GeoDiscoveryNZ
Ocean and Land Scientific Drilling and Discovery

Workshop Report: Shaping the Future of Aotearoa New Zealand's Involvement in Global Scientific Drilling Programs

Geosciences pre-conference workshop, 24 November 2025 held at the University of Auckland

GeoDiscoveryNZ: We coordinate geoscience discovery and research with relevance to Zealandia, the Southern Ocean and Antarctica, as part of the Australian and New Zealand International Scientific Drilling Consortium (ANZIC).

ANZIC: ANZIC gives scientists in Australia and New Zealand access to international projects, harnessing state-of-the-art scientific drilling infrastructure, so they can address fundamental questions about Earth's dynamic history, processes, structure and future.

Meeting aims:

Aotearoa New Zealand has a long legacy of contributions to international scientific drilling programs (DSDP/ODP/IODP/IODP^3, ICDP), driving discoveries in climate change, geohazards, etc. With funding for our participation up for renewal in 2026, this meeting was convened to help shape our future involvement. The half-day workshop aimed to:

- Celebrate our achievements
- Spark new ideas, through lightning talks about drilling proposal and new projects. Submissions were welcomed from all, especially early career researchers, and Māori and Pasifika scientists.
- Create the value proposition needed to secure ongoing funding, showcasing the societal, scientific, and cultural impact of scientific drilling.

Meeting Agenda:

1pm Introduction (Phaedra Upton, Ron Hackney, Joshu Mountjoy)
1:15pm Rapid fire drilling proposal updates
2:00pm Breakouts

- Continental drilling
- Piston coring
- Ocean drilling
- Online breakout

3:00pm Afternoon tea (30 minutes)
3:30pm Report back – what new proposals are on the table?
Next Steps – what is likely to be submitted for the January 2026 IODP^3 and ICDP rounds?
5pm Close

Update and infrastructure:

Update on IODP^3:

- Expeditions
    - 4 voyages took place in 2025, and a call was open for one expedition in 2026 (now closed)
    - SPARCs (Scientific projects using ocean drilling archives) are onshore expeditions for work on archive material
    - https://iodp3.org/expeditions/what-are-msps-sparcs/
- ANZIC has Associate membership of IODP^3 – involved in everything with most benefits of a full membership.
- Drilling proposal deadlines coming up in January and July 2026
- 23 proposals and two SPARCs already in the system

Other programs:

- US/NSF – there is still a lot of uncertainty about the US program, but proceeding as if it's going to happen; however, there is no action on proposals and no system in place for these; will use Mission Specific Platforms, where vessels will be hired for specific expeditions; Scripps manage the site survey databank
- China – Deep Ocean Drilling Program (DODP) was approved by the government; first expedition planned for 2026 in South China Sea; DODP is committed to IODP working principles; unclear how ANZIC will work with DODP.
- Other nations: Brazil – IODP^3 Associate Membership is likely; India – no funding for involvement in ocean drilling, but ICDP still active.

Overview of drilling infrastructure capabilities

- A bespoke approach now needed
- Deep water:
    - Chikyu – leaving Japanese waters is difficult and would require substantial funding.
    - Meng Xiang – similar capabilities to Chikyu; could potentially drill deeper – waiting to see what the DODP program looks like and how to get involved
    - Haiyang Dizhi Shihao – strong drilling capabilities; will be part of DODP
- Mission Specific Platforms (MSPs) – several available; ECORD scientific drilling model is using these. We'd have to leverage on work happening in Australia or in other local waters. Options include:
    - ESNZ vessels RV Tangaroa & RV Kaharoa – short piston coring, ROVs, site surveys, seismic
    - Australian vessels – Nuyina, Investigator
    - Seafloor drilling – MeBo (Germany, operated from the Sonne), PROD5 (UK), Hainiu II (China)
    - Borehole Observatories – CORKs, Genius Plus
    - AIDD – Ice drilling rig, developed for SWAIS2C

3-minute talks – proposals and planned proposals:

Dan Bassett: IODP 959-pre: Probing the physical controls on a locked vs. creeping megathrust, Hikurangi Subduction Margin

- Pre-proposal was submitted in 2019 with the *JOIDES Resolution* in mind
- Builds on IODP Exp 371 and 375 – Hikurangi Margin
- Site surveys have been completed, then the system went through change
- Invited to submit full proposal
- Require a vessel with deep drilling capabilities

Jamie Howarth: Hikurangi: a natural laboratory for seismogenesis

- Consortium of the paleosiesmology community met recently in Taiwan for Land 2 Sea Shaking workshop
- Agreement that the Hikurangi margin is a natural laboratory for seismogenesis
- A distribution of sites along the margin have been identified
- Between 15 and 30 giant piston core sites
- IODP^3 giant piston coring pre-proposal being worked on – submission aimed for July 2026 round
- Also looking at archive seismic data
- Two other NZ projects, in earlier stages of development, also discussed at the workshop – Puysegur subduction zone and Kermadec
- Discussions on getting the *Kaimei* out here to drill; need to refine the strategy and scaffold proposals to get the ship out here

Rob McKay: SPICE-GIRLS: Southern Pacific Ice, Climate and Ecosystems

- 40m piston cores in the Southern Ocean
- Looking at ACC dynamics
- Auckland Islands – wind record
- Macquarie and SE Indian Ridge Sediment Drift
- Ross Sea Gyre – also looking at sites undrilled during IODP 374 due to technical issues
- *Polarstern* cannot go below 60^0 south, so looking at longer piston drilling
- Does not require site survey data
- Aiming to submit July ’26 or Jan ‘27

Gary Wilson: FACET: Fiord records of Southern Hemisphere Climate, Carbon and Tectonics

- In the mill for a while
- ICDP workshop completed
- Recovering long climate records and carbon burial; quantifying the impact on the carbon cycle, also obtaining paleoseismic activity record – quantify earthquake risk model
- Vessel identified: Seaworker – bigger platform than previous vessel; will be perfect for fjord drilling but needs a moon pool added back.
- Proposal to be submitted in January (subsequent note this was submitted as planned); drilling planned to commence in winter 2026

- Money already set aside from Endeavour Programme to get going
- Webster drilling working on getting the vessel ready

Isabel Chambefort: Deep drilling in central North Island for geothermal

- Investigating the viability of supercritical geothermal capability
- Deeper than conventional geothermal – 4-6km vs. 2-3km
- In parallel, the government is looking at extending from initial drillhole to a 3-well campaign
- Deep heat research focus – collaboration with Japan, also with Iceland and the USA
- Parallels with supercritical drilling in Japan happening by 2027/28
- Aim is baseload energy generation
- No ICDP proposal, as the cost is too large – c.$60 million for the well design and drilling alone

Ian Wright: Natural Hydrogen within convergent margins – globally unique NZ

- 5-15% of current global emissions cannot be electrified – natural hydrogen could be a solution (green hydrogen is proving to be prohibitively expensive)
- NZ is globally unique with having 5 of the 6 processes to potentially generate natural hydrogen
- Similar project happening in Oman for carbon sequestration, also Horoman, Japan
- Ideas for drilling are entirely on land, potential drilling targets
    - Hydrogen systems, serpentinization, Jackson et al. 2024
    - Hydrogen generation injection experiments, Hand 2023
    - Biotic processes and trap architecture – onshore Hikurangi margin
- In some places, drill to 4km and need ability to inject at pressure; keep in mind pressure and casings

Joshu Mountjoy: Offshore groundwater drilling

- NZ is very dependent on groundwater resources
- Global water stress; climate change impact
- There are known large offshore reserves
- Lots of work already done; 2020 995-Full IODP proposal to drill Canterbury Bight; very well reviewed, but there are some hurdles (site survey data is insufficient and additional third-party funding to cover extra costs needed)
- RV Tangaroa voyage including focus on Hawke's Bay groundwater is scheduled for May 2026
- Pegasus Bay PhD completed on offshore groundwater system
- Previously approved RV Sonne voyage for new site survey data in Canterbury Bight to be submitted in December 2025
- Could we bring the international community to Aotearoa New Zealand for a Magellan[3] workshop?

Breakout room discussions:

Below is a summary of the discussions that were had in the three separate groups.

Online

- Build a **series of linked regional proposals** using shared drilling capabilities and aligned science goals; strengthen international connections.
- Use **piggy-back projects** alongside funded work.
- Meet at the **International Sedimentology Congress (Jan 2026)** to coordinate.
- Strengthen **comms, outreach, and indigenous involvement** from the outset.
- Strong support likely for **giant piston coring (GPC)** projects.
- What about holding an **early -2026 workshop** on GPC, observatories, and paleoseismicity (virtual may work best); keep Puysegur and Kermadec discussions partially separate.
- **ANZIC Comms Plan** in development—need broad engagement (talks, displays, interactives, courses, videos).
- Puysegur well -suited for a **land-to-sea turbidite paleoseismology** concept, but still early stage.

Ocean

- Strong interest in **giant piston coring**, but vessel commitment still uncertain.
- **Eastern Australia drilling activity** might help bring seafloor drilling capability south (mostly deeper drilling, not GPC).
- Need a **desktop engineering study** to assess adding a drill system to the *Investigator*.
- **MeBo** involvement in IODP[3] possible, though backlogged.
- Explore **developing in-house capability** using NZ vessels.
- ***Marion Dufresne*** may offer regional opportunities for GPC.
- JAMSTEC vessel *Kaimei* is also an option, but how far south can it go?
- **Deep-water drilling** options uncertain — possible but unclear availability (e.g., ***Meng Xiang***).
- **Groundwater programme** needs maturation; a **Magellan[3] workshop** could advance it (July 2026 deadline).
- **Indigenous engagement** already progressing through Brad Moggridge.
- ***Seaworker***, currently being set-up for FACET, will be a major new NZ capability once operational.

Continental

- Need a **science question** that fits community needs, commercial interest, and the **ICDP mandate**.
- **Natural hydrogen**: high interest but high uncertainty; technical and biological challenges; possible fallback to **low temperature geothermal**.
- **CALDERA** requires clearer societal/economic impact; currently paused.
- **Geothermal**: focus on deep permeability, impacts on groundwater, and high temperature-temperature drilling challenges.

- Need mechanisms to **integrate commercial partners** in ICDP/IODP[3]; manage **data moratoriums**.
- Opportunities: **volcanic maars**, **Alpine Fault revisit**, **deep subsurface flow/aquifers** (complex but important).
- NZ could act as a **geothermal instrument testbed**, with iwi perspectives and cost considerations.
- **ICDP allows commercial co-funding** with open data and strong social licence. ICDP recently instigated a fast-track full proposal process, which could benefit opportunities tied to industry activities.
- Funding available for **outreach and students** (NZ CORE + out-of-cycle).

Summary

Strategic Vision

Create a connected suite of proposals, rather than isolated projects, packaged around:

- Shared drilling capabilities (giant piston coring, seafloor drills, geothermal & hydrogen wells, SWAIS sub ice drill)
- Common science goals (paleoseismology, groundwater systems, geothermal flow, natural hydrogen, deep crustal processes)
- Integrated observatories for hazards, groundwater and deep subsurface monitoring
- Joint communication, indigenous partnership, and social licence frameworks
- Strong links with the international community through workshops aligned to the new IODP[3] science priorities and ICDP science priorities.

Overall Strategy: Build a Regional Programme, Not One-Offs

Goal: Deliver a coherent suite of linked proposals (ICDP/IODP[3] + commercial partnerships + national funding) that:

- Share drilling capabilities (especially giant piston coring; observatory-ready)
- Share science goals (paleoseismology, groundwater, geothermal, natural hydrogen, deep subsurface flow)
- Are cross-linked (data, methods, team), including international partners
- Factor in communication, indigenous partnership, and social licence from day one

Actions:

- Write a workshop report and circulate
- Investigate options for virtual-only workshops early next year

Update on Actions

- These notes will serve as the workshop report

- A lunchtime discussion of ~25 people was held during the International Sedimentology Conference in Wellington, 29th January. The meeting was chaired by Charlotte Pizer. Minutes from the meeting will be circulated soon.
- The FACET proposal was submitted to ICDP in January.
- ANZIC held a similar workshop at the AESC on 2nd February in Melbourne. The focus of the participants was to learn about ANZIC and/or discussion of impact.

Suggested next steps for the community

- Stand up a 2026 workshop focused on giant piston coring (GPC), observatories, and paleoseismicity to align science goals, capabilities, and proposal scaffolding across teams – discussions in progress
- Regular meetings chaired by GDNZ with the aim of facilitating a connected suite of Giant piston Coring proposals for the Jul 2026 Jan 2027 IODP3 rounds – Joshu Mountjoy
- Work with the Australian Marine National Facility to facilitate a desktop engineering study on adding a seabed drilling system to RV Investigator that clarifies feasibility, costs, and timelines—key to regional capability and scheduling – Ron Hackney (ANZIC)
- Investigate a Magellan^3 community workshop proposal to mature the offshore groundwater programme – Joshu Mountjoy
- Advance near-term platform readiness and access pathways—progress *Seaworker* operationalisation for fjord drilling; explore NZ in-house capability on local vessels – associated with FACET proposal.
- Keep options open with MSPs/MeBo/*Marion Dufresne*/*Kaimei*/deep-water assets (e.g., *Meng Xiang*) as availability clarifies.