Australian and New Zealand
International Scientific Drilling Consortium

CORE Legacy Report

Celebrating Oceanic Rediscoveries & Exploration of Legacy scientific drilling collections

Written by Kelly-Anne Lawler, Sarah Kachovich, Janelle Kennard, Ron Hackney & the ANZIC Science Committee.

Summary

This document details the history and success of the Australian and New Zealand International Scientific Drilling Consortium (ANZIC) Legacy Awards Funding scheme. Following the theme of "Learn, Celebrate and Collaborate" from the CORE Legacy Forum held on May 30, 2024, it provides a detailed evaluation of the significant contributions and impacts these awards have made since the program's inception.

Learn

To evaluate the impact of the 12 years of the ANZIC legacy funding scheme, a survey and audit were conducted. The responses of awardees show clearly how valued ANZIC legacy grants are as a source of funding, collaboration and career enhancement. The audit reveals the breadth, range and reach of the grants across research areas, Australian and New Zealand institutes, and global drilling sites. A record of gender balance and spread of awards across career stages is also revealed.

Celebrating Outcomes

The wide array of successful legacy projects has significantly advanced scientific research and discovery while also fostering interdisciplinary collaboration and building research capacity. The impact of ANZIC legacy funding is clear. It has played a vital role in promoting and sustaining scientific excellence and innovation within the ANZIC community and beyond.

ANZIC-funded projects have yielded groundbreaking research and valuable insights into various aspects of the Earth sciences and beyond.

Collaborate

ANZIC’s legacy funding also serves as a platform for fostering collaboration among researchers. By connecting with fellow scientists through pilot projects, new exchanges of ideas, and developing new partnerships, the scheme encourages a collaborative research environment.

By reflecting on our past successes and challenges, we aim to inspire the next generation of scientists to uncover the secrets held within hundreds of kilometres of collected core samples and data from below the ocean and the continents.

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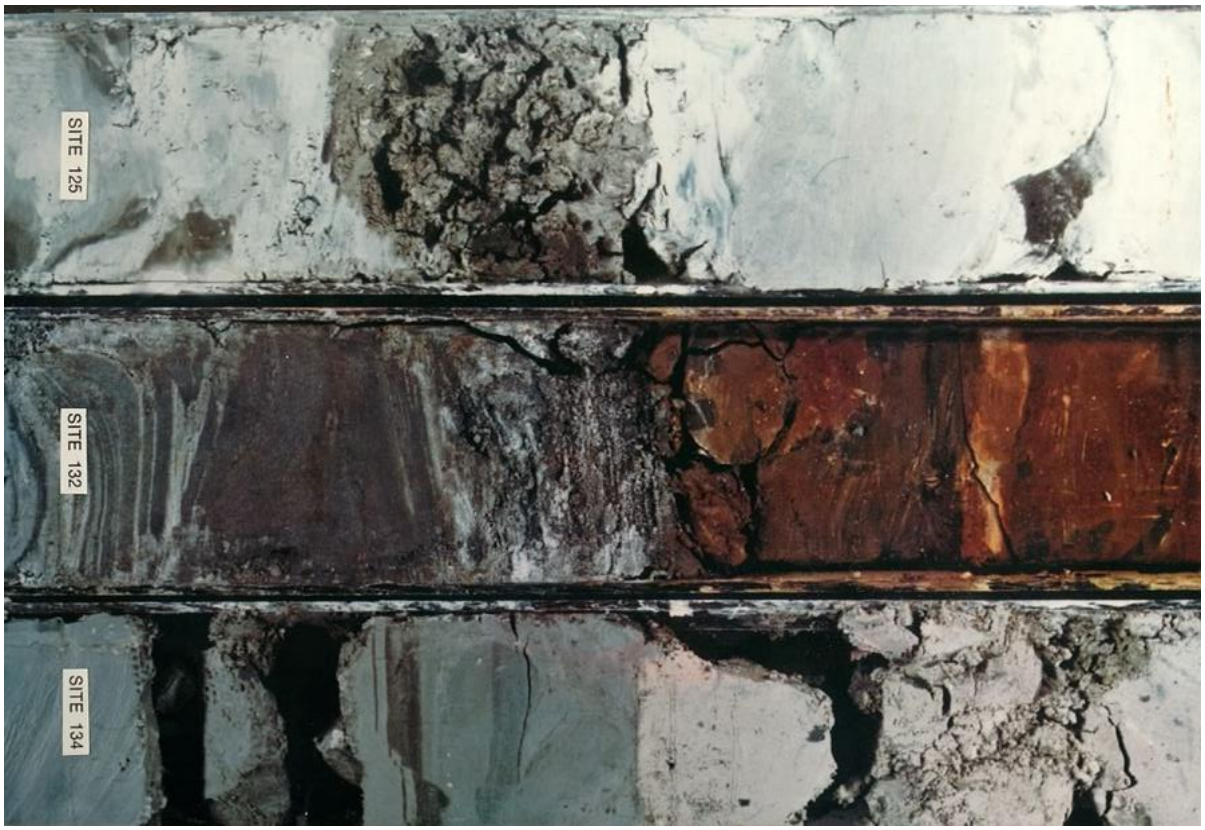
Evolution of the ANZIC Legacy Funding Scheme

ANZIC's legacy funding scheme has been a cornerstone in the advancement of scientific research related to scientific ocean drilling. It began in 2012 with a visionary initiative: ANZIC, leveraging ARC LIEF grants, introduced 'Special Funding' for groundbreaking analytical work on ocean drilling materials.

These legacy materials, collected via flagship international programs – Deep Sea Drilling Project (DSDP), Ocean Drilling Program (ODP), Integrated Ocean Drilling Program (IODP) and International Ocean Discovery Program (IODP) – comprise samples of rock, sediment and fluids from beneath the seafloor. A range of scientific questions can be addressed by studying these precious materials.

ANZIC's ambitious endeavour to enable this research offered grants of up to $25,000. In 2013, the first 12 pioneering grants were awarded.



Core photos from the Pliocene Transgression of the Mediterranean Sea, from Ryan, W.B., et al, 1973

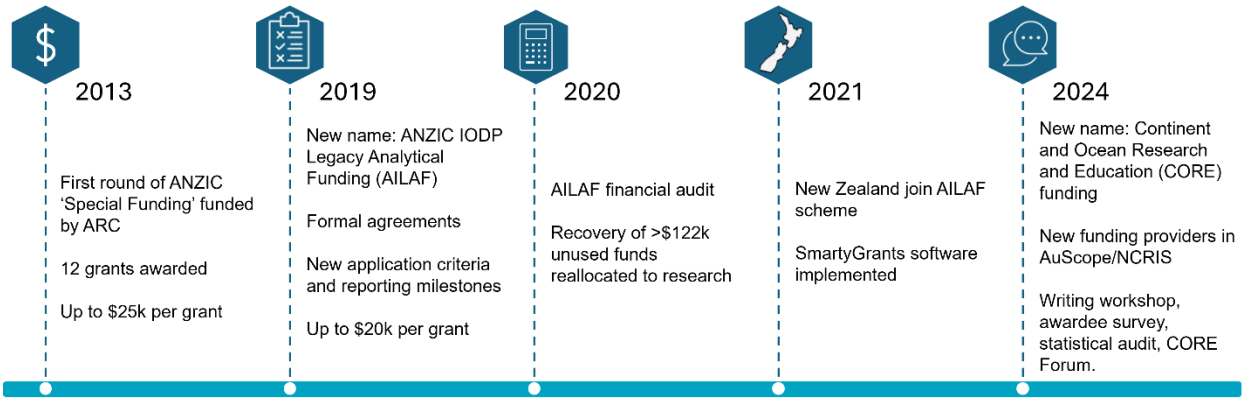
From that initial spark, the ANZIC legacy funding scheme ignited a wave of scientific exploration. Every year, with the exception of 2017, ANZIC has fuelled legacy scientific ocean drilling research at ANZIC institutions. The funding, ranging between $72,000 (2022 – NZ institutes only) to $350,000 (2023) annually, has been a lifeline for innovative projects that have expanded our understanding of Earth sciences and provided researchers with opportunities to progress their careers.

In 2019, the scheme underwent a significant transformation, rebranding as ANZIC IODP Legacy Analytical Funding (AILAF). This wasn't just a name change; it marked the introduction of formal agreements, enhanced application forms, and rigorous selection criteria. The ANZIC Office also instituted reporting milestones and revised the maximum grant amount to $20,000, distributed in tranche payments to ensure optimal financial stewardship.

In 2020, ANZIC conducted its first financial audit, uncovering $122,105 in unused legacy funds. These funds were reallocated to support other ANZIC-related research initiatives, demonstrating ANZIC’s commitment to maximising the impact of every research dollar.

ANZIC celebrated another milestone in 2021 when New Zealand joined the scheme, expanding its reach and impact. That same year, ANZIC modernised its grant management by implementing SmartyGrants, a leading grant management solution. This upgrade enabled the adoption of best practices and streamlined the application process, enhancing both efficiency and transparency.

Now, as we look to the future, ANZIC is poised for even greater achievements. We have a new Australian funding body, AuScope, through the National Collaborative Research Infrastructure Strategy (NCRIS), and a strengthened New Zealand program funded by GeoDiscoveryNZ through the Ministry of Business, Innovation and Employment (MBIE). ANZIC also enters a new era, working not only with international scientific drilling programs, but also with our new partners, the International Continental Scientific Drilling Program (ICDP). Thanks to this new partnership, the legacy funding scheme has been expanded to include ICDP scientific drilling materials, educational initiatives, and pilot projects that may lead to future drilling proposals. It also continues to encourage collaboration with national programs and collections, broadening the scope for innovative research. As such, in 2024, the AILAF Awards were rebranded as Continent and Ocean Research and Education (CORE) Funding, to highlight the extended focus of the scheme.



The evolution of the ANZIC legacy funding scheme.

Guided by community feedback – through our 2024 survey, ANZIC Forum, AILAF writing workshop, and the ANZIC Science Committee – and strengthened by another comprehensive audit, ANZIC continues to refine the CORE scheme to better serve and inspire the scientific community.

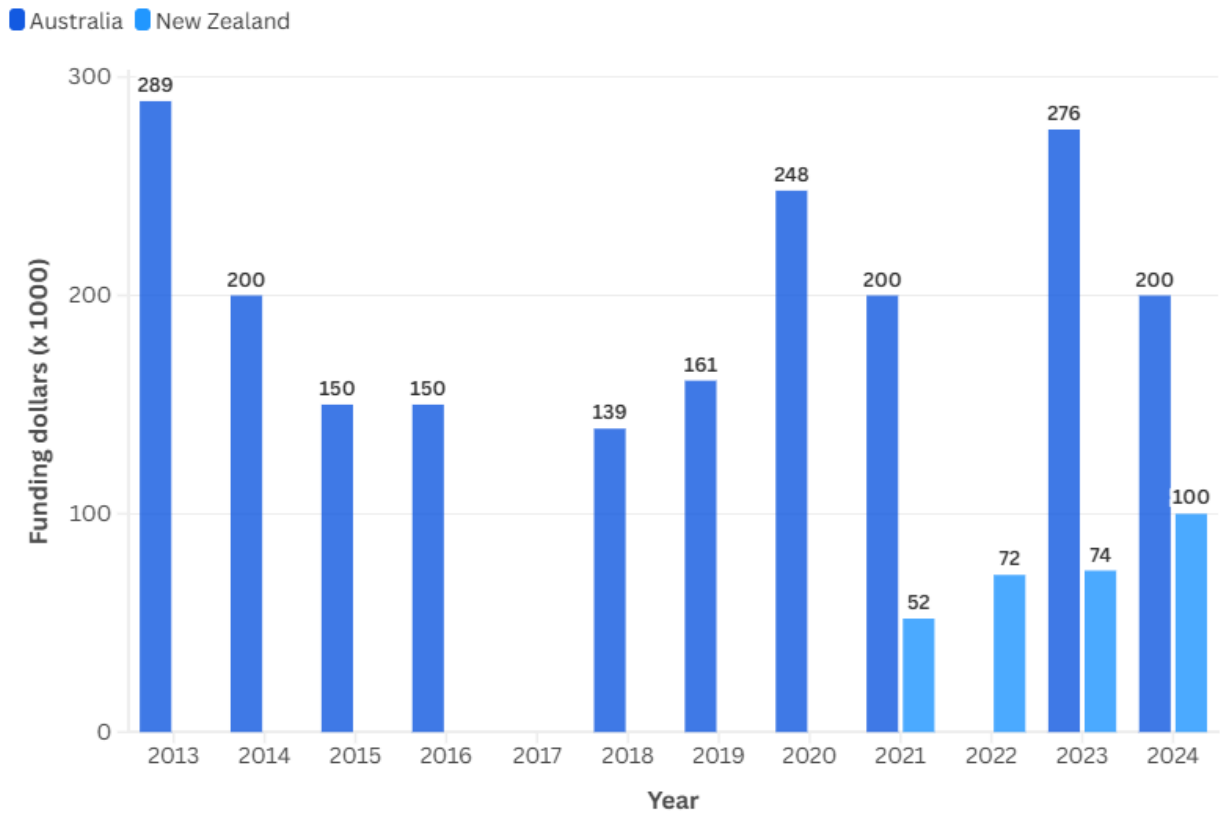
The history of ANZIC legacy funding reflects ongoing evolution and adaptation to support the changing needs of the ANZIC community as they pursue scientific excellence. It's a story of visionary funding transforming research potential into valuable outcomes, ensuring that the quest for knowledge continues to thrive.

Learn: Appraisal of ANZIC's legacy funding

In 2024, in recognition of having awarded over $2 million in legacy funding, ANZIC undertook a comprehensive appraisal of the scheme's reach, implementation, and impact. This comprised a careful analysis and audit of funding and award statistics, and a written survey of past recipients. The findings from this evaluation are presented in this section

Audit

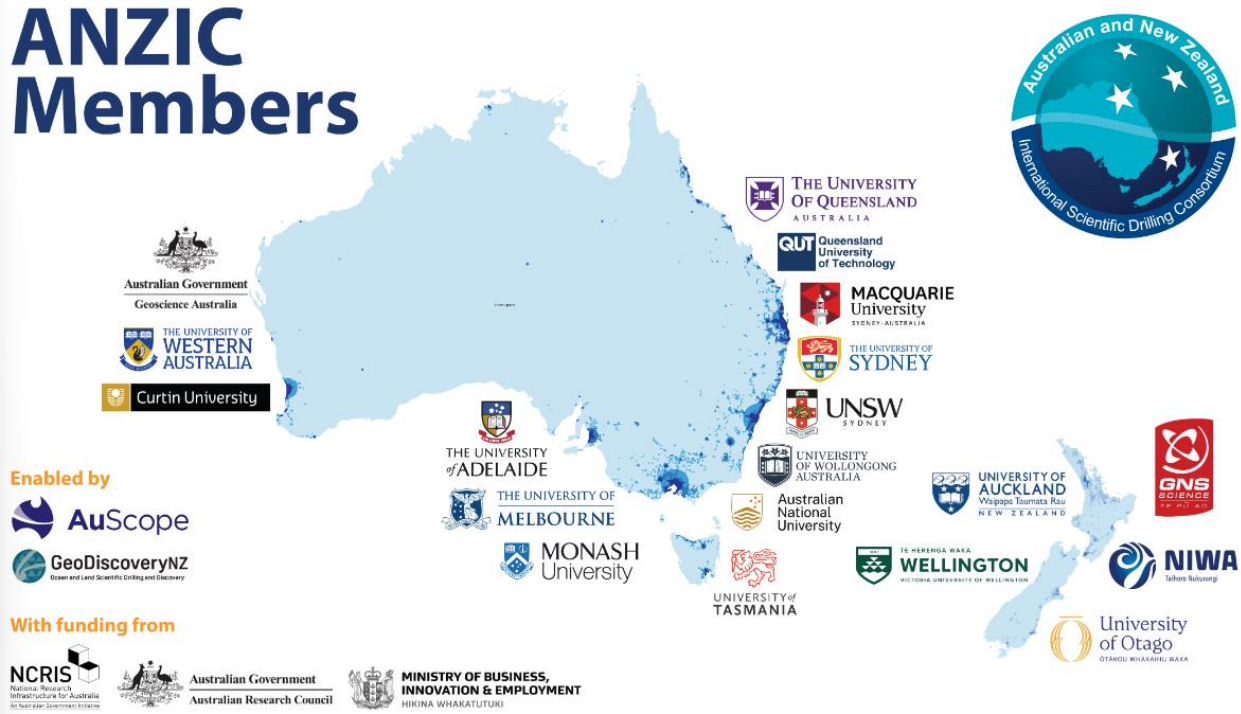
Since the inception of the ANZIC legacy funding scheme in 2013, until the most recent round in 2024, 126 grants have been awarded to 98 chief investigators. This amounts to a total of $2.3m, which includes ~A$2 million and ~NZ$300,000.



Legacy funding allocated per year in Australia and New Zealand.

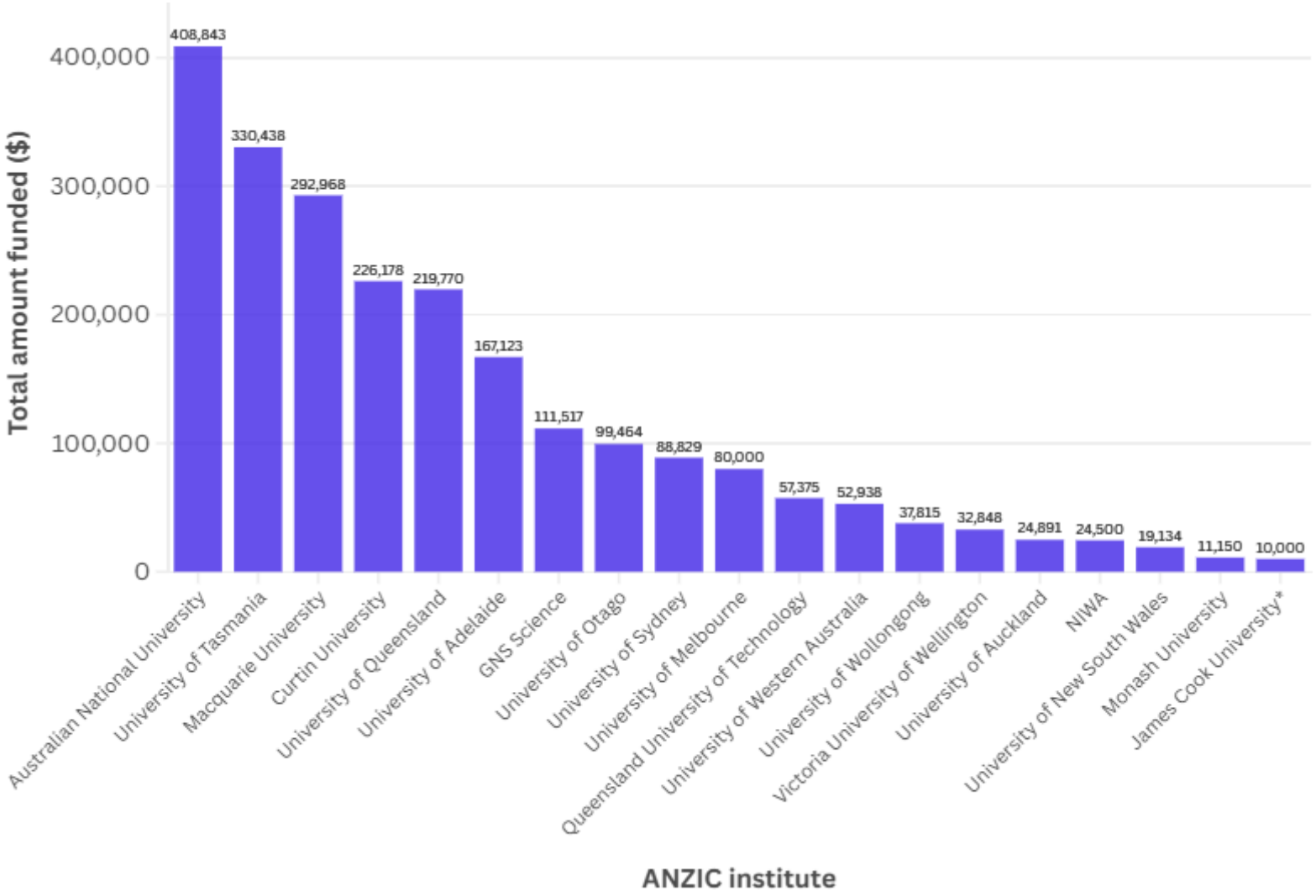
Grant success by ANZIC Institute

Over the years, the membership of the ANZIC has changed, reflecting an evolving commitment to collaborative scientific exploration. In 2024, the consortium comprised of nineteen prominent institutions from both Australia and New Zealand. This diverse membership underscores the wide-reaching and interdisciplinary nature of ANZIC's efforts in advancing scientific drilling research and fostering scientific excellence across the region.

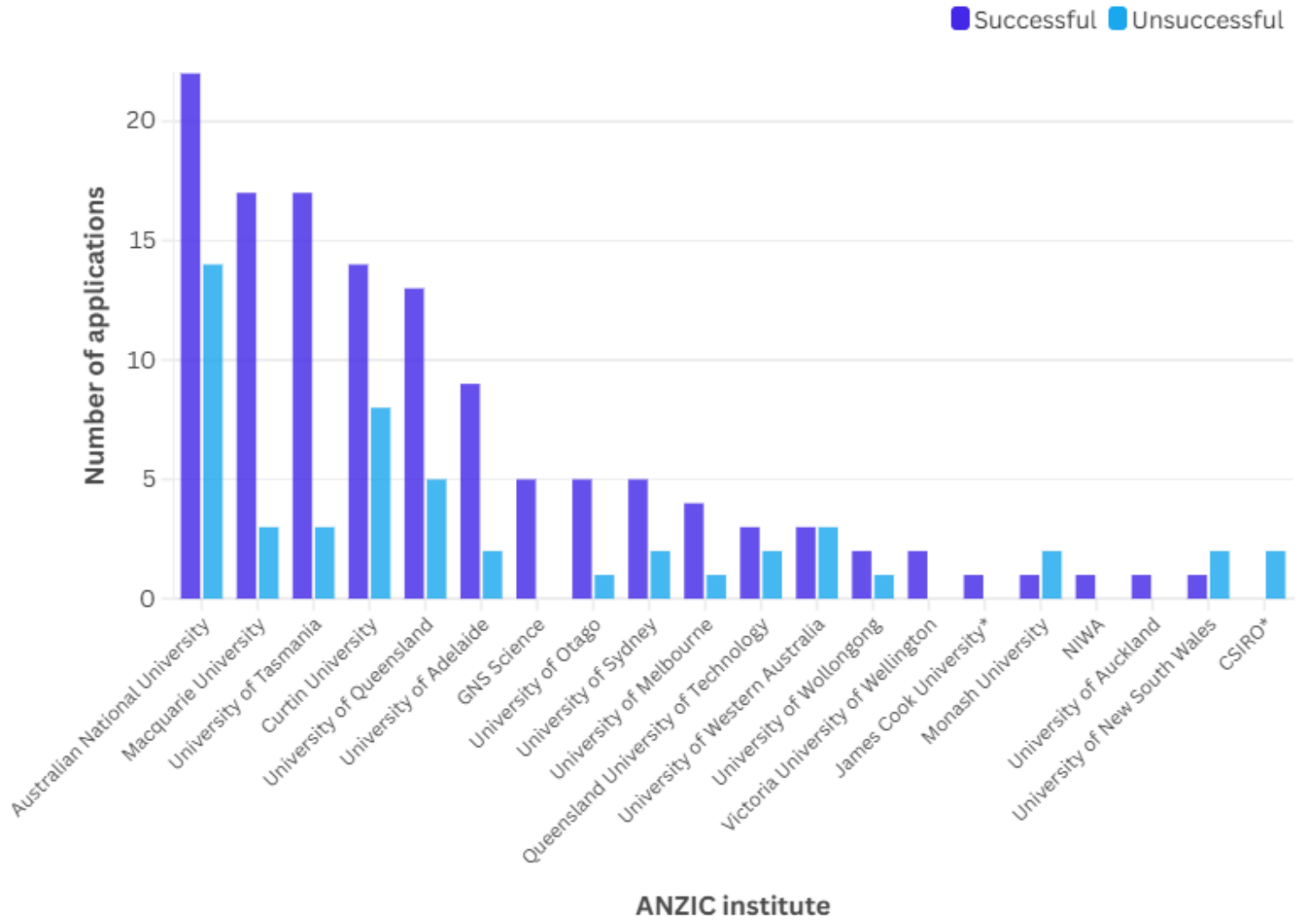


ANZIC member institutes in 2024.

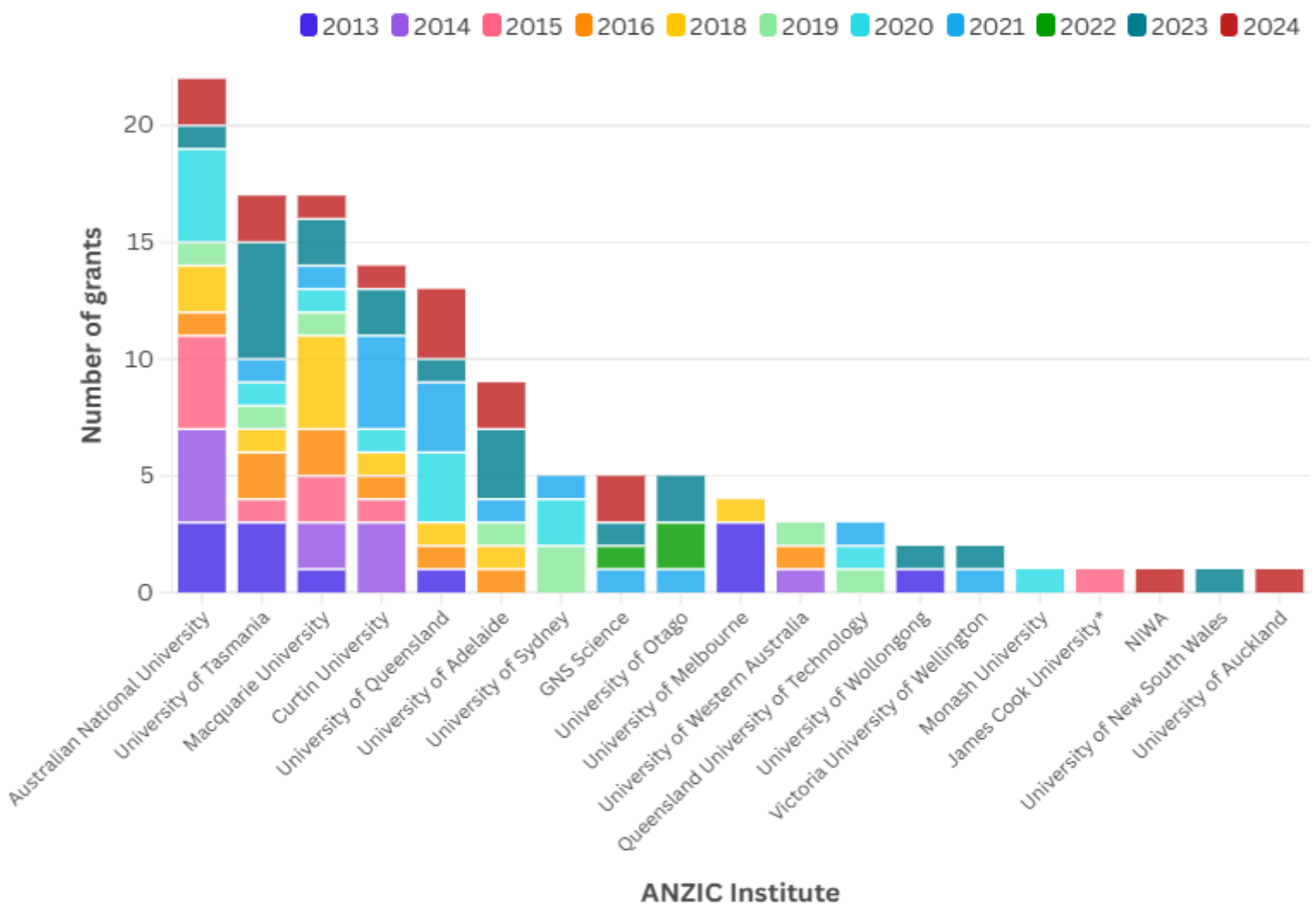
The audit of past recipients of ANZIC legacy funding revealed that The Australian National University, Macquarie University and University of Tasmania are the most successful Australian ANZIC member institutes both in terms of the number of successful applications and the amount of funding. In addition, University of Adelaide and University of Melbourne have relatively high success rates (>=80%). GNS and University of Otago have been the most successful New Zealand member institutes since joining the scheme in 2021.



*Total legacy funding awarded to each ANZIC institution from 2013 - 2024. *Former ANZIC member institute.*



*Successful vs unsuccessful legacy funding applications for each ANZIC institution from 2013 – 2024. Institutes are arranged by number of successful applications. *Former ANZIC member institute.*



*Number of successful grants awarded to ANZIC institutions, coloured by year awarded. 2017 is not included as no ANZIC legacy funding was awarded that year. *Former ANZIC member institute.*

*Application success summary for legacy grants funded by ANZIC from 2013 – 2024. Institutes ordered by number of successful applications. *Former ANZIC member institutes.*

Institute	Applications	Successful	Successful (%)
Australian National University	36	22	61
Macquarie University	20	17	85
University of Tasmania	20	17	85
Curtin University	22	14	64
University of Queensland	18	13	72
University of Adelaide	11	9	82
GNS Science	5	5	100
University of Otago	6	5	83
University of Sydney	7	5	71
University of Melbourne	5	4	80
Queensland University of Technology	5	3	60
University of Western Australia	6	3	50
University of Wollongong	3	2	67
Victoria University of Wellington	2	2	100
James Cook University *	1	1	100
Monash University	3	1	33
NIWA	1	1	100
University of Auckland	1	1	100
University of New South Wales	3	1	33
CSIRO *	2	0	0

The success of certain institutes may be attributed to factors such as their longstanding participation in the program, the presence of chief investigators who have been awarded multiple grants (with 16 individuals receiving more than one), and the high volume of applications submitted – suggesting that, in some cases, success may be a numbers game.

Improving the representation of member institutes who apply to, and are successful in receiving funding in, future CORE grant rounds may be achieved by refining communications strategies to ensure calls for applications effectively reach the intended audience within underrepresented institutions. This can be enhanced by engaging Science Committee members as key advocates or ‘influencers’ within each institute to promote opportunities internally.

Establishing mentoring programs for higher degree research students and early career researchers at institutes with limited IODP or ICDP involvement would also help build stronger networks and foster collaboration within and between institutes.

In response to these findings, and the needs of ANZIC's scientific community, ANZIC conducted an AILAF Grant Writing Workshop in July 2024. The Workshop supported first-time and previously unsuccessful applicants to improve the quality of their applications. Participants learnt from international core repository staff and past recipients of legacy funding who provided practical guidance and insights into accessing legacy materials and the application process. Resources from this workshop are available on the ANZIC website.

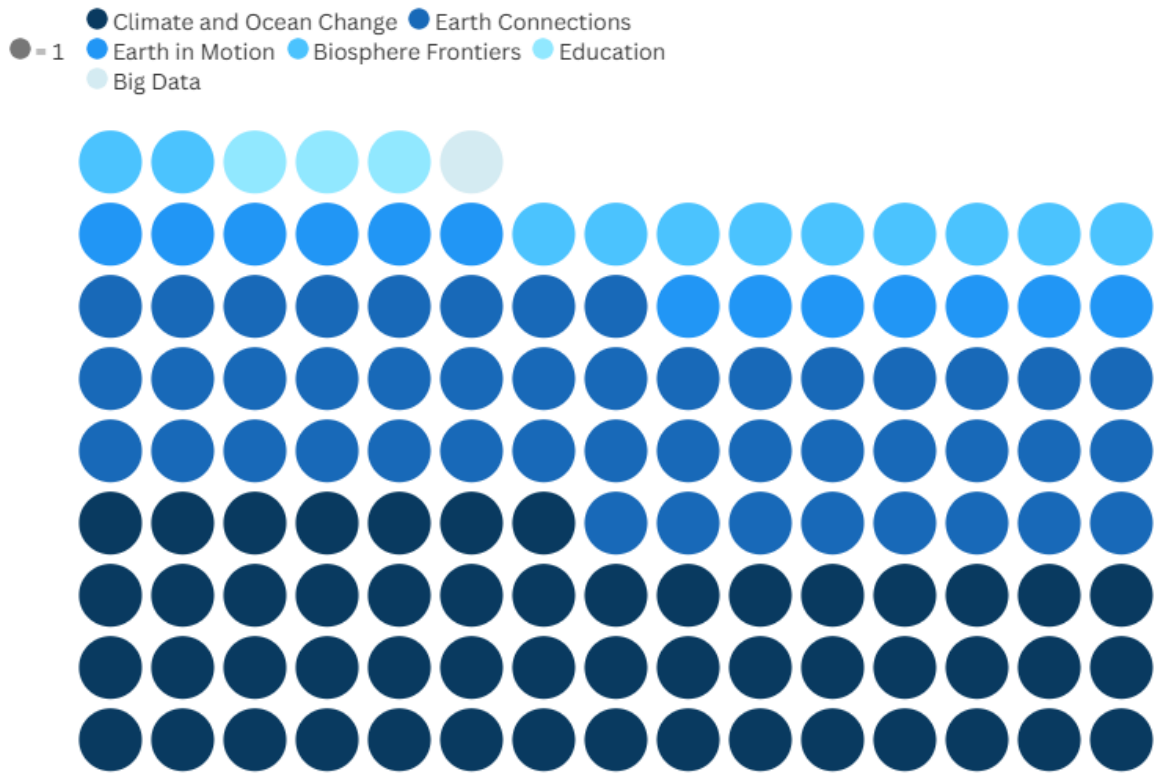
To further support first-time applicants, scientific experts from within the ANZIC community and/or office staff should be accessible to guide them in identifying legacy material that is both suitable and available for their needs and navigating the application process.

Research Themes

The IODP Science Plan covers a 10-year period from 2013-2023 and highlights four main themes:

- Climate and Ocean Change: Reading the Past, Informing the Future
- Biosphere Frontiers: Deep Life, Biodiversity, and Environmental Forcing of Ecosystem
- Earth Connections: Deep Processes and Their Impact on Earth's Surface Environment
- Earth in Motion: Processes and Hazards on Human Time Scales.

ANZIC legacy funding has supported a diverse array of research projects across all four themes. Fifty projects contributed to the Climate and Ocean Change theme and 46 explored Earth Connections. Additionally, 11 grants advanced our understanding of Biosphere Frontiers, 13 focused on Earth in Motion, and three were dedicated to educational initiatives. One grant delved into the realm of big data, highlighting the scheme's broad and impactful reach across various scientific disciplines.

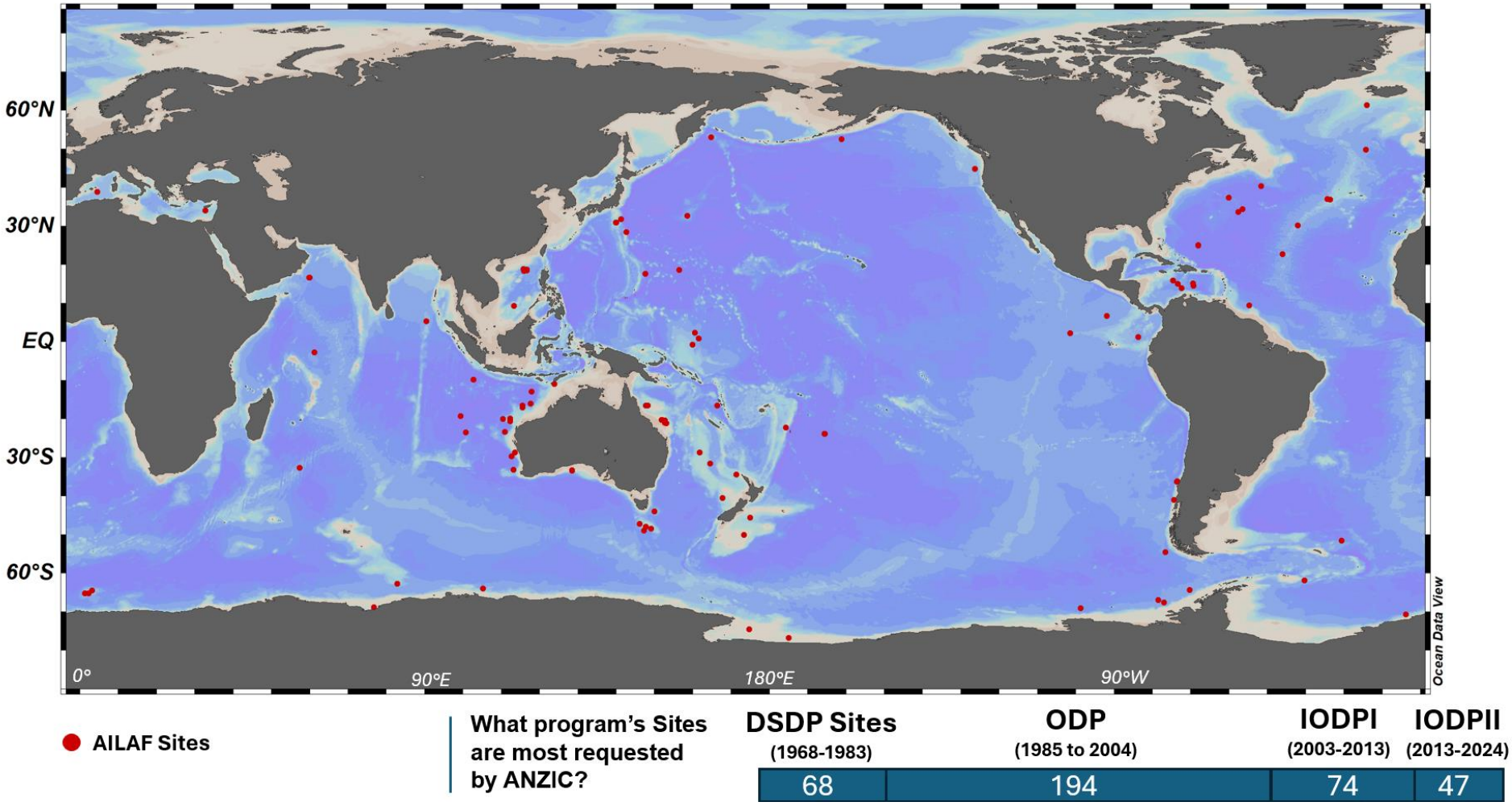


The number of successful projects funded in each IODP research theme.

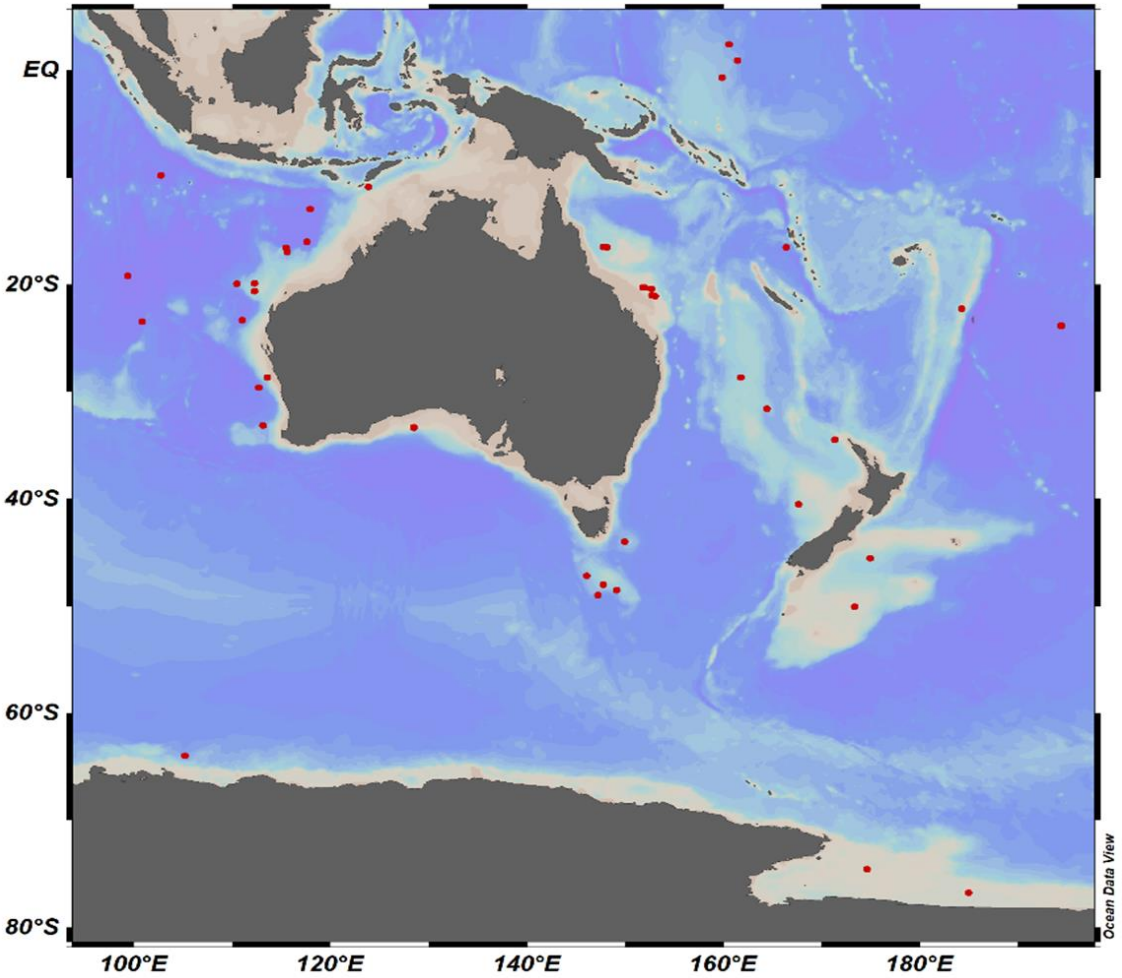
Locations of Interest

Requests for legacy materials span the extensive history of international scientific drilling. Samples have been requested from expeditions as early as DSDP Leg 15 which took place in the Caribbean Sea in 1970/71, to more recent expeditions such as IODP Expedition 382 - *Iceberg Alley and Subantarctic Ice and Ocean Dynamics* (2020/21). The continued demand for material collected more than 50 years ago illustrates the important role that legacy materials play in contemporary scientific investigations.

ANZIC has consistently supported projects that request legacy material from around the world, as well as in ANZIC waters. Researchers have frequently requested samples from expeditions conducted off the coasts of Australia and New Zealand, including ODP Leg 122 - *Exmouth Plateau* and ODP Leg 189 - *Tasmanian Gateway*. Projects have also drawn on material from further afield in our region, such as ODP Leg 192 - *Basement Drilling on the Ontong Java Plateau*, and Antarctic voyages like DSDP Leg 28, and IODP Expedition 318 - *Wilkes Land Glacial History*. These projects highlight the importance of the role ANZIC researchers play in advancing marine geoscience and fostering innovative research regionally as well as globally.



Global map of sites requested in ANZIC legacy funding applications from 2013 – 2023.



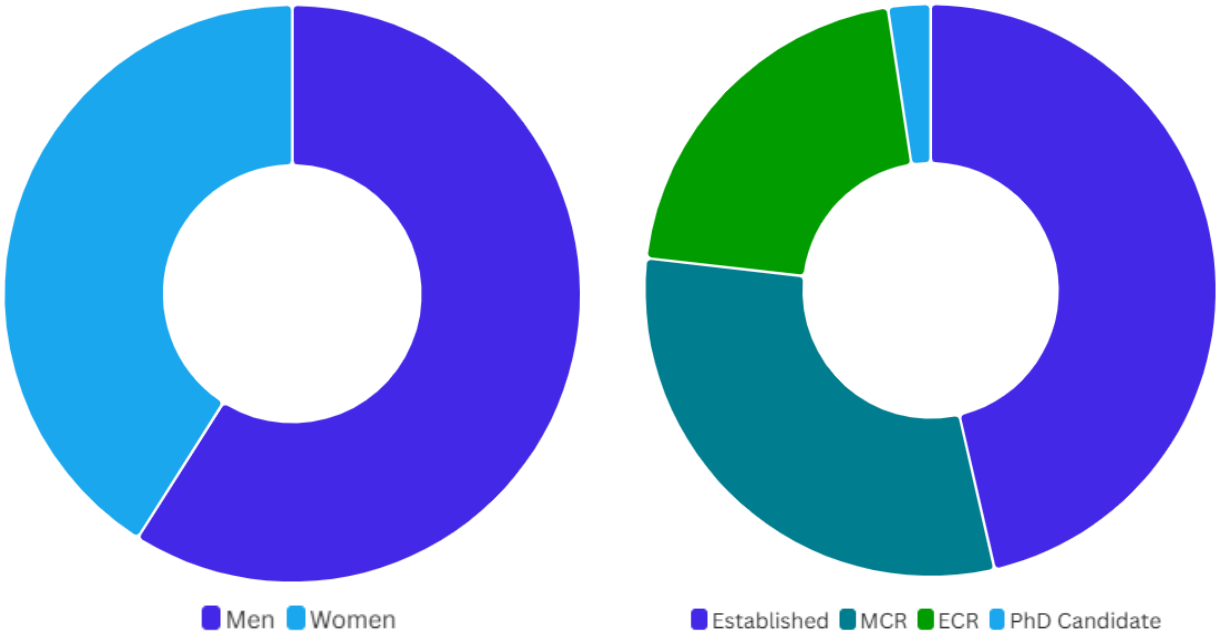
Regional map of sites requested in ANZIC legacy funding applications from 2013 – 2023.

Fostering Diversity and Mentorship

ANZIC's small grants to study IODP legacy material play a vital role in the inclusion of a more diverse group of researchers. These grants provide scientific opportunities for researchers who cannot commit to seagoing expeditions or continental drilling projects, which are lengthy, rare, and physically and mentally demanding experiences. By providing funding for research that utilises existing core samples and data, these grants make it possible for a wider array of scientists to participate in groundbreaking Earth science research. This inclusivity helps diversify the scientific community, bringing in fresh perspectives and fostering a more comprehensive understanding of geoscience.

Furthermore, these small legacy grants serve as a crucial stepping stone for those at the beginning of their research careers or transitioning into the field of scientific drilling. For students and ECRs, the grants offer a chance to gain valuable experience, develop their research skills, and contribute to significant scientific discoveries without the need for extensive sea-time. This accessibility not only broadens participation but also enriches the research community with diverse perspectives and innovative approaches.

By supporting a more inclusive range of researchers, ANZIC's legacy grants help ensure that international scientific drilling programs continue to advance scientific knowledge through a wide array of voices and expertise, fostering a vibrant and dynamic research environment.



Gender and career stage of the lead investigators of the 126 successful ANZIC legacy funding grants.

Legacy Funding Awardee Survey

Feedback from past awardees is crucial in evaluating ANZIC's legacy funding scheme. We invited all past awardees to complete a qualitative survey of their experiences. We received 42 responses, which highlighted the scheme's far-reaching impacts. These are explored in the section below in a celebration of the scheme's outcomes.

The survey also highlighted opportunities for improvement, helping ensure that CORE funding remains a relevant and valuable resource that fosters a strong and resilient scientific community. The future of the scheme is discussed in the final section of this report.

V.Diekamp MARUM

"Without AILAF funding the students would not have been able to complete their PhDs"

"AILAFs supports undergraduate research which is ideal to encourage the next generation to pursue Earth sciences."

Celebrate: Legacy Funding Outcomes

Driving Quality Research

The CORE program is proof that small grants can contribute big things to our collective scientific knowledge base. More than 50 peer reviewed publications credit ANZIC legacy funding as a funding source. In addition, the funding has contributed to the completion of at least 31 Masters and PhD theses and 9 undergraduate and Honours projects. These publications are listed in detail at the end of this report and we encourage you to delve deeper into their fascinating findings!

This sizable collection of published research, driven by ANZIC legacy funding, has been highly cited and appeared in high impact journals, including *Nature Geoscience*. In fact, the average impact factor of publications derived from ANZIC legacy funded research is an impressive 6.2.

Sharing knowledge within and outside of the scientific community is vital to encourage new research projects and to encourage and support the geoscience community and the results of legacy projects have been shared in dozens of presentations and media articles, in addition to the formal publications. ANZIC provided an additional platform for sharing the results of legacy projects at our CORE Legacy Forum in 2024 (see details below).

Word cloud of publication titles from ANZIC legacy funded publications.

Transforming Careers

ANZIC legacy grants have significantly bolstered the career trajectories of numerous researchers. One researcher remarked, "*It has helped me get my career in Australia started!*" while another highlighted winning a "*highly prestigious 1000 Talents Fellowship and started a new position, (where I subsequently won tenure).*"

ANZIC legacy funding paved the way for esteemed fellowships and academic honours. Another researcher noted that their grant *"led to an ARC Discovery Grant,*" showcasing the grant's role as a stepping stone towards securing more substantial funding.

> *"Three PhD students completed, helped in awards and securing ARC laureate fellowship!"*

These testimonies illustrate how ANZIC legacy funding serve as crucial catalysts for career advancement and long-term professional success.

The grants have also greatly facilitated the completion of advanced degrees. From the survey, it was evident that many lead senior investigators use ANZIC legacy grants to support undergraduate and postgraduates. By leveraging these grants, senior researchers can involve students in high-level research projects, providing them with hands-on experience and mentorship that is crucial for their academic and professional development. This support helps students gain practical skills, develop their research acumen, and contribute to important scientific findings early in their careers. The involvement of students in legacy-funded projects not only fosters the next generation of Earth scientists but also injects fresh ideas and energy into ongoing research.

Fostering Innovation

ANZIC legacy funding grants have also been instrumental in enabling researchers to pilot innovative ideas and demonstrate the feasibility of their projects. One awardee expressed anticipation for future studies inspired by their work, noting, "*I anticipate there will be several future studies inspired by this work, and it has influenced my future research directions.*" Another researcher emphasised the grant's role in securing larger-scale funding, stating that it allowed them to "*demonstrate the feasibility aspects of my research when applying for large scale grants*." The opportunity to explore new research areas is highlighted by another awardee, who shared that their successful project was their "*first foray into looking at this time period*."

> *"It helped carry out important research that otherwise would not have happened which established links with other organisations."*

Additionally, ANZIC legacy funding has fostered new collaborations and valuable links with other organisations. The support for interdisciplinary research is particularly valued, with one awardee describing it as "*very valued funding for interdisciplinary research that is otherwise very difficult to seed.*"

The grants have also provided follow-up funds essential for further testing and validating findings, with one researcher acknowledging, "*It was fantastic to get follow-up funds to further test our findings.*"

Educational Impact

As well as research, the CORE scheme now also provides funding for the development of educational and outreach resources. One researcher shared how their lesson plans, developed with ANZIC legacy funding, "*have been deployed in 2nd and 3rd courses at the University of Sydney and University of Tasmania for the past 3 years.*" Additionally, these lesson plans were provided to high-school teachers attending the NSW Science Teacher's conference, taking Earth science to new audiences and illustrating the broad educational reach and impact of ANZIC- funded initiatives.

2024 ANZIC Forum

On May 30th, 2024, the CORE (Celebrating Oceanic Rediscoveries & Exploration of Legacy scientific drilling collections) Legacy Forum gathered an enthusiastic group of researchers to celebrate the impressive advancements in scientific ocean drilling research made possible by ANZIC legacy funding. The event underscored the value of sub-seafloor core samples and data as rich resources for groundbreaking research beyond the realm of traditional geosciences.

Legacy projects have significantly advanced our understanding of the Earth, leveraging the wealth of data collected through the scientific drilling programs. At the forum we heard from 8 people, presenting the findings of their research supported by ANZIC legacy funding. The presentations spanned a diverse array of disciplines, from microbes to tectonics.

Speakers at the 2024 CORE Legacy Forum

Speaker, Affiliation	**Presentation Title**
Georgia Grant, GNS	Amplified surface warming in the south-west Pacific during the mid-Pliocene (3.3 – 3.0 Ma) and future implications
Kliti Grice, Curtin University	Microbial Mayhem: Recovery of microbial life after the end-Cretaceous extinction & during hot-house conditions
Teresa Ubide, University of Queensland	Tracking the growth and evolution of the oceanic crust using cryptic crystal archives
William F. Defliese, University of Queensland	The Halogen Composition of Oceanic Sediments

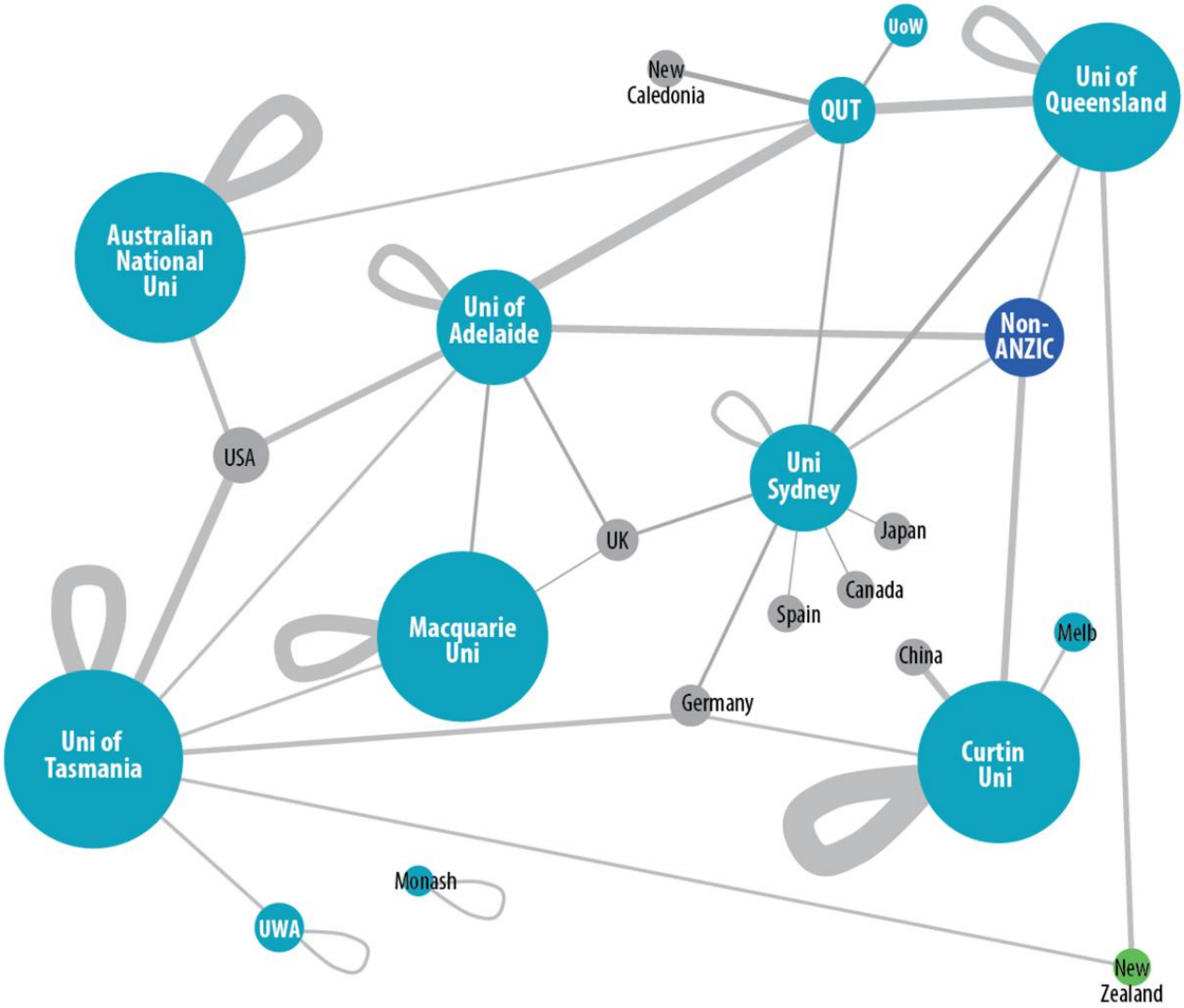
Indrani Mukherjee, University of New South Wales	Modern oceans tell an ancient story (better?)
Simon George, Macquarie University	Organic Geochemistry of Eocene to Oligocene sediments in the Tasmania Gateway – a detailed analysis
Grace Duke, University of Otago	Extension of stable isotope records at Site U1361 on Wilkes Land continental rise, East Antarctica
Sharmaine Verhaert, University of Adelaide	Unravelling the tectonic and metamorphic framework of subglacial East Antarctica using detrital garnet Lu-Hf geochronology

This forum not only celebrated past achievements but also set the stage for future discoveries. We look forward to the innovative projects and collaborations that will emerge from this inspiring event.

Collaborate: Combining Expertise

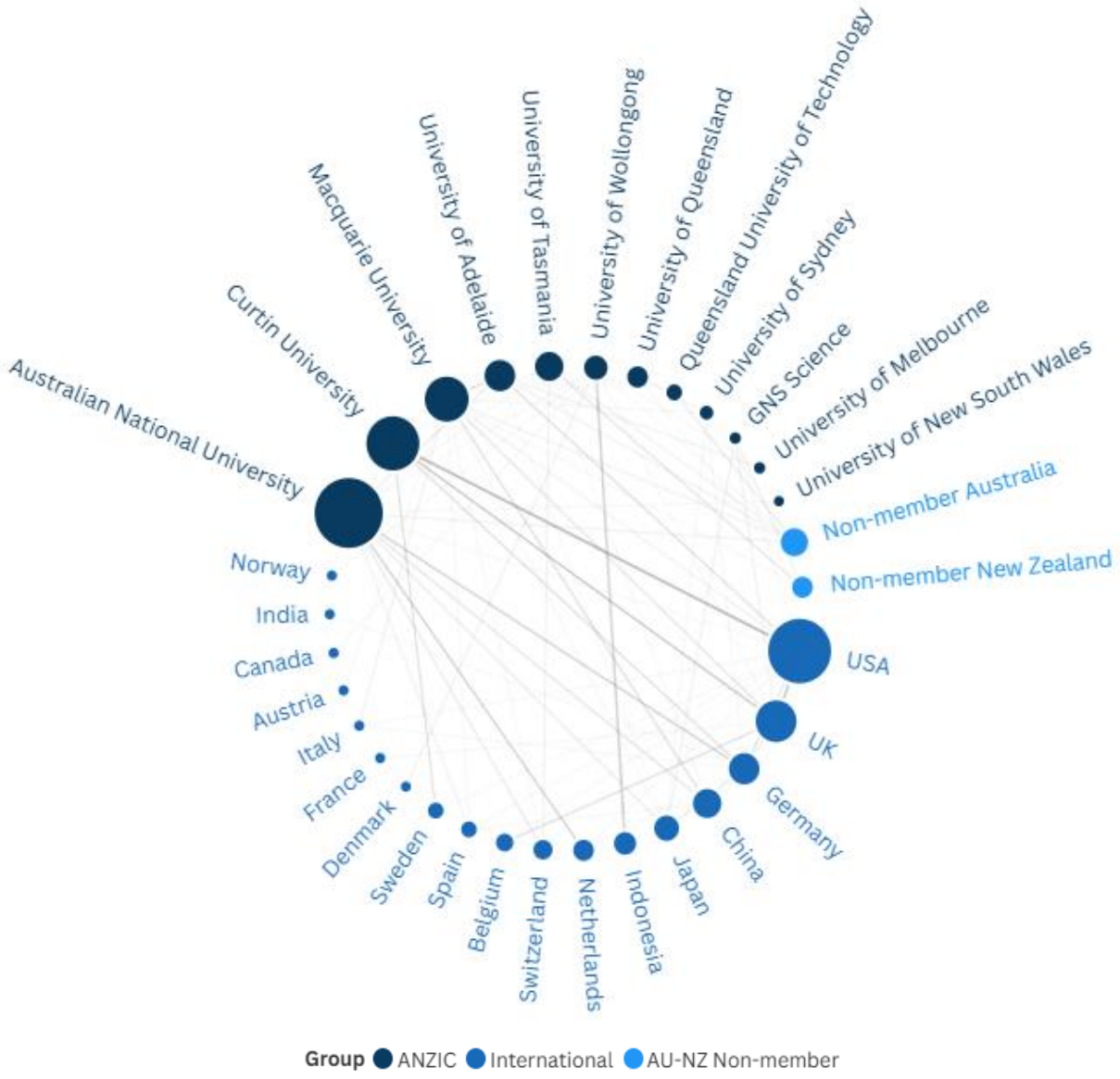
The collaborative nature of ANZIC legacy funded projects has been a cornerstone of their success. One awardee highlighted how their project was "*an essential foundation of my continued productivity during COVID as I was transitioning between positions and has resulted in ... new collaborations*." This underscores the importance of small grants in maintaining research momentum and fostering new partnerships, even during challenging times.

Notably, Australian non-ANZIC members, such as Flinders University, CSIRO, the Australian Antarctic Division, Southern Cross University, and Lithodat Pty Ltd, have also played significant roles in these collaborations. This interconnected web of relationships underscores the scheme's impact in fostering a robust and dynamic research community, driving forward scientific discovery through collective effort.



Listed collaborators on successful Australian applications for 5 funding rounds, between 2018-2023.The size of each circle represents the number of grants awarded to each institution during this period, highlighting prolific contributors within the network. Thicker grey lines denote stronger collaborative ties between institutions, indicating frequent partnerships and shared research endeavours.

In addition to domestic partnerships, ANZIC legacy-funded projects have also fostered valuable international collaborations as researchers from international institutes can be listed as collaborators. These global connections not only expand the scope and impact of Australian-led research but also enable access to complementary expertise, infrastructure and data that might otherwise be out of reach. International engagement strengthens Australia's role in addressing globally-significant scientific questions and the ANZIC legacy funding scheme helps position Australian researchers as integral contributors to the international scientific community.



The countries of listed authors on publications resulting from ANZIC funded legacy research projects. The reach of ANZIC small grants is global.

The Future of the CORE Scheme

By aligning our funding strategy with community-driven research priorities, ANZIC's updated CORE scheme aims to foster impactful scientific discoveries and address pressing societal and environmental challenges. We encourage all eligible researchers to submit innovative proposals that use legacy materials to further enrich our understanding of the Earth's systems and advance scientific drilling capabilities across our region and beyond.

Research Priorities

The further development of the CORE scheme will reflect the evolving research priorities identified by the ANZIC community. Future funding will be aligned with ANZIC's published science priorities. These priorities encompass vital fields: ground-truthing future climate change, geohazards, coastal zone dynamics, deep biosphere studies, indigenous engagement with geoscience, and coordination efforts focused on Antarctica and the Southern Ocean.

Appropriateness and Continuation of the CORE Scheme

The overwhelming consensus among respondents to the survey was that the scheme is an appropriate and necessary use of ANZIC funds. All respondents agree that the scheme should continue, emphasising its importance in supporting small-scale, high-impact projects.

Acknowledging the current decrease in geoscience capacity in Australia and New Zealand, expanding the scope of the AILAF scheme beyond scientific ocean drilling cores is crucial. By opening up this small legacy funding to encompass a broader range of research endeavours, we aim to strengthen the community's resilience and capacity. This approach not only supports diverse research initiatives but also fosters interdisciplinary collaborations that are essential for tackling complex scientific challenges.

Recommendations for Improvement

1. **Funding Amount**: While $20k AUD / $25k NZD is generally seen as sufficient, some respondents suggested increasing the funding range. For example, one participant recommended a range of $10k to $50k to support 1-2 larger projects per round, which could potentially achieve more significant outcomes. Another suggested increasing the maximum amount to $30k-$35k to cover more expensive analyses.

2. **Funding Duration**: Several respondents proposed extending the duration of the CORE scheme from one year to two years. This extension would provide researchers more time to complete their projects and address challenges such as delays in receiving samples from the core repositories.
3. **Flexibility in Funding Use**: There is a call for more flexibility in how funds can be used. One suggestion was to include provisions for travel expenses related to conducting analyses abroad.
4. **Strategic Funding Cycles**: It was suggested to set priorities for funding cycles, targeting different ANZIC strategic aims for each round. This approach could ensure that a wide range of research areas receive support over time.
5. **Inclusion Beyond IODP and ICDP Cores**: Some respondents recommended expanding the scope of the CORE scheme to include funding for work on other samples or datasets that could aid in developing new IODP and ICDP drilling initiatives. This expansion would support research in new regions where short cores or seismic data are available.
6. **Standardised Annual Call Schedule**: It was raised that ANZIC needs to establish a standard, predictable annual call for funding applications, with an extended open period to allow researchers sufficient time to coordinate and prepare their proposals effectively.

With minor adjustments in funding amounts, duration, and flexibility, the future of the CORE scheme can continue to drive innovation, foster collaboration, and support the next generation of Earth scientists. The feedback from past awardees underscores the critical role that legacy funding plays in the scientific community and provides a roadmap for its future enhancement.

Enhancing Visibility and Impact through Communication and Outreach

Despite its significant contributions to our understanding of the Earth’s processes, the IODP and ICDP often struggle with visibility outside the immediate scientific community. This lack of awareness can hinder broader support and appreciation for the program's work. By including dedicated communication, educational, and outreach activities in CORE-funded projects, researchers can help bridge this gap. These efforts can involve creating engaging educational materials, participating in public lectures, and using social media to share discoveries and insights. Enhancing the visibility of scientific drilling through these methods not only informs the public but also encourages new collaborations and funding opportunities.

By including components focused on communication and outreach in CORE-funded projects, researchers can translate their findings into accessible formats, engage with broader audiences, and highlight the relevance of scientific drilling to societal and

environmental issues. This approach not only amplifies the impact of research but also fosters public understanding and support for scientific endeavours.

Support for Pilot Projects and Legacy Initiatives

Legacy funding provides a crucial avenue for piloting drilling proposals or supporting newly developing larger legacy projects. Projects funded under CORE can serve as preliminary investigations or feasibility studies that lay the groundwork for larger-scale initiatives within the scientific ocean drilling programs. This aligns with initiatives from international scientific drilling partners such as LEAPS (Ocean Drilling Legacy Assets Projects), SPARCs (Scientific Projects using Ocean Drilling Archives) and ReCoRDs (Repository Core Re-Discovery Program), which promote international and interdisciplinary collaborations to maximize the scientific potential of existing core samples.

Peer reviewed publications

The following extensive list of publications have stemmed from ANZIC's legacy funding.

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Selected Theses

Amarathunga, U. (2023). *Mediterranean oceanography and North African climate over the Pliocene*. http://hdl.handle.net/1885/301844. Supervisor/s:Katharine Grant

Andrae, Jake (2019). Palaeo-Environmental Analysis of Australia During the Late Cenozoic [PhD Thesis, University of Adelaide]. Supervisor/s: Francesca McInerney

Bettina (2021). The end-Cretaceous mass extinction event--Recovery and evolution of life [PhD Thesis, Curtin University]. Supervisor/s: Marco Coolen, Kliti Grice

Chen, B. (2022). *Growth of the Preserved Continental Crust: Integrated U-Pb, O, and Hf isotopic systematics of detrital zircons from Australia and Antarctica*. http://hdl.handle.net/1885/267270 Supervisor/s: Ian Campbell

Danlei (2021). The Study of Lipid Biomarkers and Contemporary Microbial Communities in Early-Eocene Sedimentary Records at Chicxulub Impact Crater [PhD Thesis, Curtin University]. Supervisor/s: Kliti Grice

Mabee, A. (2018). Plume volcanism controls Site 1172 sediment provenance and deposition pre Antarctic Circumpolar Current [Master of Research, Macquarie University]. Supervisor/s: Nathan Daczko, Stefan Loehr

Sohaib Naseer (2023). Recovery of the deep biosphere at the Chicxulub impact crater [PhD Thesis, Curtin University]. Supervisor/s: Marco Coolen, Kliti Grice

Wu, J. (2025). *Unraveling the Influence of the North Atlantic Ocean on Atmospheric CO2 through Carbonate Chemistry: Insights from ODP Site 984*. https://hdl.handle.net/1885/733731454 Supervisor/s: Jimin Yu

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Successful AILAF Proposals by year

Table X: Successful AILAF proposals in 2013

2013			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Amy Chen	Macquarie University	Aus	A multi-proxy approach to address water column oxygenation change at the Paleocene-Eocene
Andrew McNeill	University of Tasmania	Aus	Sulphur and metal evolution in parental mid ocean ridge basalt magmas
Barbara Wagstaff	University of Melbourne	Aus	A 6 million year orbital scale record of the onset and variability of the Australian Monsoon: pollen evidence from ODP Site 765 northwest Australia
David Heslop	Australian National University	Aus	Searching for giant magnetofossils in the geological record
Frances Jenner	Australian National University	Aus	Trace element and volatile abundance systematics in the world's largest intraoceanic igneous provinces
Greg Webb	University of Queensland	Aus	Tahiti (IODP Leg 310) as a natural laboratory for studying coral and microbialite diagenesis.
Helen McGregor	University of Wollongong	Aus	Great Barrier Reef temperatures and paleoclimate from the LGM to present: Additional samples from IODP Expedition 325 "Great Barrier Reef environmental changes
Jon Woodhead	University of Melbourne	Aus	Constraints on the global subduction flux: state-of-the-art analytical approaches to determining the composition of the altered oceanic crust.
Mark Kendrick	University of Melbourne	Aus	Recycled and primitive halogens in backarc basins: Constraints from high precision Cl, Br, and I analyses of basaltic glass [ODP Leg 135 Lau Basin]
Masahiko Honda	Australian National University	Aus	Noble gas systematics in basaltic glasses from the Lau Backarc Basin: Characterisation of mantle sources, magmatic degassing, and crustal contamination
Taryn Noble	University of Tasmania	Aus	Southern Ocean's role in moderating glacial-interglacial variability in atmospheric pCO2: Decoupling nutrient cycling and ocean circulation
Zanna Chase	University of Tasmania	Aus	Links between Australian dust and marine productivity (ODP Leg 189: The Tasmanian Seaway and DSDP 593: Challenger Plateau)

Table X: Successful AILAF proposals in 2014

2014			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Gianluca Marino	Australian National University	Aus	Carobonate chemistry and temperature varibility in the deep Indian Ocean IODP 121
Hugh O'Neill	Australian National University	Aus	In-situ trace element and FTIR study of coexisting minerals in gabbros from the Southwest Indian Ridge
John Mavrogenes	Australian National University	Aus	Precious metal and isotopic systematics of quenched boninitic glasses of the Izu-Bonin forearc" on material from ODP Leg 125,
Kliti Grice	Curtin University	Aus	Objectives were to assess the suitability of core library stored shales for combined biomarkers and paleo genomic studies.
Leanne Armand	Macquarie University	Aus	Antarctic Piocene Warming ODP Exp 318
Liao Chang	Australian National University	Aus	Constraining the origin and environmental impacts of Eocene hyperthermal events by mineral magnetic analyses
Moyra Wilson	University of Western Australia	Aus	Carbonate pore systems evolution during birth to burial
Nicholas Timms	Curtin University	Aus	Searching for slippery nanopowders in earthquake-generating megathrust faults
Ronald Merle	Curtin University	Aus	Magmatism on the Iberia-Newfoundland passive margins since 200 Ma
Sophia Aharonovich	Macquarie University	Aus	Patterns of global climate changes during the Miocene Epoch based on evaluation of the biomarkers from IODP expeditions 313 and 317

Table X: Successful AILAF proposals in 2015

2015			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Brad Pillans	Australian National University	Aus	"The correlation of Toba-sourced tephra from Indian Ocean and South China Sea marine cores to a hominin-bearing sequence in central Flores, eastern Indonesia
Christopher Kirkland	Curtin University	Aus	Betwixt the WAC and the SAC: basement information recovered through detrital minerals and implications for the evolution of Australia's southern margin
Eric Roberts	James Cook University	Aus	Combined U-Pb zircon/detrital zircon geochronology & Lu-Hf analysis of Jurassic-Cretaceous Volcanic rocks and sandstones from the Queensland Plateau and Lord Howe Rise, Australia:
Ian Campbell	Australian National University	Aus	Are primitive MORBs sulphide saturated?
Jimin Yu	Australian National University	Aus	North Atlantic Ocean circulation, climate, and carbon cycle during past 150 ka
Jin-Xiang Huang	Macquarie University	Aus	Mg-isotope composition of altered oceanic crust
Katharine Grant	Australian National University	Aus	Paleo-temperature reconstructions in the Mediterranean Sea across TII using planktic foraminifera
Rebecca Carey	University of Tasmania	Aus	Chasing the Kerguelen Mantle Plume 'tail': investigating the Miocene to Holocene record of volcanism present in ODP Leg 183, Site 1138a cores
Stefan Loehr	Macquarie University	Aus	Constraining the impact of benthic meiofaunal activity on organic carbon burial in ancient oxygen-depleted sedimentary environments.

Table X: Successful AILAF proposals in 2016

2016			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Stewart Fallon	Australian National University	Aus	Addressing the critical need for radiocarbon-based stratigraphic control on the Gulf of Alaska Margin: IODP Exp 341
Hugo Olierook	Curtin University	Aus	Time constraints on the world's clearest oceanic curved fracture zone: implications for a global plate reorganisation in the Cretaceous (DSDP Legs 22 and 26
Leanne Armand	Macquarie University	Aus	Using ancient phytoplankton communities and genes to illuminate future ocean responses
Nathan Daczko	Macquarie University	Aus	East Tasman Plateau – onset of the Antarctic Circumpolar Current [Leg 189]
Cesca McInerney	University of Adelaide	Aus	Ecosystem change through the Neogene in Australia: documenting the rise of C4 vegetation (DSDP Leg 90 and ODP Leg 122)
Uri Shaanan	University of Queensland	Aus	Basement terrane of the Queensland Plateau (ODP Leg 133
Zanna Chase	University of Tasmania	Aus	ANZIC - Reconstruction of ocean (de)oxygenation in the South East Pacific over the last glacial cycle (IODP 202)
Sean Johnson	University of Tasmania	Aus	The establishment of ocean anoxia and ocean acidification during the PETM: Understanding the biological and chemical response on a regional and global scale."
Daniel Peyrot	University of Western Australia	Aus	Conjoint use of 3d seismic and palynological data to refine the Berriasian/Valanginian biostratigraphic zonation and characterize palaeoenvironments from the lower Barrow Group, northern Carnarvon Basin, North West Shelf, Australia (ODP Legs 762 & 763)

Table X: Successful AILAF proposals in 2018

2018			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Katharine Grant	Australian National University	Aus	African Humid Periods through the Pliocene
Laura Rodriguez-Sanz	Australian National University	Aus	Global ice-volume changes leading to the Mid-Pleistocene transition
Christopher Spencer	Curtin University	Aus	Contamination or treasure trove? Exploring the source of exogenic zircon signatures in drill
April Abbott	Macquarie University	Aus	Sediment provenance influence on neodymium records of ocean circulation through Quaternary
Christine Harper	Macquarie University	Aus	Organic geochemistry of Eocene to Oligocene sediments in the Tasmania Gateway – a detailed analysis
Nathan Daczko	Macquarie University	Aus	Melt-present deformation within the dynamic oceanic crust: recognition and rheological consequences
Stefan Loehr	Macquarie University	Aus	Massive subaerial volcanism associated with Oceanic Anoxic Event 2?
John Foden	University of Adelaide	Aus	Sediment subduction: the reflection and control of iron isotopic composition
Stephen Gallagher	University of Melbourne	Aus	Glacial-interglacial dynamics on the Irish margin during the Quaternary
Daniel Harris	University of Queensland	Aus	The influence of wave exposure on coral reef sea level records: Can wave energy resolve the
Martin Jutzeler	University of Tasmania	Aus	Eruption styles and periodicity of the silicic Sumisu

Table X: Successful AILAF proposals in 2019

2019			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Katharine Grant	Australian National University	Aus	Australian monsoon variability through the Pleistocene
Jody Webster	University of Sydney	Aus	Death by a thousand cuts: understanding the role of paleowater quality (high sediment & nutrient flux) in the growth and demise of the Great Barrier Reef over the past 30,000 yrs
Teresa Ubide	Queensland University of Technology	Aus	Taking the pulse of oceanic crust formation: unlocking the magmatic secrets stored in cumulate pyroxene crystals
Lucy McGee	University of Adelaide	Aus	Calibrating metal isotope proxies in modern hydrothermal environments for ancient ore deposit applications
Stefan Loehr	Macquarie University	Aus	Constraining the palaeodepth evolution of the South Tasman Rise and determining its role in development of the Antarctic Circumpolar Current ACC
Martin Jutzeler	University of Tasmania	Aus	Volcanic architecture and eruption behaviour at Site U1347 Izu-Bonin-Mariana rear-arc, IODP 350
Maria Seton	University of Sydney	Aus	Queensland and Marion Plateaus: the birthplace of eastern Australian volcanism?
Aleksey Sadekov	University of Western Australia	Aus	Evolution of Cretaceous foraminiferal geochemistry and its links to seawater carbonate chemistry

Table X: Successful AILAF proposals in 2020

2020			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Balz Kamber	Queensland University of Technology	Aus	Elemental fluxes from alteration of sub-aqueously emplaced plateau basalt
Bree Morgan	University of Sydney	Aus	Unravelling a trace element fingerprint for low-temperature dolomite formation in the Great Australian Bight
Helen Bostock	University of Queensland	Aus	Ocean circulation and Australian climate change across the Mid-Pleistocene Transition (MPT)
Ian Campbell	Australian National University	Aus	What is under the Antarctic ice?
Isabel Sauermilch	University of Tasmania	Aus	The Lost Atlantis between Australia and Antarctica - Pin down the subsidence of the South Tasman Rise
Katharine Grant	Australian National University	Aus	Oxygen isotope stratigraphy of IODP site U1464
Maria Seton	University of Sydney	Aus	Bringing ODP/IODP into the classroom: remote learning resources for marine geoscience
Mark Kendrick	University of Queensland	Aus	The timing of ocean floor carbonation and global Co2 cycling
Nathan Daczko	Macquarie University	Aus	Significance of syn-deformational melt migration for oxide enrichment in oceanic crust
Oliver Nebel	Monash University	Aus	Metal (re-) mobilisation in oceanic crust at Atlantis Bank (ODP Hole 735B, Leg 176)
Penny King	Australian National University	Aus	Identifying submarine volcanism in the Izu-Bonin-Marianas Forearc
Stewart Fallon	Australian National University	Aus	Understanding the origin of millennial-scale abrupt global climate changes
William Defliese	University of Queensland	Aus	Sea temperature reconstruction throu the Middle Miocene Climatic Optimum and Transition, central Campbell plateau ODP site 1120
Yebo Liu	Curtin University	Aus	Testing late cretaceous true polar wander on the Western Australian Margin

Table X: Successful AILAF proposals in 2021

2021			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Charlotte Allen	Queensland University of Technology	Aus	Tracking Tonga-Kermadec subduction initiation in mixed volcaniclastic-calcareous turbidites with U-Pb zircon geochronology and trace element geochemistry
Claudine Stirling	University of Otago	NZ	Interrogating the efficiency of the Southern Ocean's 'biological pump' through abrupt climate reorganisations.
Georgia Grant	GNS Science	NZ	Glacial/interglacial latitudinal temperature gradients in the Southwest Pacific during the mid-Pliocene: an assessment of climate model predictions.
Hamed Gamal EL Dien	Curtin University	Aus	Tracking the recycled carbonates into the deep mantle using Zn isotopes
Hugo Olierook	Curtin University	Aus	Did the Caribbean large igneous province cause the Turonian global oceanic anoxic event?
Jenni Hopkins	Victoria University of Wellington	NZ	Hunting for hidden ash: cryptotephra in IODP cores.
Jody Webster	University of Sydney	Aus	How high and how fast: new constraints on sea-level change and reef development during Marine Isotope Stage 3 (60-30 ka) from Great Barrier Reef and the North West Shelf.
Linda Armbrecht	University of Tasmania	Aus	Improving species identification from short sedimentary ancient DNA (sedaDNA) sequences: an addition to the sedaDNA assembly toolbox
Luc S. Doucet	Curtin University	Aus	Oceanic zircons and their apatite inclusions hold clue to Earth's mantle evolution
Lucy McGee	University of Adelaide	Aus	Metal isotopes applied to the start of subduction: testing the fluid transfer of copper from slab to surface
Mark Kendrick	University of Queensland	Aus	Evaluation of seafloor-carbonation feedback on atmospheric CO2
Milo Barham	Curtin University	Aus	Provenance ice-breaker: getting to know Antarctica's cryptic geological history through detrital feldspar Pb-isotopes
Nathan Daczko	Macquarie University	Aus	Mafic melt flux through oceanic rocks
Teresa Ubide	University of Queensland	Aus	Tracking the growth and evolution of the ocean crust using cryptic crystal archives
William Defliese	University of Queensland	Aus	The halogen composition of subducting oceanic sediments

Table X: Successful AILAF proposals in 2022

2022			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Agnes Reyes	GNS Science	NZ	Cycling of high-temperature fluids venting at Brothers Volcano revealed by microscopic studies of mineralogy, corrosion products and fluids trapped in crystals
Christina Riesselman	University of Otago	NZ	Calibrating the connection: Using the Southern Ocean's most highly-resolved Quaternary sediment record to illuminate the relationship between primary production and Antarctic climate
Christopher Moy	University of Otago	NZ	Reconstructing millennial-scale coupled atmosphere-ice sheet dynamics in the south Pacific during the Pleistocene

Table X: Successful AILAF proposals in 2023

2023			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Bryant Ware	Curtin University	Aus	Towards greater IODP digital discoverability via AusGeochem: A proof of concept
Catherine Beltran	University of Otago	NZ	Comparison of organic sea surface thermometers in the Southern Hemisphere
Chris Firth	Macquarie University	Aus	What really killed the Dinosaurs? A Southern Hemisphere perspective using novel geochemical proxies
Christian Ohneiser	University of Otago	NZ	Is the stability of Antarctic Bottom Water production really under threat?
Grace Duke	Victoria University of Wellington	NZ	Extension of stable isotope records at Site U1361 on Wilkes Land continental rise, East Antarctica
Indrani Mukherjee	University of New South Wales	Aus	Modern oceans tell an ancient story
Jacqueline Halpin	University of Tasmania	Aus	Past ice sheet change in western Wilkes Land, East Antarctica
Jo Whittaker	University of Tasmania	Aus	South Tasman Rise subsidence and its role in the onset of the Antarctic Circumpolar Current
Jonathan Tyler	University of Adelaide	Aus	Interglacial temperature change in the Mediterranean region through the last 630 thousand years
Linda Armbrecht	University of Tasmania	Aus	Characterising radiolarian assemblage change through time: a paleo-genomics approach (IODP Exp. 382)
Martin Jutzeler	University of Tasmania	Aus	Volcanic Record from West Antarctica, Amundsen Sea, IODP 379
Samuel Marx	University of Wollongong	Aus	A central Pacific sediment record of Australian dust export
Sarah Kachovich	Australian National University	Aus	ANZIC Mini IODP Cores Education Project
Shane Rooyakkers	GNS Science	NZ	Magmatic Volatiles, Metals, and the Magmatic-Hydrothermal Connection at Brothers Volcano
Sharmaine Verhaert	University of Adelaide	Aus	Unravelling the tectonic and metamorphic framework of subglacial East Antarctica using detrital garnet Lu-Hf geochronology
Simon George	Macquarie University	Aus	Organic matter inputs, depositional environment, and thermal maturity of Paleogene sedimentary rocks in the deep-water South China Sea
Stefan Loehr	University of Adelaide	Aus	75 Myr record of seawater metal isotope composition from authigenic clays
Thomas Williams	University of Tasmania	Aus	Identifying Signals of Antarctic Ice Mass Loss during Past Warming
Uwe Kirscher	Curtin University	Aus	Enhanced dust influx into the oceans related to hyper-arid periods in Arabia in the Pliocene
William Defliese	University of Queensland	Aus	Halogens in coral as paleoenvironmental proxies

Table X: Successful AILAF proposals in 2024

2024			
Primary Investigator	**Institute**	**Country**	**Proposal Title**
Alexander Francke	University of Adelaide	Aus	Reconstructing groundwater, surface runoff and rainfall recharge of Lake Ohrid (North Macedonia, Albania) during the current and last interglacial period using Sr isotopes
Catherine Ginnane	GNS Science	NZ	Exploring the long-term fate of organic carbon exported from New Zealand fjords
Chutian Shu	Curtin University	Aus	Temporal Dynamics of Mantle Heterogeneity: Geochemical Insights from Equatorial Pacific MORB Samples
George Rowland	University of Tasmania	Aus	Tracing dust sources to the southern Indian Ocean during the last glacial cycle
Gideon Rosenbaum	University of Queensland	Aus	Can soft collision lead to plate tectonic reorganisation? Revisiting the Ontong Java Plateau collision paradox
Greer Gilmer	GNS Science	NZ	Do Fiordland (NZ) sediment cores contain an untapped record of past earthquakes?
Ita Wulandari	Macquarie University	Aus	A Miocene-Pliocene Perspective on the Messinian Salinity Crisis: Organic Geochemical Evidence from the Alborán Sea Basin
Jess Hillman	NIWA	NZ	Unboxing the Ocean: a hands-on bathymetry exploration kit
Katharina Hochmuth	University of Tasmania	Aus	Middle to late Miocene development of the East Antarctic Ice sheet offshore the Knox Coast
Lorna Strachan	University of Auckland	NZ	Has the Hikurangi Subduction Margin undergone profound changes in accelerated Pacific Plate subduction during the last 1 Myrs?
Mark Kendrick	University of Queensland	Aus	Does the Hawaiian Arch have an anomalous alteration history?
Simon Haberle	Australian National University	Aus	Geophysical Survey of Lake Kutubu, Papua New Guinea - a potential ICDP coring site
Stefan Loehr	University of Adelaide	Aus	Testing the impact of early diagenesis on Si isotope fractionation in marine authigenic clays
William Defliese	University of Queensland	Aus	Characterizing the F and Cl content of terrigenous oceanic sediments
Yuhao Dai	Australian National University	Aus	Ancient CO2 levels in a modern world – How will the Southern Ocean respond?