Dam and landslides that deliver organic material into the fjords.

Back in Dunedin, we dived into detailed analysis of our samples and data. Otago's Repository for Core Analysis (ORCA) was kitted out with a Geotek Boxscan, Geotek MSCL, Itrax equipment, and more, all at our disposal. I was amazed by the amount of information that could be extracted using this technology. Each group worked to create a hypothetical ICDP drilling proposal, which centred around understanding and quantifying carbon burial in the fjord.

Collaborating across disciplines – biology, microbiology, geology, sedimentology, and geophysics – was both rewarding and productive, highlighting the power of interdisciplinary research. It was fulfilling to contribute my own knowledge while also learning from my peers in areas that were new to me. I have met lifelong friends and possibly future colleagues through this Masterclass. This truly was the cherry on top of an unforgettable experience.

Ella Dorward
University of Auckland



Ella and her study group excitedly extract a core from the piston corer in Doubtful Sound.

Proud students with cores they collected on *Polaris II*.



“The mix of study levels and disciplines was amazing – whatever someone had an issue with, someone else specialised in it and was happy to help. It felt complementary and complete.”

Students take up core analysis at the Otago Repository for Core Analysis. Photo credit: Sarah Kachovich



Students take time out to explore Dunedin Harbour wildlife. Photo credit: Sarah Kachovich



Collaborating and research planning are a big part of the Masterclass experience.

ANZIC Marine Geoscience Masterclass

Student Reports

The ANZIC Masterclass was an incredible opportunity to not only learn about deglaciated fjord systems and paleoenvironments, but to also get some hands-on experience with lead researchers in the field.

A key highlight was getting involved with the work on *Polaris II* in breathtaking Doubtful Sound, including everything from deploying equipment for seismic profiling, taking CTDs of the water column, grab sampling, piston coring and even multi-coring. Apart from all the science and enjoying panoramic views of the fjords, we also got to see plenty of seagulls, penguins and even dolphins! We also spent some time onshore where we learned about the history, climate, geology and tectonic setting of the region, and how these have shaped the catchment dynamics of the area today.

Back in Dunedin we began to split, log and analyse the cores that we had collected. Beginning to characterise the sedimentary record and place it in the context of everything we had learned the week

prior was a really rewarding experience. Preparing and characterising smear slides from the core was also a great way to investigate the provenance of sediment and see lots of cool microfossils. A big theme of the research was investigating carbon sequestration in the area, and getting to see (and smell!) the abundance of organic matter in each core was pretty incredible.

This trip was truly an amazing experience, and I really enjoyed getting to learn from and spend time with some really knowledgeable, like-minded budding and established oceanographers and geoscientists. Their energy and passion for the Earth and marine sciences is palpable. I'm glad to have made lots of new friends in this space. I'm very grateful to have been involved in such an incredible opportunity and I'll certainly continue to follow ANZIC's future endeavours in both the ocean and continental scientific drilling programs.

Jarell Cubarrubia
Australian National University

“The Masterclass introduced me to far more content, equipment, and procedures than my undergraduate course. It was amazing to be challenged and stretched in that way.”

Jarell and his team at ORCA, describing the cores they collected from Fiordland.



I was fortunate to attend ANZIC's Masterclass hosted by the University of Otago. It was a great opportunity to be immersed in a project and see it through from the field, into the lab space and completed with a presentation.

In Doubtful Sound, we got to experience a mix of shore-based activities looking at the local geology, and activities aboard University of Otago's RV *Polaris II*, including collecting sediment samples and water data. It was really beneficial to be able to have a hands-on experience of selecting our own sites to sample and then seeing our plans through to collecting our elected samples in such a magnificent field setting. Our data collection included a range of forms including piston cores, sediment grabs, geophysical data and water column CTD data.

During the second week, based in the Department of Geology at University of Otago, we were able to access a wide range of tools to analyse our sediment cores and other data. At the end of the week, we presented our own site proposals based on our collected data, which was a great opportunity to practice effectively communicating information.

Overall, the Masterclass was very beneficial and gave me a greater understanding of research in the scientific drilling field. I also found it very valuable being in a group of students with such wide-ranging backgrounds, meaning that each team member brought a slightly different set of knowledge to the group. This helped me see ideas from different perspectives and learn a lot more.

Petra Arthur
University of Otago

“Everyone was incredibly friendly, welcoming and supportive, no matter how senior or advanced they were. I felt comfortable to be myself and ask questions.”

“I loved the idea of having our own project and that we had to manage the unexpected outcomes. It was a great way to learn.”



Petra deploys the CTD from *Polaris II*.

ANZIC Prize for Best Student Publication

A new ANZIC award supports and celebrates early career scientists and their passion and innovation in unravelling Earth's past to shape a sustainable future.

This year, we were thrilled to launch a new initiative: the ANZIC Prize for Best Student Publication, a project driven by our newly formed ANZIC Engage Science Subcommittee to foster community, celebrate excellence and recognise outstanding contributions to scientific drilling research. By highlighting exceptional work, we aim to support early-career researchers in continuing their engagement with ANZIC and advancing their careers in scientific drilling.

Our inaugural winner was extremely deserving: **Ratneel Deo**, a PhD student from the University of Sydney, whose pioneering paper, *ReefCoreSeg: A Clustering-Based Framework for Multi-Source Data Fusion for Segmentation*

of Reef Drill Cores harnesses machine learning to produce an annotated image of a reef core with six lithologies identified.

Ratneel's exceptional work, coupled with his impressive outreach, put him above a competitive field, setting a wonderful precedent for this new tradition of recognising student excellence.

To recognise his win, Ratneel took up a funded opportunity to attend the ANZIC Forum in Auckland where he presented his work, received a commemorative trophy, and had the chance to connect with the ANZIC community.



ANZIC Distinguished Lecturer Series

Prof Laura Wallace

We've relaunched our Distinguished Lecturer Series to share the knowledge and wisdom of esteemed experts across the ANZIC scientific community.

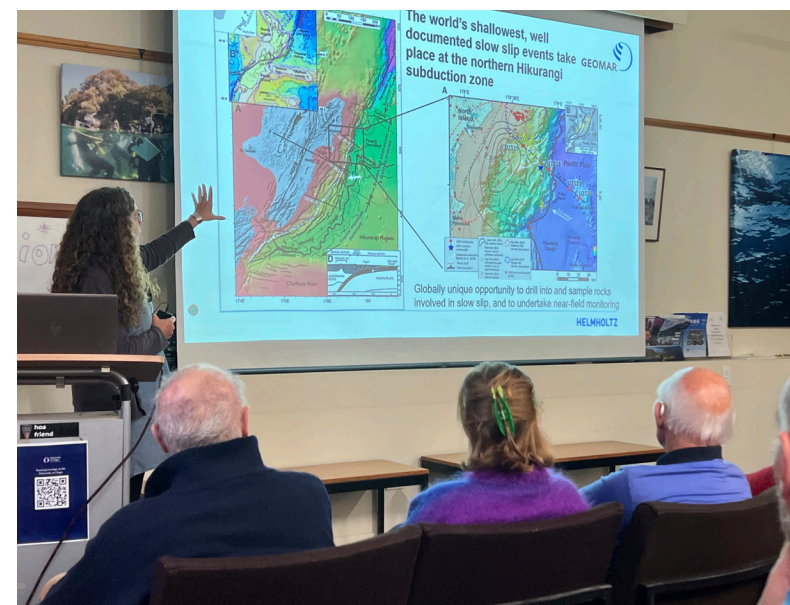
Ocean drilling veteran Prof Laura Wallace toured eight ANZIC member institutions, relaunching our Distinguished Lecturer Series this year. The series aims to bring the exciting discoveries of scientific drilling to wider geosciences communities in Australia and New Zealand, while creating opportunities for scientists at all stages of their careers to acquire skills and knowledge for advancing their scientific leadership.

Modelled after the long-running US Ocean Discovery Lecture Series, this initiative links leading scientists involved in the scientific drilling programs with ANZIC consortium member institutions, and funds travel and costs. In 2025, Laura visited eight campuses: University of Otago, Earth Sciences New Zealand, University of Sydney, the Australian National University, the University of Melbourne, Monash University, Adelaide University, and the University of Western Australia.

Laura is a GEOMAR geophysicist and ANZIC's first and only female Co-Chief Scientist in the 57-year history of the International Ocean Discovery Program. As a global pioneer in slow slip event research, Laura led IODP Expedition 375, installing one of just two borehole observatories in the Southern Hemisphere, at New Zealand's Hikurangi Subduction Zone.

Her lecture, titled *Unlocking the secrets of slow slip events with IODP drilling*, shared her groundbreaking work on fault mechanics and seismic hazard prediction with cutting-edge, long-term monitoring.

The ANZIC team was delighted to give so many people the opportunity to meet such an esteemed academic, to learn from her fascinating lecture and benefit from her vast experience.



CAPSTAN: Australian at-sea training Re-Launched!

Thirty university postgraduate students and tutors experienced life and work onboard an advanced ocean research vessel in the Collaborative Australian Postgraduate Sea-Training Alliance Network (CAPSTAN) program.

Students from every ANZIC member institution got the training experience of a lifetime in March, on a 10-day voyage circumnavigating Tasmania aboard CSIRO's RV *Investigator*. The CAPSTAN program is a maritime education and training initiative of the CSIRO, the University of Tasmania's Institute for Marine and Antarctic Studies (IMAS) and ANZIC.

"CAPSTAN is a rare and exciting opportunity that opens doors for students, and we're proud to support it," said ANZIC Director, Ron Hackney, at the launch. "This hands-on training gives students the skills and confidence to tackle vital research – not just for Australia, but on a global scale, preparing them to join and lead major scientific projects."

"The CAPSTAN program first sailed in 2017, with Leanne Armand the inaugural Director, and it's great to see the program re-launched."

CAPSTAN Director, Dr Pier van der Merwe (IMAS) said the sea-going experience was invaluable for developing Australia's next generation of marine experts. "Nothing compares with hands-on learning. Being at sea is where it all makes sense for students."

As University of Queensland student, Emily Flanagan, reflected: "This experience gave me more confidence in the value of my own skill set, my ability to work in remote field environments and showed me that I can contribute meaningfully in interdisciplinary research spaces."

International training

Where specialist skills can only be gained from international course, ANZIC funds students to attend. In 2025, we sponsored 21 attendees from Australia and five from New Zealand. ANZIC will move towards a competitive grant system for 2026 to manage the funding requests.

The enormous value of this training is highlighted by the reports from students on the following pages.



ECORD Summer School

Southern Ocean - Antarctic paleoclimate interactions

Given the importance of this year's theme, ANZIC and GeoDiscoveryNZ supported six students and an invited lecturer to attend this Summer School, run by the European Consortium for Ocean Research Drilling (ECORD)

Aike Albers, Shams Shahriar, Ezra Timothy Nugroho, Catherine Lit, Amy Wells, Mila Huebsch & Andrew Macintosh (Lecturer, Monash University).

Through ANZIC, I was able to participate at the 17th ECORD Summer School at MARUM (Center for Marine Environmental Sciences) in Germany. The intensive two-week program aimed to integrate thematic lectures and hands-on practicals to simulate working on a research vessel. Daily schedules included lectures, participant presentations, and practical activities.

The central theme of the Summer School was the past, present, and future oceanographic, environmental, and climate dynamics in the Southern Ocean and Antarctica. I presented an overview of my research entitled Geochemical fingerprinting of tephra from marine cores in the Kermadec Arc/Rangitāhua. It was great to receive constructive feedback and collaborative interest from fellow participants despite my project being slightly divergent from the main topic of the program.

It was great to meet the few volcanology colleagues whom I was able to discuss my research with and it was also great to learn and be inspired by graduate students, postdoctoral researchers, and professors from other fields.

In these two weeks, I learned about concepts and techniques that could be applicable to my research, particularly using sortable silt size ratio as a bottom current proxy and the wide range of applications of using CT scanning for characterising marine cores. During the practical sessions, I was able to do hands-on core logging and scanning, and analysis techniques for determining physical properties, pore water chemistry, and biostratigraphy.

Gaining these skills is very helpful for my studies and I am very grateful to have had such an enriching learning experience.

Catherine Lit
University of Tasmania

The Summer School was an unforgettable and a memorable experience for me as a master's student. Throughout the program, I gained valuable insights into the Southern Ocean and Antarctic region, including past deep-ocean circulation, surface ocean changes, palaeoceanography of the Antarctic Circumpolar Current, intermediate water dynamics, nutrient cycling in the Southern Ocean, ice sheet-ocean interactions, and sea-ice proxies.

One of the highlights was the shipboard simulation, providing hands-on training in methods such as sediment core description, biostratigraphy, pore-water sampling, physical properties measurement, logging data interpretation, core splicing, and CT imaging. These practical exercises not only strengthened my technical skills but also gave me deeper insights of how international scientific drilling expeditions operate.

Most important was the opportunity to engage with fellow students and early career researchers from 13 different countries. The exchange of knowledge, perspectives, and experiences across diverse scientific fields fostered a collaborative spirit and opened up new possibilities for future international collaborations.

The Summer School also served as excellent preparation for my upcoming participation in the 2026 COOKIES (Cook Ice Ecosystems and Sediments) voyage to the Eastern Cook Glacier region of East Antarctica, where I will build upon the knowledge and skills gained during this program.

This experience has strengthened my motivation to pursue a research career in polar and marine sciences. I feel better equipped to contribute to the scientific community.

Ezra Timothy Nugroho
University of Tasmania

My main motivation for joining the Summer School was to learn theory and practical skills for scientific ocean drilling, prior to participating in Expedition 502. Having diverse interests across the Earth and ocean sciences, I have pursued this opportunity to expand my horizons during this pivotal time of finishing my PhD.

The course had three main components: practical exercises, lectures, and presentations by participants. There was also structured time for networking with fellow participants and the lecturers, which was a great opportunity for further learning about each other's work, interests, and goals for future research. We were also treated to a tour of the historical centre of Bremen, as well as a traditional German meal.

The practical exercises covered a multitude of methods which are typically used aboard drilling vessels and during onshore work following voyages.

Having a chance to do hands-on work on real drill cores from around the world, together with new friends and future collaborators, tied together much of what we learned during the lectures, and was a learning highlight!

I now feel confident in my ability to strongly contribute to a shipboard team, with an appreciation for the cross-team work and communication that is critical during large scientific voyages.

The lectures were given by more than thirty scientists from diverse fields and were thorough and detailed, and helped me develop a much deeper understanding of ocean circulation, especially in the Southern Ocean, and the transport and exchange of carbon, oxygen, nutrients, and heat via the Arctic Circumpolar Current. Having studied submarine volcanism during my PhD, the lectures, participant presentations, and conversations during the breaks sparked many questions about the complex interactions between marine and geological systems.

This Summer School was a great experience and has set the scene for exciting and strong multi-disciplinary collaboration as I embark on my academic career.

Mila Huebsch
University of Auckland

ECORD Summer School

Downhole Logging for IODP Science

ANZIC and GeoDiscoveryNZ sponsored five students to attend:

Shraddha Surajith, Harrison Jarman, Aike Albers, Anthony Shorrock & Jessica MacFarquhar.

I had the pleasure of attending the ECORD Summer School: Petrophysics and Downhole Logging. It was an amazing experience to network with peers and researchers from around the world and to build professional connections that will undoubtedly help in my geoscience career. It was great to see such a strong ANZIC contingent. Despite the differences in experience and disciplines, we quickly became a close-knit group with goals of reuniting at future IODP events/expeditions.

Before the ECORD Summer School, I was inexperienced with petrophysics and downhole logging, but now I have the confidence to utilise such data in my own research. After introductory lectures and workshops we were tasked with a group project to apply what we learnt over the week and present downhole logging data from a past IODP expedition.

I cannot overstate how privileged I am to have received an ANZIC travel grant to attend the ECORD Summer School. As a student hoping to pursue a career in marine geoscience, it is extremely important to be part of such a supportive scientific community.

*Harrison Jarman
University of NSW*

I had the privilege of attending the 2025 ECORD Summer School on Marine Downhole Logging for Marine Geoscience, hosted at the University of Leicester. A variety of workshops provided insight into scientific offshore drilling and logging operations, petrophysics, downhole logging advantages, limitations and methods, as well as log processing and interpretation.

Among the many engaging interactive lectures, I particularly enjoyed Leo Barbosa's on Mission Specific Platforms, Jochem Kueck's on International Continental Scientific Drilling Program (ICDP), and Jack Brickell's on Hydrogeology. I was intrigued by the level of operational complexity required for marine drilling expeditions and the level of adaptability MSPs can provide. Learning about hydrogeology from the perspective of the IODP³ Expedition 501: New England Shelf hydrogeology was fascinating and reaffirmed that hydrology and water resourcing are research areas that I would love to become more involved in as my career progresses.

Every participant also had the opportunity to present a poster on their current research. The variety of poster topics was impressive and allowed connections to be made across

disciplines that would be difficult to achieve at larger-scale conferences.

A major highlight was learning how to use the WellCAD software for borehole log visualisation and processing in workshops taught by specialists from the University of Montpellier, and ALT, the software developers. This will directly benefit my current Antarctic research, as I can now contribute to analysing the optical televiewer borehole imagery collected during our recent field season.

Attending this Summer School was incredibly beneficial to my professional development. It helped bridge knowledge gaps between sediment geology and drilling operations, strengthened my technical skills, and expanded my understanding of scientific drilling from both engineering and geological perspectives.

*Jessica MacFarquhar
University of Canterbury*

Students examining core at the Summer School.



Downhole Logging participants discuss log interpretation of a site.

"Over the span of seven days, we listened to a variety of lectures and engaged in various activities that deeply familiarised our group with the methodologies and applications of downhole logging in the geosciences.

As a marine geologist set to sail the next month as part of Expedition 503 to the Japan Trench, I found the experience at the workshop invaluable, especially as my role will be as a physical properties specialist.

I highly recommend the workshop for early career geoscientists with interests in the marine geosciences, especially those wanting to get involved with international ocean drilling projects."

*Anthony Shorrock
University of Auckland*

Continental scientific drilling Summer School Chinese Academy of Sciences

ANZIC sponsored five students to participate:

Mahima Tawal, Kary Chang, Lucy Rowlands, Jaida Flynn, Kimberley Edwards, Ajisaka Octawiyano & Nadia Saboune

In July, I participated in the UCAS-ANSO-APRU Summer School in Xi'an, China, hosted by the Institute of Earth Environment, Chinese Academy of Sciences (IEECAS). The program brought together students to explore current topics in Earth and environmental sciences through online lectures, lab sessions, and field visits.

A major highlight was the visit to the Weihe Basin drilling site, where we engaged directly with the on-site team and gained insight into both the geological background and the practical aspects of scientific drilling.

The program also included tours of specialist Earth Science laboratories and hands-on experience with advanced instruments such as Accelerator Mass Spectrometry, paleomagnetic tools, and XRF. We attended a PhD Forum showcasing ongoing research across various disciplines. Field excursions to local geological formations added further context to regional stratigraphy and paleoenvironments.

I am especially grateful to the organiser, Ai Li, and the volunteer team, whose warmth and efficiency ensured a smooth and enriching experience. I sincerely thank ANZIC, UCAS, and IEECAS for making this exceptional opportunity possible.

Kary Chang
University of Melbourne

It was an absolutely amazing opportunity, including lectures, lab tours at UCAS, and field trips to the Weihe Basin. One highlight was spending two days learning about the different techniques for analysis they used, including SEM, XRF, XRD, paleomagnetism, and luminescence. We were even able to operate some equipment ourselves!

Another highlight was seeing the site where they are erecting the drill. The Weihe Deep Drilling Program aims to drill 10 kilometers through the paleosol and loess deposits in the Weihe Basin, as they represent a fantastic,

continuous record of climate for the past 50 million years. Over two days of field trips, we were able to observe outcrops around the basin, and understand how they reflected and captured past climatic conditions.

This opportunity was an absolute highlight of my university experience, and I will not forget the learning experiences I had and the connections I made!

Jaida Flynn
University of New South Wales

Photo credit: Kary Chang



Photo credit: Kary Chang

21st Century Drilling Workshop

ANZIC supported three participants:

Jodi Fox, Jess Hillman & Vicki Lowe.

The US Science Support Program's 21st Century Drilling Workshop, held at the Gulf Core Repository Texas, was the final of four global workshops designed to test best working practices for combining digital and repository-based activities linked by a key scientific question. Previous workshops had been held at the Bremen and Kochi core repositories. The global legacy core collection, amounting to about 500 km of core, is of huge scientific value and developing these best working practices is critical for optimising their use to address important regional and global research questions.

The workshop had two main goals:

- to develop capacity for planning and implementing expedition style scientific ocean drilling projects based on legacy cores and data
- trace ice rafted debris and biological responses to shifting Antarctic fronts in the Southern Ocean in response to Miocene ice volume variability.

Our workshop group included post-graduate students, post-docs and experienced researchers; many of us had not participated in an IODP ship-based expedition. We were guided through a series of presentations and group activities that developed skills in working with shipboard datasets and in

acquiring new datasets with a view to how both can be used to answer new scientific questions.

Presentations highlighted how to access legacy data, described techniques used for shipboard data collection and their limitations, and demonstrated techniques to assess the quality of the data. Identification of opportunities to collect new data with instruments available at the core repository and the issues with applying these techniques to legacy core were also discussed and demonstrated. Data collection activities included visual core descriptions using IODP protocols, biostratigraphy, stratigraphic correlation, XRF core scanning, track mounted physical properties data collection, core imaging and x-ray.

As someone who had not participated in an IODP expedition, the combination of explanations of drilling processes, shipboard core processing, data collection and integration together with hands on experience in handling core and collecting data was invaluable.

The workshop has helped significantly with understanding expedition reports and assessing results. I have a much better understanding of what facilities are available at the core repositories, people to contact to find out further information and logistics of

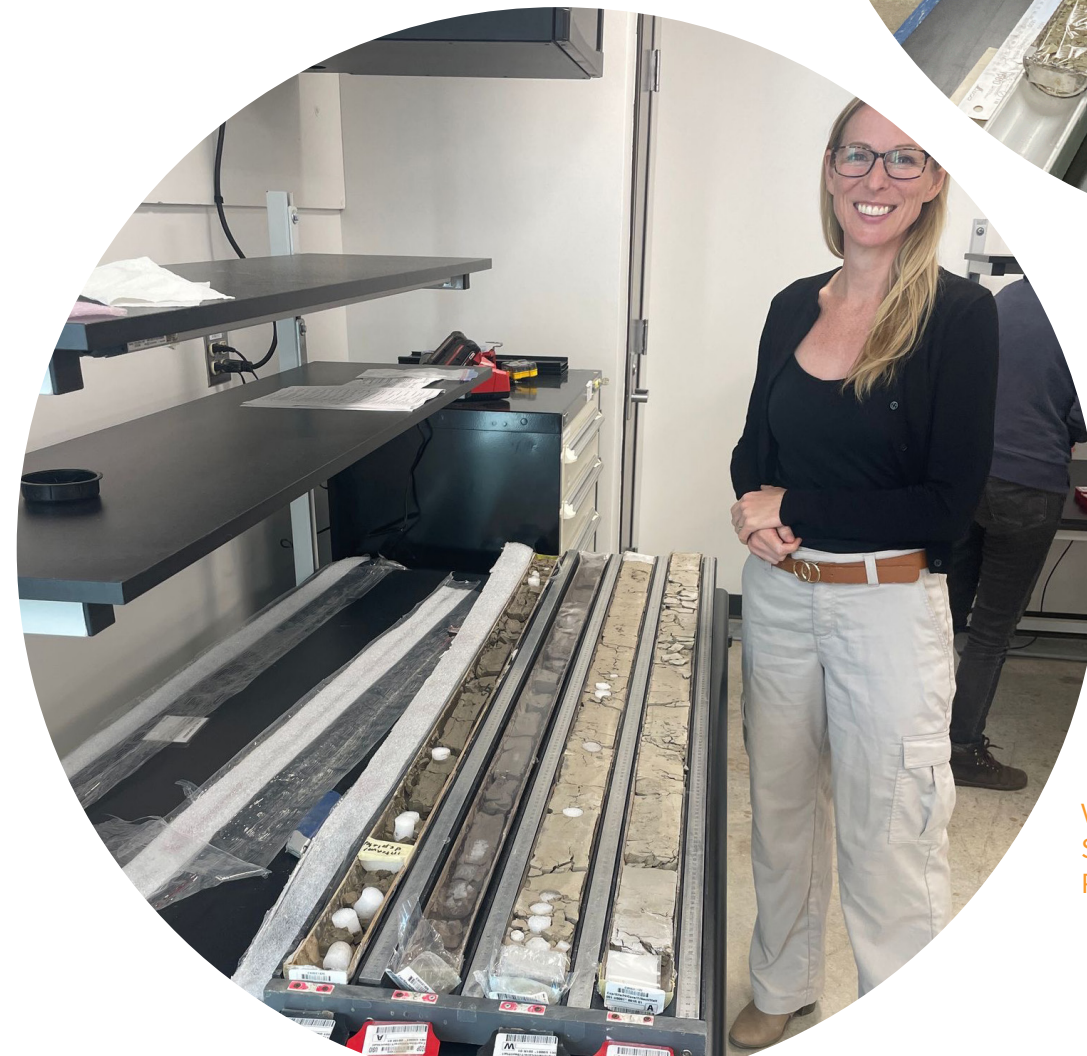
core processing which will be very useful for planning a core repository-based expedition. Workshop time was well balanced between presentations and practical activities.

The leaders and technicians were not only extremely knowledgeable but also encouraging, supportive and engaging making the workshop both challenging and enjoyable. Additional benefits included making new connections with geoscientists from a range of disciplines some of which I believe will develop into future collaborations.

I would recommend this type of workshop to anyone interested in developing new small scale or large expedition style research projects that will use IODP legacy cores.

Jodi Fox
University of Tasmania

Jodi Fox and some core prepared for XRF scanning.
Photo credit: Jodi Fox



Vicki Lowe with the first Deep Sea Drilling Project core.
Photo credit: Jess Hillman

Urbino Summer School Paleoclimatology

ANZIC sponsored five students:

Jakob Radford, Louisa Sheridan, Maame Adwoa Maisie, Natalie-Jane Reid & Luisa Fontanot.

My PhD journey has deepened my passion for understanding how climate change shapes landscapes, particularly through bushfire reconstruction, carbon cycling, and climate modelling. This drive led me to the Urbino Summer School in Paleoclimatology, which I was fortunate to attend with the generous support of an ANZIC scholarship.

Held in the beautiful UNESCO heritage hill-top town of Urbino, Italy, the 16-day program offered an inspiring mix of lectures, workshops, and field activities led by leading international scientists. Core themes included the climate system, statistics for paleo, chemical tracers and biomarkers, modelling, and integrated stratigraphy. A highlight was our field trip to Furlo-Gubbio, where we examined Meso-Cenozoic limestone successions such as the Scaglia Bianca and Maiolica. Most memorably, we observed the K-Pg boundary, marking the 66-million-year-old mass extinction event.

Beyond the classroom, I experienced Italy's cultural richness through the Urbino Food Fusion Festival, visits to the local museums and chapels, as well as traditional cuisine. No one visits Italy without good pasta for lunch or gelato on a bright day.

On the conference day, I presented a 10-minute talk on Fire Regime Shifts in the Blue Mountains during the Twentieth Century,

sharing insights from my PhD. Several flash talks, posters and oral presentations were shared across a wide range of paleoclimate science!

The Summer School broadened my perspective on paleoclimate science and demonstrated the value of interdisciplinary collaboration. Working alongside peers from across the globe reinforced the importance of diverse perspectives in tackling global climate challenges. It was indeed a good depth of knowledge with the spice of great Italian hospitality.

Maame Adwoa Maisie
University of Wollongong

The course was wide-ranging in the field of paleoclimatology with a mixture of lectures, applications of material learnt, a conference day, and a field trip. This field trip was a highlight for me – seeing the KT boundary and a lovely cyclic stratigraphy sequence. We then learned to apply spectral analysis techniques to our field-collected data in subsequent sessions, something I had been wanting to learn.

Meeting and learning about the other students' and teachers' research areas was really rewarding, as was sharing my own work. It was great to introduce others to my research on paleo-current reconstruction,



Natalie-Jane, Louisa and Luisa on a field trip.

and I look forward to seeing how everyone's work progresses and to cross paths again as colleagues in the future. The social aspects of the course were equally valuable, and experiencing Italy for the first time added to the experience.

This course proved useful for placing my work in a wider paleoclimatology context. The program also provided insights into paleoclimate methodologies and data interpretation, which were especially relevant to my interest in post-Pliocene climate records. Thanks again to ANZIC and GeoDiscoveryNZ for helping me attend this Summer School.

Natalie-Jane Reid
University of Otago

I had the opportunity to network with 50+ inspiring PhD students from all around the world, who work on a diverse range of topics within paleoclimatology. A highlight was the conference day, where each student presented a lightning talk and participated in a poster session.

Each day involved four sessions of lectures and tutorials. In addition to learning more about my own methods and proxies, it was a fantastic opportunity to learn more about other methods that are being used in the field. This will undoubtedly support me in being able to interpret a diverse range of datasets throughout my PhD.

Furthermore, we were taught by a number of experts about the inner workings of climate modelling. This made me realise just how important the coupling between proxy data and modelling is, where empirical data is used to validate and refine the climate models.

This opportunity would have been out of reach without the support from ANZIC, and I am so grateful to have received this support at this point in my PhD.

Louisa Sheridan
University of Melbourne

ENGAGE

We are proud to host and foster ways for scientists to deepen their engagement with the ANZIC community and International Scientific Drilling science.



ANZIC Forum

Our Annual ANZIC Forum, held in June at the University of Auckland, was a great success. The Forum was held in the spectacular Fale Pacifika, and began with a heartfelt Pacifika welcome. It was the perfect venue to bring our community together to reflect, learn and listen. It was a truly stimulating gathering with a tremendous sense of shared focus and responsibility.

The focus this year was strategy. It was great to see the energy that representatives of the Science Committee and Governing Council invested in reflecting on who ANZIC is, our strengths and weaknesses, as well as assessing where we are and where we need to head. Together, we mapped out a path to reviewing ANZIC's value proposition for our stakeholders as providers, partners and users, and created a clearer articulation of ANZIC's position, purpose and future.

We also had the chance to reflect on ANZIC's involvement in scientific drilling programs

over the last decade – hundreds of Australian and New Zealand-based scientists involved in expeditions, projects, proposals and workshops!

Will Grant from ANU's Australian National Centre for the Public Awareness of Science shared his observations of how scientists on IODP Expedition 405 viewed their responsibility and capability in communicating the amazing science of scientific drilling, while Ratneel Deo (University of Sydney), the first recipient of our prize for Best Student Publication, presented his research.

As usual, the event was bookended by in-person Science Committee and Governing Council meetings, and liberally sprinkled with lively conversations and stimulating exchanges.

Many thanks to all who participated.



Engaging our consortium members!

16 Research Institutions, One mission: Deep Earth Discovery.

In September, we re-signed our Australian consortium member agreements, renewing our powerful alliance to keep Australian and New Zealand scientists at the cutting edge of global Earth science.

“Getting access to samples from deep beneath the Earth’s surface requires highly specialised infrastructure that is well beyond Australia’s or New Zealand’s reach if we act alone,” said Dr Ron Hackney, ANZIC Director, as the agreement was announced.

“By uniting as a Consortium, with everyone contributing, we are able to leverage research infrastructure funds and ensure our scientists retain access to the billion-dollar scientific drilling vessels and large-scale research projects operated by international partners.”

“ANZIC membership is like a passport to discovery on a global scale. With this new agreement in place, the next generation of scientists will continue to tackle the big questions about our planet’s past, present, and future.”

Scientific drilling samples of sediment, rock, fluids and microbes, underpin research into climate change, geohazards like earthquakes and tsunamis, ocean circulation, coastal ecosystems and the evolution of life.

Over the past decade, more than 70 ANZIC-supported scientists have taken part in

varied international scientific expeditions, for example, sampling sediments to understand global weather cycles (El Niño/ La Niña), probing fossil coral reefs to map their resilience to sea level rise, and drilling into fault zones to understand earthquakes, tsunamis and the shaping of the continents.

“This year alone,” Ron said, “ANZIC scientists have studied offshore ground-water systems – which could be important in a hotter, dryer future – and the stability of the West Antarctic Ice Sheet.”

“And there are future projects planned to drill down to investigate the birth and growth of Pacific volcanoes.”



New Zealand Roadshow

In April, we took the good news about ANZIC membership to New Zealand, visiting several of our member institutions and one prospective member.

Stuart Henrys, though about to step down as GeoDiscoveryNZ Chair, joined our Director Ron Hackney as they showcased what we do and connected with key people to ensure that each of our member institutions is getting the full value from being part of the ANZIC Consortium.

At the University of Otago, Ron and Stuart met with key ANZIC participants and toured the RV *Polaris II*, a unique research and teaching tool, and got up close with some cores from the SWAIS2C project at the Otago Repository for Core Analysis. Updates on the status of international scientific drilling were given at Victoria University of Wellington and University of Canterbury. At the University of Canterbury, a strategy for bringing them in as an ANZIC member was also discussed.

Ron and Stuart also met with representatives from the Ministry of Business, Innovation and Employment, who were impressed with the scale, complexity and value of international scientific drilling programs and ANZIC as a valuable example of trans-Tasman scientific collaboration.

There was also a chance for Ron to meet with Phaedra Upton and Joshu Mountjoy, the new Co-Chairs of GeoDiscoveryNZ and to strategise around ANZIC's place in the evolving world of scientific drilling.



Embracing a core from the SWAIS project at the Otago Repository for Core Analysis.



Sarah Kachovich and Ron Hackney discuss plans with Phaedra Upton and Joshu Mountjoy.

ANZIC Governing Council

The Governing Council is a steering committee for ANZIC, responsible for broad policy and high-level decision making.



Jonathan Law
Chair



A/Prof Ron Hackney
ANZIC



Prof Dorit Jacobs
Australian National
University/Host



Dr Phaedra Upton
GeoDiscoveryNZ



Dr Joshu Mountjoy
GeoDiscoveryNZ



Dr Tim Rawling
AuScope



Dr Lorna Strachan
GC Chair/University
of Auckland



David Robinson
Geoscience Australia



Jens Klump
CSIRO



Dr Christina Riesselman
University of Otago



Prof Andrew Roberts
Australian National
University



Prof Helen Bostock
University of
Queensland



A/Prof Jon Tyler
University of Adelaide



Roger Fairclough
Independent
Member (NZ)



Dr Sue Barrell
Independent
Member (Aust)

ANZIC Science Committee

The Science Committee has oversight of the scientific program of ANZIC, including setting criteria and assessing applications for expeditions, legacy funding and training initiatives.



Dr Lorna Strachan
Chair/University of
Auckland



Dr Georgia Grant
Vice Chair/Earth
Sciences NZ



Prof Myra Keep
University of WA



Dr Sarah Kachovich
ANZIC



Dr Verity Normington
Geoscience Australia



Dr Alexander Franke
Adelaide University



Dr Nicky Wright
University of Sydney



Dr Katharina Hochmuth
University of Tasmania



Dr Suzanne Bull
Earth Sciences NZ



Dr Amy Elson
Curtin University



Dr Matthew Druce
University of Otago



A/Prof Olivier Alard
Australian National
University



Dr Bella Duncan
Victoria University of
Wellington



Dr William Defliese
University of Queensland



Mr Yangguang (Light) Han
University of Wollongong



Dr Jess Hillman
Earth Sciences NZ



Dr James Muirhead
University of Auckland



Kelly Lawler
Australian National
University



Dr Vicki Lowe
University of
Queensland



Dr Indrani Mukherjee
University of NSW

Nurturing international partnerships

Scientific Drilling Forum

In October, Phaedra Upton and Ron Hackney represented ANZIC at the inaugural Scientific Drilling Forum, held in Mazara del Vallo, Sicily.

The Forum brought together international scientific drilling programs – both continental and ocean – along with funding agencies and stakeholders at a time of significant change in scientific drilling. It was a chance to discuss the challenges and opportunities associated with the developing landscape.

Participants agreed on Terms of Reference for the Scientific Drilling Forum, received an update on progress with an IODP Achievements report, and even heard from Assoc Prof Will Grant, ANZIC-supported Science Communicator on IODP Expedition 405, on the initial findings of his research into how IODP scientists approach outreach and the challenges they face in doing so.



The Forum also acknowledged efforts by China’s emerging Deep Ocean Drilling Program to host a workshop in 2026 focused on coordinated international collaboration to expand the role of artificial intelligence in enhancing the accessibility of scientific drilling data in accordance with FAIR principles, and in enabling new methods of data interrogation and synthesis.

During the Forum, Ron and Phaedra took the opportunity to hand over the formal paperwork for ANZIC’s Associate Membership of IODP³ to Gilbert Camoin, Director of the IODP³ Managing Agency, ready for co-signing. This membership will continue to connect scientists from Australia and New Zealand to scientific ocean drilling infrastructure and opportunities.

Ron and Phaedra present ANZIC’s Membership paperwork to IODP³’s Gilbert Camoin (centre) at the Forum.



ANZIC representation at IODP³ and ICDP

IODP³ and ICDP evaluate proposals for scientific drilling expeditions based on impact, logistical feasibility and cost through a system of committees and advisory panels whose membership is drawn from the international scientific community.

Ocean drilling proposals submitted to IODP³ are first evaluated by the Science Evaluation Panel, which assesses scientific objectives and technical approach. This Panel then forwards ready-to-drill and top-priority proposals to the appropriate Facility Board. The IODP³ Safety and Environmental Advisory Group provides critical support to the review process.

Continental and land-to-sea drilling proposals are similarly assessed by ICDP’s Science Advisory Group and Executive Committee.

ANZIC has participation rights on these evaluation panels and groups, with ANZIC representatives listed below.

ANZIC Representatives

Committee or Panel	Representatives	Institution
ICDP Assembly of Governors	Dr Tim Rawling Dr Alex Thompson	AuScope Earth Sciences New Zealand
ICDP Executive Committee	A/Prof Richard Levy, Chair A/Prof Ron Hackney	Earth Sciences New Zealand ANZIC
ICDP Science Advisory Group	Dr Graeme Ross Beardsmore	University of Melbourne
IODP ³ Executive Board	Jonathan Law	ANZIC
IODP ³ Vision Taskforce	A/Prof Ron Hackney	ANZIC
IODP ³ Communications Taskforce	Janelle Kennard Dr Sarah Kachovich	ANZIC ANZIC
IODP ³ Science Evaluation Panel	A/Prof Maria Seton	University of Sydney
IODP ³ Mission Specific Platform Facility Board	Prof Jody Webster	University of Sydney
IODP ³ Safety & Environmental Advisory Group	Dr Katharina Hochmuth, Chair Prof Simon Holford	University of Tasmania Adelaide University
IODP ³ Magellan ³ Science Steering Committee	A/Prof Christina Riesselman Prof Myra Keep	University of Otago University of Western Australia
JOIDES Resolution Advisory Board	Prof Rob McKay A/Prof Ron Hackney	Victoria University of Wellington ANZIC

More opportunities to engage

Geoscience Society of New Zealand Conference

GeoDiscoveryNZ proudly sponsored the Geoscience Society of New Zealand Conference in Auckland in November, continuing a commitment to supporting New Zealand's geoscience community.

A Pre-Conference Workshop focused on the future of Aotearoa New Zealand's involvement in global scientific drilling programs (see page 17) and set the scene for an event which brought together the community. The momentum was maintained with a lunchtime Special Interest Group meeting, at which ANZIC Director Ron Hackney provided an update on the international scientific drilling landscape. The meeting fostered targeted discussions among a small group of participants.

In addition, GeoDiscoveryNZ maintained a vibrant booth throughout the conference – an excellent hub for networking, sharing information and showcasing recent New Zealand European Summer School attendees.

Science Meets Parliament

Kelly Lawler (Australian National University) and Jody Webster (University of Sydney) represented ANZIC at this year's Science Meets Parliament in Canberra. It was a great chance to hone new skills, meet other passionate scientists and – of course – talk to politicians about what matters.

Jody was “thrilled and honoured” to attend on behalf of ANZIC.

“The program was incredibly jam packed over two days with a range of fascinating presentations and panel discussions. I learned a lot and it was quite an eye-opening experience, particularly the advice on the need to clearly articulate the ‘retail value’ and ‘value proposition’ of the research that we do as scientists to the electorate.”

“It was also a chance to meet and network with a very diverse cross section of scientists from different disciplines and career stages and I found it an incredibly interesting and worthwhile experience”.

Welcome to the



Side event at UN Ocean Conference: Understanding the ocean below the seafloor

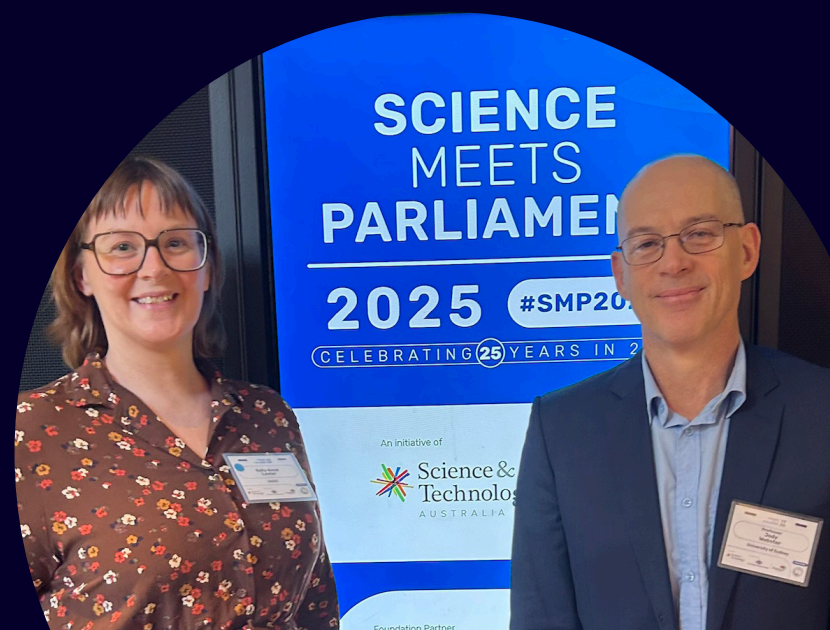
As a high-profile way to make an impression on the world's policy makers, ECORD held a side-event to the UN Ocean Conference (UNOC3) in June in France, and ANZIC was invited to take part. It provided networking opportunities for decision makers and stakeholders while demonstrating the role of scientific ocean drilling in linking the past and future of our planet, and exploring synergies with seabed and sub-seabed observation and exploration on a global scale.

ANZIC was privileged to be represented by Jas Chambers, Chair and Co-founder of Ocean Decade Australia, who spoke in support for scientific ocean drilling and posed some great

questions about what we wouldn't know without the ability to collect samples from below the seafloor. For Jas this was an exciting opportunity to re-connect with the scientific ocean drilling community about 20 years after she organised school visits to the *JOIDES Resolution* during a Sydney port call in 2002.

ANZIC at EGU

ANZIC was well represented by Kelly Lawler at the European Geosciences Union (EGU) Meeting in May. As well as catching up with colleagues at the joint ECORD/IODP/ICDP booth, Kelly presented her findings from a retrospective assessment of ten years of our CORE funding program as part of the session 'Maria Bianca Cita and her legacy in the Messinian Salinity Crisis and micropaleontology in scientific ocean drilling'.



Indian links

In November, ANZIC Director Ron Hackney travelled to India to visit their National Centre for Polar and Ocean Research. The Centre has supported Indian involvement in scientific ocean drilling. He shared ANZIC's experiences with IODP³ and the benefits of membership, and updates from the Scientific Drilling Forum.

Ron also presented an invited plenary talk at the 4th Triennial Congress of the Federation of Indian Geoscience Associations. The theme of this meeting was 'Geosciences for Blue Economy' and there was certainly an appreciation of geoscience contributions to the Blue Economy in India.

Early Career Network

This year, the International Continental Scientific Drilling Program launched a new initiative: The Early Career Researcher (ECR) Network.

The Network provides a dedicated community to support and connect early career geoscientists involved in continental scientific drilling. It aims to promote collaboration, mentorship, skill development, and leadership to accelerate early career growth, expand the scientific horizons of students, postdoctoral researchers, and early-stage professionals.

The Network features a structured mentorship initiative where senior ICDP scientists provide guidance on career development, grant writing, research planning, and integration into ICDP projects. The Network will also provide tailored events, workshops and community calls specifically designed to promote interdisciplinary collaboration and peer-to-peer engagement. Network members can also join working groups focused on science communication, mentorship, events, and other strategic initiatives, providing opportunities to develop valuable skills and make meaningful contributions.

Ron Hackney with Nisha Nair, Indian IODP representative at India's National Centre for Polar and Ocean Research.



I'm a speaker!



Lisa Smith

*'Drilling in the Deep' **

Documenting discovery at the bottom of the ocean.



Outreach

The ANZIC community continues to tell broad audiences about our science and the wonders of scientific drilling. Lisa Smith, ANZIC Communications Officer on IODP Expedition 405, spoke at Curtin University's 'Cosmos on Campus' about what it was like to work on a scientific ocean drilling expedition and why capturing these stories through film is just as important as the science itself. She also had a big hand in a documentary about the Expedition: [The Story of Stress](#).

Meanwhile, Lucinda Duxbury wrote a [story](#) about her time onboard IODP Expedition 403 which was then selected for the Best Australian Science Writing 2025 anthology, published in November.

Ann-Maree Long also shared her experience as an ANZIC expeditioner on [indigenous.gov](#) 'The world is your oyster – expedition of a lifetime'. She travelled on the JR Academy: Fire to Flood from Naples to Amsterdam in 2024.

2025 Publications

In 2025, ANZIC members provided remarkable scholarly output, contributing 80 ocean drilling and 82 continental drilling publications stemming from scientific drilling research, highlighting ANZIC's pivotal role in advancing science.

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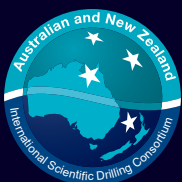
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