

## SYNTHESIS OF THE INDEPENDENT SCIENCE PANEL'S REVIEW OF THE PLATFORM

*[A Position Paper for the Antarctic Science Platform's Midterm Review]*

The Independent Science Panel (ISP), comprised of eleven highly respected international Antarctic researchers<sup>1</sup> (see Annex), provides ongoing strategic advice and independent science peer-review of and for the Platform. The ISP's collective experience, insights, observations, and suggestions offer valuable feedback to ensure continuous improvement, focus, high-quality and refinement of science goals.

To support the Platform's midterm review, in early 2022 the ISP assessed the performance of the Platform to date, the research activities planned for the remainder of the current contract, and what a second tranche of funding should consider. Specifically, the ISP were asked three high-level questions:

1. What are the strengths you see in the New Zealand / Platform research community?
2. Where are the opportunities for New Zealand / the Platform in an international context?
3. What are the gaps and where should we be building capability?

The ISP members' responses were presented and discussed in a workshop in March 2022, attended by the ISP members and the Platform's Steering Group, the joint Deep South-National Science Challenge / Antarctic Science Platform Kāhui, the Platform Leadership Team, Principal Investigators, and Expert Group Chairs, as well as key influencers from end-user organisations (MPI, MFAT, MBIE).

In addition to the questions listed above, the workshop accommodated discussions on Special Topics, which also informed the Platform review:

1. Planning for science while building a new base
2. Minimising the carbon footprint of research
3. Integrating sea ice research across the Platform

**This document seeks to summarise the key observations and recommendations arising from this ISP review and workshop**, while also recognising that this most recent feedback builds on a substantive body of science reviews undertaken by the ISP since the inception of the Platform (see Annex).

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<sup>1</sup> [www.antarcticscienceplatform.org.nz/about/people/governance?group=independent-science-panel](http://www.antarcticscienceplatform.org.nz/about/people/governance?group=independent-science-panel)

## **PLATFORM STRENGTHS**

### *1. New Zealand's location and size is an advantage*

Aotearoa New Zealand's location provides ready access to the Ross Sea region, enabling the nation to be nimble and responsive. This region is also identified as an area of high scientific importance for global change, while also suffering a high vulnerability to the impacts of change.

Science is in a more elevated position in the New Zealand Government hierarchy and funding structure than in many other nations, in part due to the small population and accessibility of government agencies. Likewise, the New Zealand Antarctic system (combining research and policy) is the 'right' size, enabling effective interactions between government and science, when compared to other nations. This connectedness is a distinct New Zealand advantage that empowers science to influence policy, and vice versa.

### *2. The Platform is well designed and structured*

The ISP praised the overall design and funding/planning structure of the Platform. The cross-disciplinary science and teams are working well and are gaining international attention. The Platform is nimble and has demonstrated its ability to pivot and be innovative when needed so. There's a lot of resilience in the Platform for dealing with issues and challenges, and the team is open to advice.

### *3. Strong track record of high-quality science and leadership*

The Platform builds on decades of high-quality research, strategic capabilities, long-term datasets, and infrastructure investment in Aotearoa New Zealand, and continues to enhance this legacy in both physical and biological research. Examples of New Zealand's scientific leadership on major international programs include Cape Roberts, ANDRILL, SWAIS 2C, Siple Coast drilling, and ANTOS. The high-impact achievements and papers by the teams to date, are "punching above their weight" per capita for publishing Antarctic science. Added to this, valued assets include the nurturing of excellent early career researchers, establishment of a world-first national Antarctic modelling hub and a focus on interdisciplinary networks.

The Platform excels in communicating with other international programmes and forming fruitful collaborations. The positive reputation and international recognition positions the Platform to be a global influencer, ready to lead expanded national and international studies.

## **INTERNATIONAL CONTEXT**

### *4. Urgent questions can only be addressed from an international perspective*

The Platform has substantial expertise in looking at the past and modelling what may be coming in the future. But high priority science questions can only be addressed in the international context, working together. Science can't be delivered effectively without discussions and collaborations with international partners. The Platform should (i) Lead where the knowledge gaps match New Zealand's specialist capabilities and experience, and join in with others in the Antarctic system for other research areas; (ii) Identify partners with similar, compatible and overlapping needs and interests, and move from bilateral to multilateral collaboration; (iii) Explore the potential of establishing and leading an International Antarctic Science Program, funded by 20+ nations, similar to the IODP funding model.

## *5. Explore what is unusual*

Panel members highlighted an urgency Antarctic science advancement. Global temperatures are now 1.2°C above pre-industrial levels. The sharp increase in the frequency and intensity of extreme events in Antarctica (e.g., temperatures 40°C above East Antarctica's average) and around the world are concerning. Global temperatures continue to rise; at current trends global temperatures will have reached 1.5°C above pre-industrial temperatures in 5-10 years, and 2°C in 20 years. The Platform should investigate what is unusual as well as what is unique (e.g. cryosphere-ocean-atmosphere-ecosystem interactions) in both modern and historical Antarctic datasets.

## *6. Marine Protected Areas are a challenging topic for governance of the Southern Ocean*

The Ross Sea region is one of the better-studied parts of Antarctica and yet there's still much that remains unknown. Internationally, the discussion on how marine resources will be used are a priority. The Marine Protected Areas (MPAs), and their efficacy into the future, is becoming a challenging topic for governance of the Southern Ocean. Better knowledge of the Ross Sea region (RSR) MPA will inform principles and management practices to guide future Antarctic MPAs.

The effectiveness of the Ross Sea region MPA needs to be validated with quality science. A coordinated, international programme is needed to better understand the scientific and policy drivers that will impact the future of marine resources. Ross Sea MPA research is especially given the urgency of the approaching 10-year RSRMPA review in 2027. This is an opportunity for leadership in scientific discovery, science-to-policy, and the Antarctic Treaty System by New Zealand, but it requires reaching out to international partners to coordinate the strategic deployment of resources. This area of research should be a greater component of the future Platform, aiming to understand how drivers of ecosystem productivity vary spatially, and particularly how this might change with climate change.

## *7. New technologies, cost and carbon footprint will change science approaches*

A recent renewal of various Antarctic-capable vessels used by National Antarctic Programs and the New Zealand Defence Force, new relationships with fishing and tourist vessels, and continued international collaboration with on-ice field deployments provide exciting new opportunities to access new frontiers and grow international collaboration. However, the increasing cost of fuel and emphasis on minimising our carbon footprint might pose significant challenges. Developments in technologies, such as geospatial solutions, automated sensing, molecular sequencing, bioinformatics, modelling, machine learning and AI, and robotics, can drive considerable new science, and provide means to reduce field deployments. The Platform's new sentinel sites and ability to access under-ice shelf also offer new opportunities.

Scientific arguments can guide the Platform in reaching out to international partners on how best to deploy resources in Antarctica and the Southern Ocean in coordinated campaigns. Consequently, decadal planning is critical. There needs to be an understanding that science can't be delivered in short time frames, and long-term budgeting and international collaboration is essential.

## **FUTURE CONSIDERATIONS**

### *8. Design strategically*

The Platform needs to consider how local climate change impacts on infrastructure and ice/snow (i.e. useability, such as the ice runway and ice wharf) change field deployment approaches and be proactive. Succession planning is needed to attract, train and enhance the future Antarctic research and policy workforce.

The Platform's science priorities and impact statements stand strong, but it might be time for a refresh on the +2°C statement, as the envelope of the projected amount of global warming and rate of change has increased. A mixture of bottom-up, curiosity-driven, and mission-driven science is a good model. The Platform has unique and useful advantages in capability, and the ability to interlock with other nations. There's a substantial benefit in already having secured funding that remains unallocated and ready to foster international collaboration.

Think big, take risks and be ready for some failure. Make sure the governance and funding structure accepts and empowers this approach. Know there will be change and unanticipated surprises and disruptions. The cost of scientific research is radically rising, with the potential of curtailing some of the science you want to do. Scenario planning is critical, especially for uncertainties around logistics support and capabilities. Safeguard against the creep of admin control over science.

### *9. Align closely with policy needs and international interests*

Science can be hard to translate to stakeholders and to connect directly to impact. To bridge this gap, researchers need to know what government/policymakers need, and vice versa. Better mechanisms are needed to inform the science community about societal needs are. There are gaps in readily available information, and barriers to accessing expert guidance. However, the Platform has good connections. Policymaker and science priorities and needs are recorded (e.g. CCAMLR, CEP, SCAR, WCRP, UN SDG). The Platform should identify where it can have impact and align to such documents and stakeholder needs.

### *10. Communicate the value of Antarctic science*

The benefit of blue skies research, with long time horizons to impact, is hard to communicate to government and society. Often science (basic and applied) has to defend itself, and impactful science is not always the same as published-papers-science. Antarctic research must be able to show value – to secure funding, achieve impact and have social license. It is essential to clearly communicate the national goals for the Antarctic enterprise and Ross Sea region. The involvement of resource economists is recommended to quantify the economic value of climate change impacts, as well as determining the economic value of scientific knowledge, and the opportunity cost of not doing the research.

### *11. Bring the large-scale climate story to a sub-regional focus (and vice versa)*

The Platform, and the wider New Zealand Antarctic science community, has many strengths in modelling (e.g., ice-shelves, ice-sheets, paleoclimate records, polar components for earth system modelling, etc.), and the National Modelling Hub is an asset. Yet, there are still gaps and opportunities to match timescales, observations and models. Crossing scales is difficult, and scaling observations is difficult. Geophysics is needed at scale, and data gaps in physical and biological observations need to be filled. More closely connect geoscience and modelling communities. Through international collaborations, there are opportunities to bring the

large-scale climate story to sub-regional focus, and vice versa – to export catchment and regional data to bigger modelling initiatives and other experts.

#### *12. Special Topic: Integrating sea ice research across the Platform*

The Platform has implemented ample opportunities with the integration of data, observations, reconstructions and modelling across disciplines and scales. The Platform needs to prioritise key outcomes, as current ambitions exceed capacity. Seed projects have been an effective tool to recruit ECRs and to facilitate international collaborations. Gaps include: the role of sea ice in climate/ecosystem feedbacks, recent sea ice trends, and incorporating sea ice better into Earth System Models. Opportunities include: using machine learning to understand sea ice trends from satellite imagery, and increased computational capacities in New Zealand.

#### *13. Special Topic: Planning for science while building a base*

Scientists need to be included in the planning and construction phases throughout the entire process to ensure that science goals are integrated with planning and funding goals. Impacts can be best mitigated if the construction schedule can be predicted, but construction delays are expensive and impacts on science support is unavoidable. There is a need to be agile, flexible and adaptable. Weather delays, supply chain issues, etc., will also undoubtedly amplify the impacts on science.

#### *14. Special Topic: Minimising the carbon footprint of research*

“Carbon” = “Fuel” = “Funding”. Once this equation is understood, this relationship becomes a critical driver for reducing the carbon footprint across all partners and stakeholders. This constraint is a challenge, but also an opportunity to redesign how science is being conducted, and to lead by example. International collaboration will be even more important to increase efficiency and adopt solutions widely and quickly.

### **SUMMARY**

The Platform is a strong, strategically-focused, nationally and internationally collaborative research programme, delivering high impact achievements, and committed to a planning horizon well beyond the current contract length. The Platform can harness its many strengths to embrace high-risk / high-reward science goals, reflecting the New Zealand Antarctic community’s exceptionally high standing and an international community ready to collaborate on addressing grand challenges by working together.

This synthesis closes with a quote from an ISP member: “Seize the day – the Platform is remarkable and the international community stands ready to support and join your science goals and aspirations”.

## ANNEX

### 1. ISP Members

- ISP Chair [Prof. Rob Dunbar](#)
- [Prof. Byron Adams](#)
- [Prof. Celia Bitz\\*\\*](#)
- [Prof. Steven Chown](#)
- [Prof. Carlota Escutia](#)
- [Prof. Dame Jane Francis FRS](#)
- [A/Prof. Jill Mikucki](#)
- [Prof. Steve Rintoul](#)
- [Prof. Martin Siegert](#)
- [Dr. Sharon Stammerjohn](#)
- [Chris Thomson\\*](#)

Two ISP members indicated to stand down in \*March 2022 and \*\*July 2022]

### 2. Timeline of ISP science reviews since the Platform's inception

FY	ISP Activities
2018-2019	ISP established (9 members) ISP review of 4x core science project proposals (P1,2 and 4 recommended for funding)
2019-2020	ISP review of revised Project 3 science proposal (recommended for funding) Two new ISP members added to extend expertise (11 members)
2020-2021	ISP review of: (i) 4x core science projects (annual reports) and covid impact assessment (ii) 2x expert groups (annual reports) ISP sub-group review of 1x opportunity fund proposals (recommended for funding)
2021-2022	ISP review of: (i) Integration between Platform Expert Groups & Research Projects (ii) ASP Mitigation Strategies to Manage Anticipated Disruptions (iii) Integration of sea ice research across the Platform ISP sub-group review of 3x opportunity fund proposals (3x recommended for funding) ISP review of the Platform's strengths, gaps and international opportunities

### 3. Acronyms

Acronym	Definition
ANDRILL	Antarctic Drilling Project
ANTOS	Antarctic Near-shore and Terrestrial Observing System
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CEP	Committee for Environmental Protection
ECR	Early Career Researcher
IODP	International Ocean Discovery Program
IPCC	Intergovernmental Panel on Climate Change
MBIE	Ministry of Business, Innovation and Employment
MFAT	Ministry of Foreign Affairs and Trade
MPA	Marine Protected Area
MPI	Ministry for Primary Industries
NAP	National Antarctic Program
NSC	National Science Challenge
SCAR	Scientific Committee on Antarctic Research
SSIF	Strategic Science Investment Fund
UN SDG	United Nation Sustainable Development Goals