Proactive Release

Date: 15 February 2022

The following Cabinet paper and related Cabinet minutes have been proactively released by the Minister of Foreign Affairs

Title	**Reference**
Minute of Decision: Aotearoa New Zealand Antarctic and Southern Research Directions and Priorities 2021-2030	ENV-21-SUB-0071
Report of the Cabinet Environment, Energy and Climate Committee: Period Ended 10 December 2021	CAB-21-MIN-0530
Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities 2021-2030	
Annex	

Some parts of this information release would not be appropriate to release and, if requested, would be withheld under the Official Information Act 1982 (the OIA). Where this is the case, the relevant sections of the OIA that would apply have been identified. Where information has been withheld, no public interest has been identified that would outweigh the reasons for withholding it.

Key to OIA redaction codes:

- 6(a): to avoid prejudicing the international relations of the New Zealand Government;
- 6(b): to protect the passing of information from another government on a confidential basis;
- 6(e)(vi) to avoid damage to the New Zealand economy by the premature disclosure of decisions relating to entering into of overseas trade agreements;
- 9(2)(a): to protect individuals' privacy;
- 9(2)(ba): to protect the supply of confidential information by a third party;
- 9(2)(b)(ii): to avoid prejudice to the commercial position of another party;
- 9(2)(d): to protect the economic interests of New Zealand;
- 9(2)(g)(i): to protect the free and frank expression of opinions by departments;
- 9(2)(g)(ii): to protect officers and employees from improper pressure or harassment;
- 9(2)(f)(iv): the confidentiality of advice tendered by Ministers of the Crown and officials;
- 9(2)(h): to maintain legal professional privilege; and
- 9(2)(j): to avoid prejudice to negotiations.

CAB-21-MIN-0530

Cabinet

Minute of Decision

Report of the Cabinet Environment, Energy and Climate Committee: Period Ended 10 December 2021

On 13 December 2021, Cabinet made the following decisions on the work of the Cabinet Environment, Energy and Climate Committee for the period ended 10 December 2021:

ENV-21-MIN-0071 **Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities 2021–2030** CONFIRMED
Portfolios: Research, Science and Innovation / Oceans and Fisheries / Foreign Affairs / Conservation

Michael Webster
Secretary of the Cabinet

ENV-21-MIN-0071

Cabinet Environment, Energy and Climate Committee

Minute of Decision

Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities 2021–2030

Portfolios **Research, Science and Innovation / Oceans and Fisheries / Foreign Affairs / Conservation**

On 9 December 2021, the Cabinet Environment, Energy and Climate Committee (ENV):

1 noted that on 1 July 2021, ENV invited the Minister of Foreign Affairs to report back to the Cabinet Environment, Energy and Climate Committee on the public consultation process on the draft Antarctic Research Directions and Priorities, and provide a final version of the *Antarctic Research Directions and Priorities* for approval in late 2021 ENV-21-MIN-0035];

2 **noted** that submissions received during public consultation have been carefully considered and applied, where appropriate, to the *Antarctic Research Directions and Priorities*;

3 **approved** the *Antarctic Research Directions and Priorities* attached as Annex A to the paper under ENV-21-SUB-0071;

4 **invited** the Minister of Climate Change to join as co-signatory of the *Antarctic Research Directions and Priorities*;

5 **noted** the commitment to a review of the *Antarctic Research Directions and Priorities* no later than 2026, after which officials will report back to the Minister of Foreign Affairs, the Minister for Research, Science and Innovation, the Minister for Oceans and Fisheries, the Minister of Conservation, and the Minister of Climate Change.

Vivien Meek
Committee Secretary

Present:
Hon Grant Robertson (Chair)
Hon Nanaia Mahuta
Hon Damien O'Connor
Hon Stuart Nash

Officials present from:
Officials Committee for ENV

Offices of the Minister of Foreign Affairs; Minister for Research, Science and Innovation; Minister for Oceans and Fisheries; and Minister of Conservation

Cabinet Environment, Energy and Climate Committee

Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities 2021–2030

Proposal

1 This paper seeks Cabinet's approval of the *Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities 2021–2030* (the "Antarctic Research Directions and Priorities", appended).

Relation to government priorities

2 A robust and credible Antarctic research programme, guided by high-level government Antarctic Research Directions and Priorities, is fundamental to Aotearoa New Zealand's international reputation within the Antarctic Treaty system, the multilateral framework that governs Antarctica and the Southern Ocean.

3 Antarctic science is important to our understanding of the nature and impacts of climate change, so this paper also relates to the Government's priority for a transition to a clean, green and carbon neutral New Zealand.

Executive Summary

4 On 1 July 2021, the Cabinet Environment, Energy and Climate Committee invited the Minister of Foreign Affairs to report back to the Cabinet Environment, Energy and Climate Committee on the public consultation process on the draft Antarctic Research Directions and Priorities, and provide a final version of the Antarctic Research Directions and Priorities for approval in late 2021 [ENV-21-MIN-0035].

5 This paper asks Cabinet to note how submissions received during public consultation have been assessed and applied, and seeks approval of the final Antarctic Research Directions and Priorities. A summary of submissions received during public consultation is provided in Annex B, which includes an explanation of how these have been applied.

6 This paper also invites the Minister of Climate Change, Hon James Shaw, to join the Minister of Foreign Affairs, Minister of Research, Science and Innovation, Minister of Conservation, and Minister for Oceans and Fisheries as co-signatories of the Antarctic Research Directions and Priorities.

7 A commitment to a review of the Antarctic Research Directions and Priorities no later than 2026 is included in the appended document, and officials will report back to the co-signatory Ministers. The Terms of Reference for the

review, including the agency or agencies accountable for overseeing it, are intended to be established in 2022.

Background

8 Officials have prepared Aotearoa New Zealand's Antarctic and Southern Ocean Research Directions and Priorities for the decade ahead (2021–2030), having assessed and applied comments received during the Cabinet-mandated public consultation from 19 July to 16 August 2021.

9 The document builds on the 2010–2020 New Zealand Antarctic and Southern Ocean Science Directions and Priorities, and sets out refreshed, contemporary priorities for New Zealand's Antarctic and Southern Ocean research. The change to the title (from "science" to "research") reflects a more inclusive approach, drawing on all fields of research and the complementary knowledge systems of mātauranga Māori and science.

10 In identifying the government's priorities, under the unifying theme of "global change", the document provides direction to both researchers and government agencies, in particular with respect to investment.

11 Antarctica is an essential part of understanding global environmental systems, and is uniquely valuable for scientific research. Aotearoa New Zealand's Commitment to Antarctica and the Southern Ocean (appendix 1), and our interests in the region, are enduring. Aotearoa New Zealand, guided by manaakitanga,[1] is committed to preserving and protecting Antarctica and the Southern Ocean for present and future generations [CAB-17-Min-0437 and CAB-19-MIN-0260 refer]. This includes promoting, sharing, and collaborating on scientific research of the highest standards that will increase our understanding of the interactions between global environment systems and Antarctica, advancing evidence-based climate change policies, and improving our ability to adapt to variability and change.

12 The Antarctic Research Directions and Priorities include that New Zealand's Antarctic research will have impact, be excellent, and make connections; advance New Zealand's Commitment to Antarctica and the Southern Ocean; recognise and reflect the value of mātauranga Māori; and contribute to New Zealand's climate change, Antarctic, and environmental policies.

13 The Antarctic Research Directions and Priorities include four priority research areas:

- Antarctic contribution to sea level rise;
- cryosphere–ocean–atmosphere connections and implications of change;
- ecosystem dynamics and responses to change; and

[1] In this context, manaakitanga is about enhancing the mana of all: caring for, honouring and respecting ourselves, others and the natural environment. See Statement of Commitment to Antarctica and the Southern Ocean, appendix 1, approved by Cabinet.

- protection of Antarctic and Southern Ocean environments.

Consultation

14 This paper and the Antarctic Research Directions and Priorities have been prepared jointly by the Ministry of Foreign Affairs and Trade, Antarctica New Zealand, the Ministry of Business, Innovation and Employment, the Department of Conservation, and the Ministry for Primary Industries (the "Antarctic Science Priorities Working Group").

15 The Ministry for the Environment; Ministry of Defence; New Zealand Defence Force; Environmental Protection Agency; Department of the Prime Minister and Cabinet; Land Information New Zealand; the New Zealand Geographic Board; the New Zealand Rescue Coordination Centre; and Maritime New Zealand have also been consulted.

16 The Cabinet Environment, Energy and Climate Committee noted [ENV-21-MIN-0035] that targeted consultation has taken place over 2019–2021 with the New Zealand Antarctic research community, stakeholders, and the Kāhui Māori to the Antarctic Science Platform, with feedback incorporated into the draft Antarctic Research Directions and Priorities.

17 The draft Antarctic Research Directions and Priorities were approved by Cabinet [ENV-21-MIN-0035] for public consultation over the period 19 July to 16 August 2021. Twenty submissions were received in that time, primarily from the engaged New Zealand Antarctic science and academic community. A summary of submissions received is provided in Annex B.

18 Many who submitted comments had previously engaged with officials on the draft through targeted consultation, such as an initial survey in 2019 and at a workshop in February 2020 as part of the New Zealand Antarctic Science Conference. Many subsequent submissions built upon the points already raised and built into the draft Antarctic Research Directions and Priorities, and there were no new issues of substance.

19 There was a general agreement among submitters that the document covered the key priorities for investment in New Zealand Antarctic and Southern Ocean research. Some submitters recognised the need for the directions and priorities to balance covering the breadth of New Zealand's priorities, while not covering everything. The following points of substance were raised in public submissions. We note that all of these points had been previously raised during targeted consultation with the New Zealand Antarctic research community:

- that a fifth priority be added relating to the humanities and social sciences;
- that the "lithosphere" be included as a research priority;
- that a review mechanism be built in to evaluate the document's effectiveness as well as an implementation plan that, *inter alia*, identifies accountabilities and metrics for monitoring progress against the strategy;

- that while recognition of the value of mātauranga Māori, as currently drafted, is good progress the document should seek to advance and enable Maori participation in Antarctic research;

- that clarity be given to the funding section of the document;

- that greater recognition be given to the contribution of the fishing industry to Southern Ocean research.

20 Each is discussed in turn below, including how comments have been built into the final Antarctic Research Directions & Priorities.

Humanities and social sciences

21 A few submissions suggested that a fifth research priority be added (in addition to the four set out at para 13 in this paper) relating to humanities and social sciences research. They proposed that dedicated Humanities and Social Sciences (HASS) research is required to assess the economic, political, legal, socio-cultural and historical context of Antarctica and human connections to the region. They argued that New Zealand HASS research is vital to contextualising Antarctic science within a broader societal framework. The comments reiterated the proposal made by a group of academics during the earlier round of targeted consultations with the Antarctic research community.

22 The Antarctic Science Priorities Working Group decided that a fifth stand-alone priority was not necessary, but updated the priorities to be clear that humanities and social sciences were not out of scope. The document now emphasises that "value and impact results from drawing on all fields of research and complementary knowledge systems, and that close collaboration between researchers from all disciplines is encouraged". A new guiding principle was also added on the importance of connecting science and policy, and the research priority on "Protecting Antarctic and Southern Ocean Environments" was amended to include a link to the HASS Standing Committee established by the Scientific Committee on Antarctic Research (SCAR). Together, these changes represent a move to be more deliberately inclusive of all research disciplines where the research informs the priorities, and while retaining the focus on the key guiding principle of global change.

Lithosphere

23 s9(2)(ba)(i) submitted two separate submissions that suggested the lithosphere is not adequately covered by the draft priorities, and suggested either a standalone priority or developing sections where the lithosphere is currently in the draft.

24 The Working Group agreed that no standalone priority was needed but noted that the lithosphere, geological and soil processes are built into the priorities as it relates to other processes, particularly understanding past climates to inform future projections.

Review mechanism

25 Some submissions pointed to a need for a review of the Antarctic Research Directions & Priorities during the course of the 2021–2030 time period it covers, to evaluate if it is effective and fit for purpose. The draft did include a review section, noting that the Directions and Priorities will need to evolve to reflect emerging knowledge and policy drivers. Officials have revised this section to be more explicit in terms of the timing of this review: An evaluation of the performance of New Zealand's Antarctic and Southern Ocean research against the outcomes will be undertaken periodically and inform a review to take place no later than 2026.

26 It is expected that in 2022, Terms of Reference for a review of the Antarctic Research Directions and Priorities will be established by the Antarctic Science Priorities Working Group, and that officials will prepare a review process in anticipation of reporting back to Ministers in 2026 on performance against the Directions and Priorities.

Mātauranga Māori

27 Submissions acknowledged that the draft Antarctic Research Directions and Priorities has made considerable strides towards a document that recognises the value of mātauranga Māori in Antarctic and Southern Ocean research. The 2010-2020 document was silent in this respect, and did not reference Te Tiriti o Waitangi. The 2021-2030 Antarctic Research Directions and Priorities state that Aotearoa New Zealand's Antarctic and Southern Ocean research will uphold the principles of Te Tiriti o Waitangi; be guided by kaitiakitanga and manaakitanga; and recognise that Māori have their own knowledge system, mātauranga Māori, which enhances science and research in Antarctica and the Southern Ocean.

28 As part of drafting the Antarctic Research Directions & Priorities, officials engaged with iwi, hapu and Māori through the existing relationships and networks of the Kāhui Māori to the Antarctic Science Platform and the Māori Policy Unit of the Ministry of Foreign Affairs and Trade, and will continue this engagement with the intention of assessing progress in the 2026 review.

29 One submission proposed that the draft go further and "advance and enable Māori participation in Antarctic and Southern Ocean research activities". While that language has not been built into the appended draft for Cabinet approval, officials have committed to ongoing engagement with Māori on their interests in Antarctic and Southern Ocean research. A guiding principle in the Antarctic Research Directions and Priorities is to foster the next generation of researchers and communicators and actively promote diversification of the research community with respect to culture, race, ethnicity, gender, generation, and expertise.

30 The guidelines agreed by Cabinet for policy-makers to consider the Treaty of Waitangi / Tiriti o Waitangi in policy development and implementation were considered during drafting of the Antarctic Research Directions and Priorities.

Funding

31 Various submissions pointed to a need to expand on or clarify the funding section of the document. The Antarctic Science Priorities Working Group agreed, and revisions have been made to expand this section beyond a discussion of Antarctic research funding supported through government Votes to also include institutions and organisations that have roles and Antarctic interests beyond funding.

Fishing industry and Southern Ocean research

32 s9(2)(ba)(i)

suggested greater recognition of the contribution of the fishing industry to Southern Ocean research. Officials applied changes to the 'Logistics and Infrastructure' section to recognise industry support to research.

Implementation

33 Given the Antarctic Research Directions and Priorities is a high-level Ministerial directive document for Antarctic research, a full detailed implementation or evaluation plan has not been included in either the appended document or this Cabinet paper.

34 As noted at paras [25] and [26] of this paper, however, some comments received during public consultation suggested a review mechanism be built into the Antarctic Research Directions and Priorities. Officials will prepare a review process, including terms of reference, in anticipation of reporting back to Ministers in 2026 on performance against the Directions and Priorities.

Financial Implications

35 There are no financial implications associated with this proposal. Future research will be dependent on the continuation of existing funding mechanisms.

Legislative Implications

36 There are no legislative implications associated with this proposal.

Impact Analysis

Regulatory Impact Statement

37 This paper does not require a regulatory impact analysis. No introduction of new legislation, or changes to or the repeal of existing legislation, is proposed.

Climate Implications of Policy Assessment

38 This paper does not require a Climate Implications of Policy Assessment.

Population Implications

39 This proposal will not impact on particular population groups.

Human Rights

40 This paper presents no inconsistencies with the New Zealand Bill of Rights Act 1990 and the Human Rights Act 1993.

Communications

41 If approved by Cabinet, the Antarctic Research Directions and Priorities will be distributed to relevant stakeholders and made available on the website of the Ministry of Foreign Affairs and Trade.

42 A joint press release from the Ministry of Foreign Affairs and Trade; Ministry of Business, Innovation and Employment; Ministry for Primary Industries; Department of Conservation, and Antarctica New Zealand, is planned.

Proactive Release

43 We intend to release this Cabinet paper, with appropriate redactions, within 30 business days of decisions being confirmed by Cabinet.

Recommendations

The Minister of Foreign Affairs; Minister for Research, Science and Innovation; Minister for Oceans and Fisheries; and Minister of Conservation jointly recommend that Cabinet:

1 **note** that submissions received during public consultation have been carefully considered and applied, where appropriate, to the Antarctic Research Directions and Priorities;

2 **approve** the Antarctic Research Directions and Priorities (appended as Annex A);

3 **invite** the Minister of Climate Change, Hon James Shaw, to join as co-signatory of the Antarctic Research Directions and Priorities;

4 **note** the commitment to a review of the Antarctic Research Directions and Priorities no later than 2026, after which officials will report back to the Minister of Foreign Affairs, the Minister for Research, Science and Innovation, the Minister for Oceans and Fisheries, the Minister of Conservation, and the Minister of Climate Change.

Authorised for lodgement

Hon Nanaia Mahuta	Hon Megan Woods
Minister of Foreign Affairs	Minister for Research, Science and Innovation
Hon David Parker	Hon Kiritapu Allan
Minister for Oceans and Fisheries	Minister of Conservation

Annex A: For Cabinet approval: *Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities 2021–2030*

(Attached separately as a PDF)

Annex B: Summary of submissions received during public consultation (19 July to 16 August 2021) on the draft *Aotearoa Antarctic and Southern Ocean Research Directions and Priorities 2021-2030*

Institution/contact	Submission summary	How submission has been applied
s9(2)(a)	Largely editorial comments on the draft document.	The majority of editorial comments addressed, though not all.
	Largely editorial comments on the draft document.	The majority of editorial comments addressed, though not all.
	High level comments regarding mapping strategic priorities to more detailed plans; identifying accountability for the research priorities and including a detailed review process.	Text modified to be more specific regarding mid-term review.
	Largely editorial comments related to layout and formatting.	The majority of editorial comments addressed, though not all.
	Suggested a reference to COMNAP and its headquarters in Christchurch.	Reference included.
	Proposed the need for an implementation plan and greater detail around a review process.	Text modified to be more specific regarding mid-term review.
	Questioned the need to reflect mātauranga Māori in the document.	No changes made.
	Suggested that the 'lithosphere' be included as a key research area.	Not addressed. Geological / lithospheric research is inherent in existing research priorities.
	• Expressed concern at the timing of preparation of the document. Suggested a delay during the Scott Base rebuild. • Suggested a greater emphasis on Humanities and Social Sciences (HASS) research. • Suggested the document needs to recognise all applicable NZ legislation.	• No delay to the publication. • Improved references to HASS research. • Reference to all applicable legislation included.
	Suggested greater recognition of the contribution of the fishing industry to Southern Ocean research.	Changes made to 'Logistics and Infrastructure' section to recognise industry support to research.
	Largely editorial comments on the draft document.	The majority of editorial comments addressed, though not all.

Institution/contact	Submission summary	How submission has been applied
s9(2)(a)	Would like to see the 'lithosphere' included as a key research purpose.	Not addressed. Geological / lithospheric research is inherent in existing research priorities.
	Suggested research be undertaken to examine the link between climate and the position and strength of the magnetic field.	No changes made.
	Range of high level suggestions including: • Enhanced references to HASS research; • Development of metrics for measuring success; • Enhanced review process; • Development of cross-cutting aims; • Development of a synthesis report to support the mid-term review.	• Improved references to HASS research made; • Text modified to be more specific regarding mid-term review. • Development of metrics and a synthesis report of science performance to be further considered.
	Range of suggestions to enhance support for HASS research.	Improved references to HASS research made throughout the document.
	Range of comments throughout the document including more explicit references to research in support of CCAMLR.	The majority of editorial comments addressed, though not all. CCAMLR and marine ecosystems research references strengthened throughout the document.
	Range of editorial suggestions made as well as: • Development of an implementation plan; • A stronger commitment to a mid-term review process.	The majority of editorial comments addressed, though not all. Text modified to be more specific regarding mid-term review. Development of an implementation plan to be further considered.
	Range of suggested edits to advance and enable Māori participation in Antarctic and Southern Ocean research activities.	Some suggestions have been incorporated into the draft, including improving references to HASS research made throughout the document. Some points acknowledged but not addressed, noting a need for ongoing engagement with iwi, hapu and Māori on Antarctic and Southern Ocean research.

Institution/contact	Submission summary	How submission has been applied
s9(2)(a)	Suggested: • 3-yearly review of the strategy; • Greater recognition of HASS research; • Greater recognition of geoscience; • Emphasis of SCAR links.	• Text modified to be more specific regarding mid-term review; • Improved references to HASS research made; • Multiple references to SCAR research made. Explicit inclusion of geological / lithospheric research not made. Considered to be inherent in existing research priorities.
	Largely editorial comments on the draft document to enhance references to snow and ice research.	The majority of editorial comments addressed, though not all.

Aotearoa New Zealand Antarctic and Southern Ocean Research Directions and Priorities

2021–2030

New Zealand Government

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Whakataukī

Mā te rongo ka mōhio
Mā te mōhio ka mārama
Mā te mārama ka mātau
Mā te mātau ka ora

Through perception comes awareness
Through awareness comes understanding
Through understanding comes knowledge
Through knowledge comes wellbeing

Cover image: © Anthony Powell
Inside-cover image: © Jamie McGaw

Foreword

Aotearoa New Zealand's environment is connected to Antarctica and the Southern Ocean. From early Polynesian voyages south, through to New Zealand's more than 60-year Antarctic and Southern Ocean research effort, and the establishment of Scott Base in 1957, New Zealanders have a deep connection to this unique and fragile place on our southern flank. It is a part of our heritage and a critical part of our future.

Ten years ago, the Government set the directions and priorities for New Zealand's research and science in Antarctica and the Southern Ocean for 2010–2020. The enduring priorities that underpin our research have not changed: we continue to prioritise the environmental protection of Antarctica and the Southern Ocean; we value healthy and productive ecosystems; and we are committed to protecting biodiversity.

But a lot has happened since 2010. Now more than ever there is a need to understand how processes in Antarctica and the Southern Ocean influence our planet's climate system and the implications of global climate change for future generations of New Zealanders and for our planet.

This document provides refreshed, contemporary priorities for New Zealand's Antarctic and Southern Ocean research under the unifying theme of global change. We intend that the priorities and directions provide guidance to both researchers and government agencies, in particular with respect to investment.

Aotearoa New Zealand's Antarctic and Southern Ocean research will have impact, be excellent, and make connections. It will advance New Zealand's Commitment to Antarctica and the Southern Ocean. It will uphold the principles of Te Tiriti o Waitangi, and recognise and reflect the value of mātauranga Māori. And it will contribute to New Zealand's climate change, Antarctic, and environmental policies.

In 2021, we celebrate the 60th Anniversary of the Antarctic Treaty coming into force. Aotearoa New Zealand was one of the 12 original signatories to the Antarctic Treaty in 1959, and we look forward to many years ahead of cooperation with international partners and world-leading Antarctic research by New Zealand scientists and researchers, to inform and support the protection of Antarctica in accordance with the principles of the Antarctic Treaty. A foundation of the best available science ensures that the Antarctic Treaty System continues to align with Aotearoa New Zealand's values and that Antarctica remains forever a place for peace, cooperation, and science.

Hon Nanaia Mahuta
Minister of Foreign Affairs

Hon Megan Woods
Minister for Research, Science and Innovation

Hon David Parker
Minister for Oceans and Fisheries

Hon Kiritapu Allan
Minister of Conservation

Hon James Shaw
Minister of Climate Change

Vision

Excellent and impactful science that addresses the urgent need to understand the role of Antarctica and the Southern Ocean in a globally-connected and rapidly changing environment and supports Aotearoa New Zealand's commitment to protecting Antarctica and the Southern Ocean.

Purpose

This document sets the high-level directions and priorities for Aotearoa New Zealand's Antarctic and Southern Ocean programme of research under the unifying theme of global change. It builds upon and progresses the previous document which set the Antarctic research directions and priorities for the period 2010 – 2020.

For New Zealand's government agencies, this document identifies Antarctic and Southern Ocean science priorities that require research, logistics and infrastructure investment over the next decade.

For researchers and communicators, this document identifies goals and government objectives for research through guiding principles and four priority research directions of:

- sea level rise
- cryosphere–ocean–atmosphere connections
- ecosystem dynamics
- protection of Antarctic and Southern Ocean environments.

This document was completed after a Cabinet-mandated public consultation process that ran from 19 July to 16 August 2021.

Unifying theme

The unifying theme for Aotearoa New Zealand Antarctic and Southern Ocean research is **global change.**

New Zealand is committed to understanding Antarctic and Southern Ocean environments, and their role in global systems. This unifying theme is intended to stimulate multidisciplinary research to quantify the processes that drive the state of natural systems to enable projections of future change and understand the implications of anticipated change.

New Zealand will lead, support, and share research that increases understanding of the interaction between global systems and Antarctica, and advances New Zealand's climate change mitigation and adaptation policies and capability to respond to change.

Guiding principles

Aligning with Government priorities, Aotearoa New Zealand's Antarctic and Southern Ocean research will:

1) Be *excellent* and have *impact*
   a) make *connections*[1] through the development of national and international partnerships and multidisciplinary collaborations
   b) promote responsible innovation, development and use of emerging technologies relevant to the research priorities in this document, to improve efficiency, safety and reduce environmental impacts
   c) foster the next generation of researchers and communicators and actively promote diversification of the research community with respect to culture, race, ethnicity, gender, generation, and expertise.
   d) produce data and samples that are managed in accordance with the Antarctic Treaty (Article III) and guided by *FAIR (Findable, Accessible, Inter-operable, Reusable)* (link) and *CARE (Collective Benefit, Authority to Control, Responsibility, Ethics)* principles (link)

2) Uphold the principles of Te Tiriti o Waitangi[2]
   a) be guided by manaakitanga[3]
   b) recognise that Māori have their own knowledge system, mātauranga Māori, which enhances science and research in Antarctica and the Southern Ocean

3) Sustain New Zealand's *Commitment to Antarctica and the Southern Ocean*
   a) advance New Zealand's climate change mitigation and adaptation policies and support New Zealand's leadership within the Antarctic Treaty System
   b) focus on the Ross Sea region, while also recognising the importance of collaborative research in other areas of Antarctica and the Southern Ocean
   c) be well-connected to end users and support evidence-based decisions
   d) be effectively communicated to New Zealanders
   e) be supported in Antarctica only if the research cannot be done elsewhere or through the use of existing data, collections or remote observations
   f) be carried out in accordance with all relevant legislation

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[1] From the National Statement of Science Investment 2015-2025:

'Excellence' takes account of factors including the skills of individuals and institutions that are brought together to address research needs, the rigour of the research process and the application and dissemination of the knowledge gained.

'Impact' encompasses the ways in which scientific research benefits individuals, whānau, communities, organisations, New Zealand, and the world. Researchers are encouraged to engage with stakeholders from the outset to identify the implications and benefits of the research, in accordance with the needs and interests outlined in this document. Demonstrating research impact will be an important component of measuring success.

'Connections' accommodates the importance of scientific cooperation both nationally and internationally and acknowledges the emphasis that the Antarctic Treaty places on international cooperation in scientific investigation in Antarctica. Collaboration, in particular international collaboration, enhances logistical efficiency, strengthen its research, skills development, knowledge exchange and influence. Developing interdisciplinary research programmes that bring together the right expertise to address research questions is an important element.

[2] In this document, Te Tiriti o Waitangi refers to all versions of The Treaty of Waitangi, including both English and Te Reo versions. Te Tiriti should prevail if the versions are not clear or at odds.

[3] In this context, manaakitanga is about enhancing the mana of all: caring for, honouring and respecting ourselves, others and the natural environment. See Statement of Commitment to Antarctica and the Southern Ocean, appended to this document.

Context

The importance of Antarctica and the Southern Ocean

To understand our planet's climate system, and the implications of climate change for future generations of New Zealanders, it is crucial that we understand how processes in Antarctica and the Southern Ocean influence our planet's climate system and the implications of global climate change for Antarctic ecosystems.

Natural and anthropogenic changes influence Antarctica through oceanic and atmospheric processes, and influence the Antarctic atmosphere, ocean, ice sheets, sea ice and biosphere. In turn, changes in Antarctica and the Southern Ocean directly affect global environments through ocean and atmospheric circulation and changes in primary productivity and ecosystems.

The Southern Ocean is absorbing as much as 75% of human-induced warming and 40% of the global ocean up-take of anthropogenic carbon dioxide. The Antarctic Circumpolar Current (ACC) has a major influence on global ocean heat fluxes and biogeochemistry.

The ozone hole and atmospheric circulation patterns around Antarctica heavily influence oceanic circulation patterns, weather systems and atmospheric composition of the southern hemisphere, including over the New Zealand region.

Sea ice in the Southern Ocean is crucial in the global climate system and the life cycles of marine organisms. The annual formation of Antarctic sea ice doubles the ice-cover of the Southern Hemisphere every winter, and the growth/melt cycle exerts strong influence over large-scale processes such as the ocean heat flux and global ocean overturning circulation.

By returning nutrient-rich deep water to the sea surface and exporting nutrients to lower latitudes, Southern Ocean circulation supports 75% of global marine primary production.

The Antarctic ice sheets moderate global temperatures by reflecting solar radiation due to the high albedo of snow. They also hold around 70% of the world's freshwater as ice — equivalent to approximately 58 metres global sea level rise.

Antarctica records past climate and environmental change in geological outcrops and in sediment and ice core records.

Ice shelves are essential to the stability of ice sheets in Antarctica, and they are the interface between the ice sheets and Southern Ocean. The Ross Ice Shelf is the world's largest ice shelf, and ocean–ice interactions beneath it are an important regulator of ocean properties.

Antarctica is the only continent with relatively intact ecosystems and from which anthropogenic extinctions have not been recorded. Native ecosystems have adapted to the region's extreme conditions over millions of years but are now challenged by rapid and unprecedented environmental change and increasing human impacts.

Antarctica and the Southern Ocean provide foraging areas for a wide range of species such as seabirds and marine mammals, some of which breed in and migrate through New Zealand.

Antarctica and Southern Ocean physical processes, including wind, sea ice formation, snow cover, ice mass balance and oceanographic circulation are showing increasing variability and altered trends, with long-term and far-reaching consequences for the climate of Antarctica, New Zealand, and the Earth.

New Zealanders and Antarctic and Southern Ocean research

New Zealand has a long association with Antarctica and the Southern Ocean. Early exploration by the Polynesian navigator, Ui-te-Rangiora, in a fleet of waka tīwai ("hollowed-out logs"), revealed an area of ice floes and icebergs in the vastness of the Southern Ocean which he called Te Tai-uka-a-pia ("sea foaming like arrowroot"). Some stories talk of the curiosity of Tamarereti that inspired him to journey to locate the source of the Aurora Australis or Te Tahu-nui-ā-Rangi.

In 1957, Scott Base was established as New Zealand's permanent research station. For more than 60 years, New Zealand researchers have made internationally recognised contributions to a broad range of topics including past and present climate, biodiversity, and environmental monitoring.

Connecting Antarctic and Southern Ocean research with the complementary knowledge systems of te ao Māori is vital. The principles of partnership and mutual respect embodied in the principles of Te Tiriti o Waitangi provide a foundation for these connections; through understanding and respecting mātauranga Māori and science, our knowledge of and relationship with te taiao ("the environment") is enhanced. This knowledge is fundamental to improving the wellbeing of New Zealanders: he tangata, ko Papatūānuku, ko Ranginui, ko Tangaroa, ko Tāne-mahuta.

Meaningful and enduring partnerships with iwi, hapū, researchers and stakeholders will strengthen the conservation of Antarctica and the Southern Ocean.

Guided by manaakitanga[4], New Zealand is committed to preserving and protecting Antarctica and the Southern Ocean for present and future generations. The New Zealand Government recognises Antarctica and Southern Ocean research as integral to understanding global environmental systems and its unique value for scientific research. New Zealand is committed to promoting impactful collaborative scientific research, including to:

- support, lead and share scientific research that increases understanding of the interaction between global systems and Antarctica
- increase New Zealander's awareness of Antarctic issues and advancing climate change policies and capability to respond, and adapt, to change
- be a leader in research in the Ross Sea region Marine Protected Area
- ensure Scott Base is an effective and sustainable facility, providing support for the safe conduct of excellent scientific research.

Funding

The majority of New Zealand's Antarctic and Southern Ocean research effort is supported by government agencies and research organisations which provide funding for science, infrastructure and logistical support. Some research objectives are determined by agencies with specific management or policy responsibilities, while others are driven by issues that emerge from the research community.

[4] In this context, manaakitanga is about enhancing the mana of all: caring for, honouring and respecting ourselves, others and the natural environment. See Statement of Commitment to Antarctica and the Southern Ocean, appended to this document.

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Currently Antarctic research funding is supported through the following government Votes, including:

- Vote Business Science and Innovation, which supports research through investments by the Ministry of Business, Innovation and Employment. This encompasses support for a wide range of funding including Strategic Science Investment Funds (e.g., the Antarctic Science Platform), Endeavour Fund and, through the Royal Society Te Apārangi, the Marsden fund.
- Vote Foreign Affairs and Trade, through Antarctica New Zealand, which manages Scott Base and provides logistical support for the majority of New Zealand's research programmes in Antarctica.
- Vote Fisheries, through the Ministry for Primary Industries, which funds research to assist the management of the Ross Sea toothfish fishery and to assist with delivery of research under the Ross Sea region Marine Protected Area Research and Monitoring Plan.
- Vote Education through funding for university staff and students undertaking Antarctic research.
- Vote Defence for capability procurement, and Vote Defence Force for operational support including logistics.
- Vote Lands, through Land Information New Zealand, which provides operational support by maintaining and delivering geodetic surveys, place naming, topographic mapping and hydrographic charting.

Some Crown Research Institutes also contribute funding, equipment and specialised facilities to support Antarctic and Southern Ocean research.

Logistics and Infrastructure

New Zealand Antarctic and Southern Ocean research uses a range of assets:

- Since 1957, New Zealand has maintained Scott Base as its year-round research station on Ross Island.
- New Zealand's deepwater research vessel RV *Tangaroa* undertakes ocean and atmospheric research in the Ross Sea region.
- New Zealand Defence Force assets include the C-130H Hercules and Boeing 757 aircraft for intercontinental airlift, the HMNZS Aotearoa for resupply, P-3K2 Orion aircraft for maritime surveillance aircraft, and Offshore Patrol Vessels.
- Helicopter and ski-fitted fixed-wing aircraft support field research activities in Antarctica.
- Over-ice traverse capability supports remote work.

- Joint logistics arrangements with other National Antarctic Operators in the Ross Sea region to support scientific research initiatives.
- Vessels of opportunity including the New Zealand fishing industry in support of Southern Ocean research and management objectives.
- Specialised equipment for drilling, diving, and airborne, oceanographic, atmospheric and sub-ice shelf measurements, and monitoring stations for environmental and ecological observations.

International connections

Within the cooperative framework of the Antarctic Treaty, strong national and international collaborations are fundamental to assembling world class, interdisciplinary teams, helping programmes to reach a critical mass, sharing the costs of research and logistics, and lending weight to policy advice. New Zealand researchers play a major role in international Antarctic research initiatives. New Zealand's Antarctic and Southern Ocean science will continue to be aligned with and well connected to relevant international initiatives over the next decade. New Zealand's longstanding scientific and logistic partnership with the United States, as neighbours on Ross Island, is highly valued.

New Zealand has collaborative relationships with other nations active in Antarctica, in particular those that operate in the Ross Sea region. It is important that New Zealand continues to explore opportunities to cooperate with other Antarctic Treaty Parties for mutual benefit.

The Scientific Committee on Antarctic Research (SCAR) is a thematic organisation of the International Science Council (ISC). SCAR is charged with initiating, developing, and coordinating high quality international scientific research in Antarctica and the Southern Ocean, and on the role of the Antarctic region in the Earth system. New Zealand researchers continue to play leading roles in a range of SCAR initiatives.

Antarctica New Zealand is an active Member of the Council of Managers of National Antarctic Programs (COMNAP) whose Secretariat is based in New Zealand, and whose purpose is to develop and promote best practice in managing the support of scientific research in Antarctica.

The Antarctic Treaty System

New Zealand is one of 12 original signatories to the 1959 Antarctic Treaty, which applies to the area below latitude 60° south. The Antarctic Treaty Parties have committed to the comprehensive protection of the Antarctic environment and to ensuring that Antarctica shall continue forever to be used exclusively for peaceful purposes and science.

Since the Antarctic Treaty was agreed, the Parties have negotiated a number of additional international treaties which collectively form the Antarctic Treaty System including the 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and the 1991 Protocol on Environmental Protection to the Antarctic Treaty (the Protocol).

Pressures on Antarctic environments are increasing as a consequence of changing climate, atmospheric and oceanic conditions as well as expanding human activities there including research, tourism and fishing. The Antarctic Treaty Parties and CCAMLR Members depend upon the best available science to inform their work.

New Zealand's Antarctic and Southern Ocean research supports New Zealand's leadership in, and contributes to strengthening, the Antarctic Treaty System.

Policy Drivers

New Zealand's Statement of Commitment to Antarctica and the Southern Ocean (link) emphasises that New Zealand's environment is connected to Antarctica and the Southern Ocean. This commitment includes supporting, leading and sharing scientific research that increases understanding of the interaction between global systems and Antarctica, and that aligns with and advances New Zealand's climate change policies and ability to adapt to variability and change and supports the conservation of Southern Ocean ecosystems.

The following policy drivers, which are linked to the priorities in the following section, are not exhaustive, but are important in shaping New Zealand's research directions and priorities:

- The Paris Agreement provides for the strengthening of scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and supports decision-making.
- New Zealand Antarctic research feeds directly into knowledge gaps identified by the Intergovernmental Panel on Climate Change (IPCC):
  - The IPCC Special Report of the Ocean and Cryosphere (2019) identifies a low level of confidence in interpretations of physical observations of Antarctic and Southern Ocean change, given the poor spatial and temporal resolution of in situ records and large interannual to interdecadal variability.
  - The AR6 IPCC Report published at the outset of the 2021-2030 period made it clear that Southern Ocean and Antarctic biophysical systems are central to the trajectory of future climate change.
  - The largest uncertainty in IPCC sea level rise projections comes from an ongoing lack of understanding of the key rate-determining processes that control the mass balance of Antarctica's marine-based ice sheets. Better understanding the uncertainty and reducing it, is a high priority to World Climate Research Programme (WCRP) and SCAR. The Antarctic Treaty Parties, IPCC, WCRP and SCAR have noted that critical gaps remain in our understanding of changes and trends in Antarctic sea-ice, and the connections and interactions between the atmosphere, the Southern Ocean and the cryosphere.
  - The IPCC and World Climate Research Programme (WCRP) has also identified that the role of the Southern Ocean in modulating the effects of anthropogenic CO2 emissions and the implications for global climate and the Southern Ocean ecosystems needs to be better understood.
- In support of the Antarctic Treaty system, research is required to enhance New Zealand's commitment to:
  - developing, implementing and strengthening international rules to ensure the comprehensive protection of Antarctic and Southern Ocean biodiversity
  - advocating for the establishment, protection and management of representative and special areas in Antarctica and the Southern Ocean
  - leading research and monitoring in the Ross Sea region Marine Protected Area
  - taking precautionary and ecosystem approaches to the conservation and sustainable management of marine living resources in the Southern Ocean, particularly in the Ross Sea
  - contributing to the research, monitoring and information needs of the Committee for Environmental Protection, in particular the Committee's climate change response work programme, and the Scientific Committee of the Convention on the Conservation of Antarctic Marine Living Resources.
  - As a party to the Montreal Protocol, New Zealand is committed to research, measurement and reporting of stratospheric ozone depletion. This commitment is reflected in New Zealand's Ozone Layer Protection Act 1996.
  - Support New Zealand's Antarctic Science Platform, National Science Challenges and MBIE's Endeavour fund where Antarctic and Southern Ocean data are required to meet policy inputs and to improve regional- and national-scale projections of future change.

New Zealand Antarctic and Southern Ocean research will improve our knowledge of past and present Antarctic climates, environments ecosystems. Research outcomes will better constrain models and projections of future change, and enhance our understanding of the sensitivity of Antarctic environments and biota to human impacts, including changing climate and oceanic conditions and the consequences of changes in Antarctica for global ecosystems.

The priorities identified below are strongly interconnected. Significant benefits arise from research that integrates across more than one priority. Greater scientific value and impact results from multidisciplinary approaches to research questions, including drawing on all fields of research and complementary knowledge systems. Close collaboration between researchers from all disciplines is encouraged.

Funding will be based on the merit of the research in the context of the guiding principles and priorities, and not necessarily equally distributed across priorities. Over time, it will be important that research is undertaken across all priorities. Support for monitoring, social sciences and humanities research will also be considered on this basis, where that work informs the priorities set out below. Fundamental or 'blue skies' research is encouraged and need not necessarily fit the guiding principles or directions outlined in this document.

Quantifying the Antarctic contribution to sea level rise

Accelerating ice loss from marine-based sections of Antarctic ice sheets is contributing to sea level rise around New Zealand and globally. This response is non-linear and the rate of ice loss remains a primary uncertainty in sea level rise projections. The associated global socio-economic and environmental implications of sea level rise dictate that it is of urgent national and international significance to understand the causes and rates of ice sheet melting alongside the impacts of change.

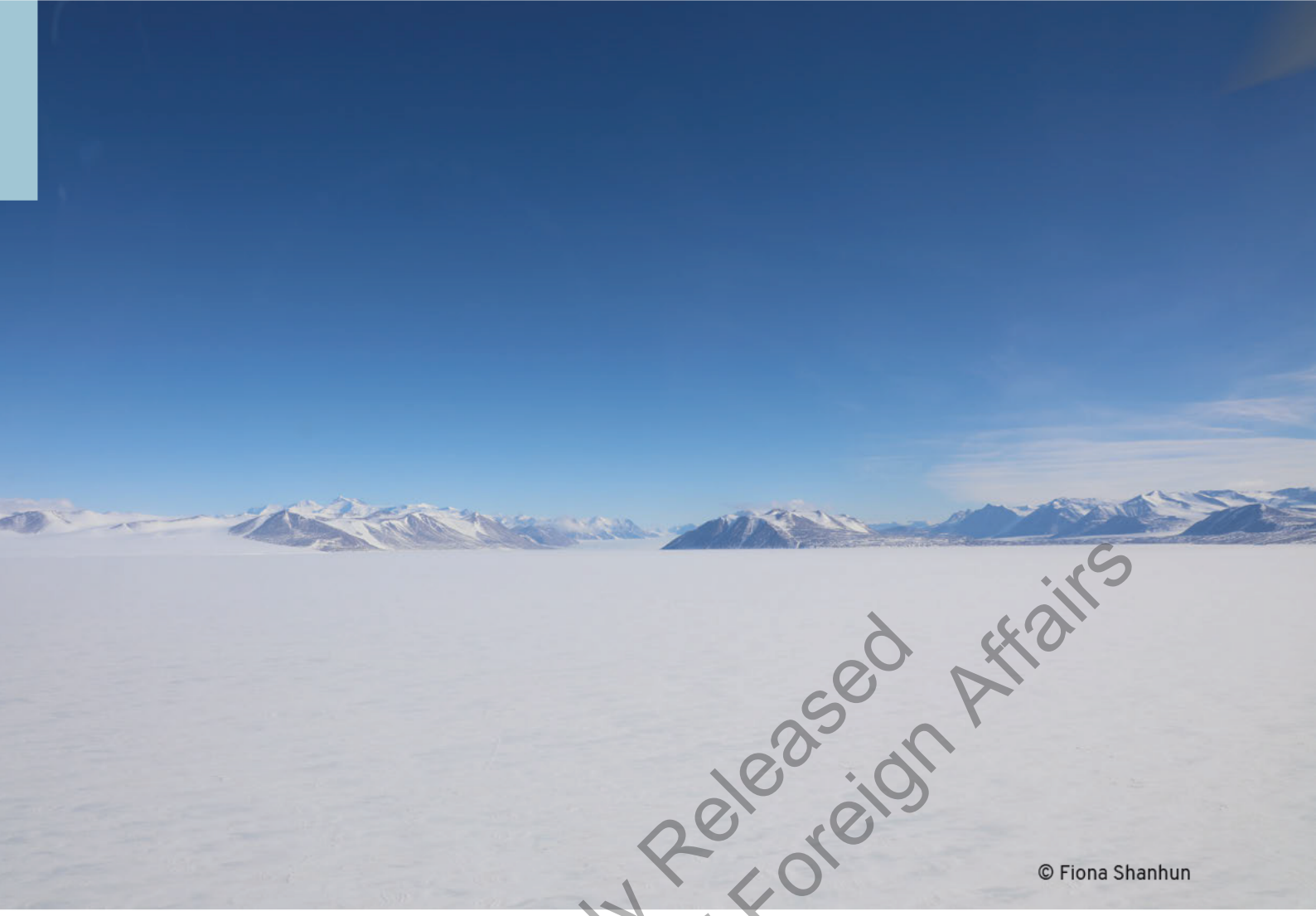
Outcomes

- Improve understanding of Antarctic and Southern Ocean influences on New Zealand's land, ocean and climate.
- Quantify and reduce uncertainties in future climate and sea level projections for Antarctica and New Zealand.
- Reduce uncertainties and improve understanding of key physical rate-determining processes in Antarctica and the Southern Ocean.
- Support the Government's climate change-related mitigation and adaptation policies and inform New Zealand's position in international climate change negotiations.

Research goals

To achieve these outcomes, research is required to:

- better understand the linked cryosphere-ocean-atmosphere-lithosphere processes regulating the state and behaviour of Antarctic ice-sheets and ice shelves under past, present and future climate conditions



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- understand processes of ocean-cryosphere interaction and ocean circulation processes beneath ice shelves and connections to ice sheet/shelf behaviour and Southern Ocean processes
- inform projections of Antarctica's contribution to regional, New Zealand and global sea level rise
- identify thresholds of irreversible ice shelf and/or ice sheet collapse

Links

- SCAR's Scientific Research Programme (SRP), Instabilities and Thresholds in Antarctica (INSTANT) aims to quantify the Antarctic ice sheet's contribution to past and future global sea-level change. It will be important to ensure connections with this SRP and other relevant SCAR Expert and Action Groups. SCAR Horizon scan questions 24 to 34 are also relevant to this research priority.
- The World Meteorological Organisation (WMO) has developed a number of programmes pertinent to this priority including the Global Climate Observing System (GCOS) and has sponsored the World Climate Research Programme (WCRP). It will be important to maintain and enhance connections to these programmes.
- The Expert Group on Ice Sheet Mass Balance and Sea Level (ISMASS) co-sponsored by SCAR, the International Arctic Science Committee (IASC), and the WCRP Climate and Cryosphere Project is an important connection.

Cryosphere–ocean–atmosphere connections and implications of change

The Southern Ocean has modulated increases in global atmospheric carbon dioxide and temperature and has been disproportionately affected by these changes. The Southern Ocean is absorbing as much as 75% of human-induced warming and 40% of the global ocean up-take of anthropogenic carbon dioxide. The increased acidity of the Southern Ocean, along with changes in temperature and salinity, have profound implications for marine living organisms as well as circulation patterns. Understanding the impacts of physical and biological interactions between the cryosphere, ocean and atmosphere is critical to inform on drivers of change and the regional and global impacts.

Outcomes

- Improve understanding of cryosphere–ocean–atmosphere connections and processes that inform regional and global models to better constrain projections of future change.
- Improve understanding of Southern Ocean processes, including the Antarctic Circumpolar Current, and the implications of changes in those processes for the Ross Sea region and for New Zealand.
- Improve ability to understand the implications of ocean change for marine living resources and ecosystems.
- Support the Government's climate change-related mitigation and adaptation policies.

Research goals

To achieve these outcomes, research is required to:

- enhance understanding of cryosphere-ocean–atmosphere interactions, in particular uptake of heat and carbon dioxide in the Southern Ocean and its implications for climate and ecosystems
- better understand sea ice distribution and volume and the processes influencing sea-ice formation, drift and decay, to enhance projections of sea-ice changes and improve understanding of the implications of those changes
- enhance understanding of the role of sea ice, polynyas and meltwater on controlling the flux of heat, carbon and salt between the ocean-atmosphere and implications for ice sheet stability
- improve knowledge of ocean heat transport including how freshwater feedbacks influence melt rates under ice shelves and at grounding lines
- better understand past, present and future ocean process and conditions to provide context for a warming [+2°C] world, testing models and initialising models used to make future projections
- improve understanding of atmospheric processes and the implications of changes in those processes for the Ross Sea region and for New Zealand
- better understand the connections between ozone recovery, global atmospheric circulation change and Antarctic weather systems.

Links

- The priorities identified in this priority are also linked to those identified in the priority Ecosystem dynamics and responses to change. Understanding the implications of changing atmospheric and oceanic conditions for Antarctic and Southern Ocean ecosystem processes and biota is critical.
- SCAR's Scientific Research Programme (SRP) Near-term Variability and Prediction of the Antarctic Climate System (Ant-Climnow) aims to improve predictions of near-term conditions in the Antarctic climate system on timescales of years to multiple decades. It will be important to identify connections with this SRP and other relevant SCAR Expert and Action Groups. SCAR Horizon scan questions 1 to 23 are relevant to this research priority.
- WMO has developed a number of programmes pertinent to this priority including the Global Atmosphere Watch Programme (GAW), the integrated Global Greenhouse Gas Information System (IG3IS), the Global Climate Observing System (GCOS), Global Ocean Observing System (GOOS) and has sponsored the World Climate Research Programme (WCRP), including the WCRP Coupled Model Intercomparison Project. It will be important to maintain and enhance connections to these programmes.
- The SCAR and SCOR (Scientific Committee on Ocean Research) co-sponsored Southern Ocean Observing System (SOOS) and associated international observation networks and data management systems including the International ARGO Ocean Observing Network are also important connections.

Ecosystem dynamics and responses to change

Antarctic biota displays high levels of endemism and adaptation to extreme high latitude environmental conditions. There is a pressing need to improve our knowledge of the natural processes, dynamics and biogeographic structure and functioning of Ross Sea region terrestrial (including aquatic) and marine environments and their biota and crucially to understand their vulnerability to climate change and direct human impacts.

Outcomes

- Improve understanding of ecosystem structure and functioning and vulnerability to change.
- Reduce uncertainties in biodiversity status projections and ecosystem resilience.
- Establish ecosystem monitoring programmes.
- Establish mitigation strategies for non-native species invasion.
- Deliver informed management and policy actions effectively through the Antarctic Treaty System.

Research goals

To achieve these outcomes, research is required to:

- better understand biogeographic structuring, processes, genetic biodiversity and biogeochemistry of terrestrial and marine ecosystems and the drivers of variability and change
- enhance projections of ecosystem vulnerability and response to changing environmental conditions and direct human pressures

- understand the resilience and adaptation of Antarctic species to changing environmental conditions
- understand how Antarctic soil, substrates, inland waters, permafrost and the associated microbial communities will respond to changing environmental conditions and the implications of those changes, including for native biodiversity and ecosystems
- improve understanding of the risks and implications across all environments of invasion and establishment of non-native species, as well as the risks and implications of human-mediated transfers of native biota
- better understand environmental impacts on migratory species including those that breed in or around New Zealand.

Links

- SCAR's Scientific Research Programme (SRP), Integrated Science to Inform Antarctic and Southern Ocean Conservation (Ant-ICON) aims to facilitate and coordinate high quality science to support improved management of and conservation outcomes for Antarctic and Southern Ocean environments. It will be important to ensure connections with this SRP, and other relevant SCAR Expert and Action Groups. SCAR horizon scan questions 43 to 45, 48 to 52, 55, and 57 to 65 are all relevant to this research priority.
- The Committee for Environmental Protection's science needs and priority environmental issues.
- The data collected and managed by CCAMLR and the SCAR and SCOR co-sponsored Southern Ocean Observing System are important connections.

Protecting Antarctic and Southern Ocean environments

The Antarctic Treaty Parties are committed to the comprehensive protection of Antarctic environments and dependent and associated ecosystems and have designated Antarctica including the Southern Ocean as a natural reserve devoted to peace and science. Natural and anthropogenic changes to Antarctic environments, coupled with the increase in human activity and diversification of those activities, are putting pressure on that commitment. New Zealand's research effort, guided by manaakitanga, is vital to continue to preserve and protect Antarctica and the Southern Ocean for present and future generations.

Outcomes

- Deliver informed management and policy actions effectively through the Antarctic Treaty System and include:
  - establishment of a representative network of marine and terrestrial protected areas that serve to enhance ecosystem structure and functioning, resilience and adaptation
  - an effective Ross Sea region Marine Protected Area that meets its objectives and informs the design and management of other Southern Ocean marine protected areas
  - support for CCAMLR to incorporate the implications of environmental change into its ecosystem-based management approach
  - improved understanding of the state of Antarctic environments.

Research goals

To achieve these outcomes, research is required to:

- improve understanding of and reporting on the state of and pressures on Antarctic and Southern Ocean environments, ecosystems, species and values
- improve understanding of terrestrial, including inland aquatic, and marine environments and biota at risk of non-native species introduction, climate change and human impacts including contamination and physical disturbance
- identify practical solutions to mitigate risks to Antarctic and Southern Ocean environments, ecosystems, species and values and measure the effectiveness of response actions
- support the establishment, research, monitoring and management of marine and terrestrial protection mechanisms including Marine Protected Areas and Antarctic Specially Protected Areas
- implement research and monitoring programmes that support the delivery of environmental protection and conservation objectives of the Antarctic Treaty system
- better understand the populations, dynamics and life habits of harvested marine species, the impacts of harvesting them (including impacts on non-target species) and food webs associated with harvested species
- understand how changing oceanic conditions affect harvested species and the implications for managing marine resources in accordance with CCAMLR objectives.

Links

- SCAR's Scientific Research Programme (SRP), Integrated Science to Inform Antarctic and Southern Ocean Conservation (Ant-ICON) aims to facilitate and coordinate high quality science to support improved management of and conservation outcomes for Antarctic and Southern Ocean environments. It will be important to ensure connections with this SRP and other relevant SCAR Expert and Action Groups, including the SCAR Standing Committee on the Humanities and Social Sciences (SC-HASS). SCAR Horizon scan questions 66 to 68, and 74 to 80 are relevant to this research priority.
- The Committee for Environmental Protection's science needs and priority environmental issues.

Reviewing the directions and priorities

These directions and priorities will need to evolve to reflect emerging knowledge and policy drivers. An evaluation of the performance of New Zealand's Antarctic and Southern Ocean research against the outcomes will be undertaken periodically and inform a review to take place no later than 2026.

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Annex: New Zealand's Statement of Commitment to Antarctica and the Southern Ocean

Antarctica has intrinsic value as a natural reserve, devoted to peace and science. New Zealand, guided by manaakitanga, is committed to preserving and protecting Antarctica and the Southern Ocean for present and future generations. New Zealand's environment is connected to Antarctica and the Southern Ocean. We prioritise the environmental protection of Antarctica and the Southern Ocean; we value healthy and productive ecosystems; and we are committed to protecting biodiversity. We will:

- Follow environmental best practice in our activities in Antarctica and the Southern Ocean.
- Advocate for the establishment, protection and management of representative special areas in Antarctica and the Southern Ocean.
- Take precautionary and ecosystem approaches to the conservation and sustainable management of living marine resources in the Southern Ocean, particularly in the Ross Sea, supporting strong environmental standards and sustainable economic benefits, and contributing to scientific understanding.
- Be an international leader in efforts to eliminate illegal, unreported and unregulated fishing in the Southern Ocean.

Antarctica is an essential part of understanding global environmental systems, and is uniquely valuable for scientific research. We are committed to promoting and collaborating on scientific research of the highest standards. We will:

- Support, lead and share scientific research that increases understanding of the interaction between global systems and Antarctica, and advances New Zealand's climate change policies and capability to respond to change.
- Be a leader in research in the Ross Sea region Marine Protected Area.
- Ensure Scott Base is an effective and sustainable facility, providing support for the safe conduct of excellent scientific research.

Antarctica is part of New Zealand's heritage, and future. As the gateway to the Ross Sea region we uphold New Zealand's role in Antarctic exploration, scientific discovery and collaboration. We will:

- Celebrate New Zealand's connection with Antarctica and the Southern Ocean; honouring our linkages through scientific research, environmental protection, conservation, heritage and logistical support.
- Strengthen Christchurch's position as the international gateway to the Ross Sea region, ensuring we provide high-quality services to, and collaboration with, other nations.
- Maintain air, maritime and terrestrial assets capable of operating in Antarctica and the Southern Ocean.

New Zealand values a peaceful, secure and safe region. We support the Antarctic Treaty principles and strive to maintain a peaceful, nuclear free and protected Antarctica. We will:

- Actively engage with our Antarctic partners to sustain a strong and effective governance framework under the Antarctic Treaty system.
- Develop and implement international rules to ensure the comprehensive protection of the Antarctic, ensuring its value as a place for peace and scientific research is prioritised, the impacts of human activity are limited, and safety is promoted.

New Zealand Government