Antarctic Science Platform

Proudly supported by Antarctica New Zealand

WHAT IS THE ANTARCTIC SCIENCE PLATFORM?

The Antarctic Science Platform (ASP) is a New Zealand Government funded programme that conducts world-class research to improve understanding of Antarctica's role in the Earth system. Our research is multidisciplinary, internationally-collaborative, and impactful exploring the interconnected nature of Antarctica, the Southern Ocean, and the rapidly-changing global climate.

The unifying theme for the ASP is identifying, and monitoring advance towards, critical thresholds in the climate system that may be crossed if the world fails to meet its Paris Agreement targets. Therefore all research funded through the ASP contributes to observing, monitoring, understanding, and predicting change in a +2 °C world, and beyond.

The ASP coordinates more than 100 researchers, students, and technical staff, representing seven New Zealand universities, two public research organisations, and several independent research institutes. The research connects in-situ and remote sensing techniques with numerical simulation and reanalyses across a wide range of scales and processes. A key focus is identifying and investigating interdependencies and feedbacks between components of the climate system. We are applying and developing new technological solutions to increase scientific gain while simultaneously reducing environmental impact.

Phase 1 of the ASP began in 2019, and the second seven-year phase recently commenced in July 2025, a period which coincides with the lead-up to the next International Polar Year. Phase 2 comprises a suite of research programmes that have been co-developed with partners who provide pathways for impact in both national and international levels. Our research is primarily focused on the Ross Sea, but connects to other regions through numerous national and international collaborations and partnerships. Relevance and impact are assured through ongoing engagement with a broad range of stakeholders and policy makers.

The Antarctic Science Platform is hosted by Antarctica New Zealand who provide administrative, operational, and logistical support. It is funded through the Ministry of Business, Innovation, and Employment's Strategic Science Investment Fund, with support and guidance from other government agencies.

OUR INTENT

- Advance understanding of Ross Sea ice-ocean-atmosphere systems and ecosystems in a +2 °C world.
- Contribute to national and international climate mitigation and adaptation strategies, focusing on the South Pacific & Southern Ocean.
- Improve projections of climate impacts on Antarctica, the Southern Ocean, New Zealand, and the globe.
- Respond with agility to pressing research priorities raised by international Antarctic and climate change agencies.
- Support New Zealand's strategic interests in, and commitments to, Antarctica and the Southern Ocean.
- Realise reciprocal benefits through Māori engagement and embedding Te Tiriti and mātauranga Māori in Antarctic research.
- Develop and enrich New Zealand's Antarctic research strengths, collaborations and capabilities.
- Raise the profile of Antarctic and Southern Ocean research and its role in future environmental changes in a warming world.

FUNDING

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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MAJOR CONTRIBUTORS

Antarctica New Zealand · Earth Sciences New Zealand · Victoria University of Wellington Te Herenga Waka · University of Canterbury Te Whare Wānanga o Waitaha · The University of Waikato Te Whare Wānanga o Waikato · University of Otago Ōtākou Whakaihu Waka

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STRUCTURTE & CORE RESEARCH PROJECTS

RESEARCH WITH MOMENTUM

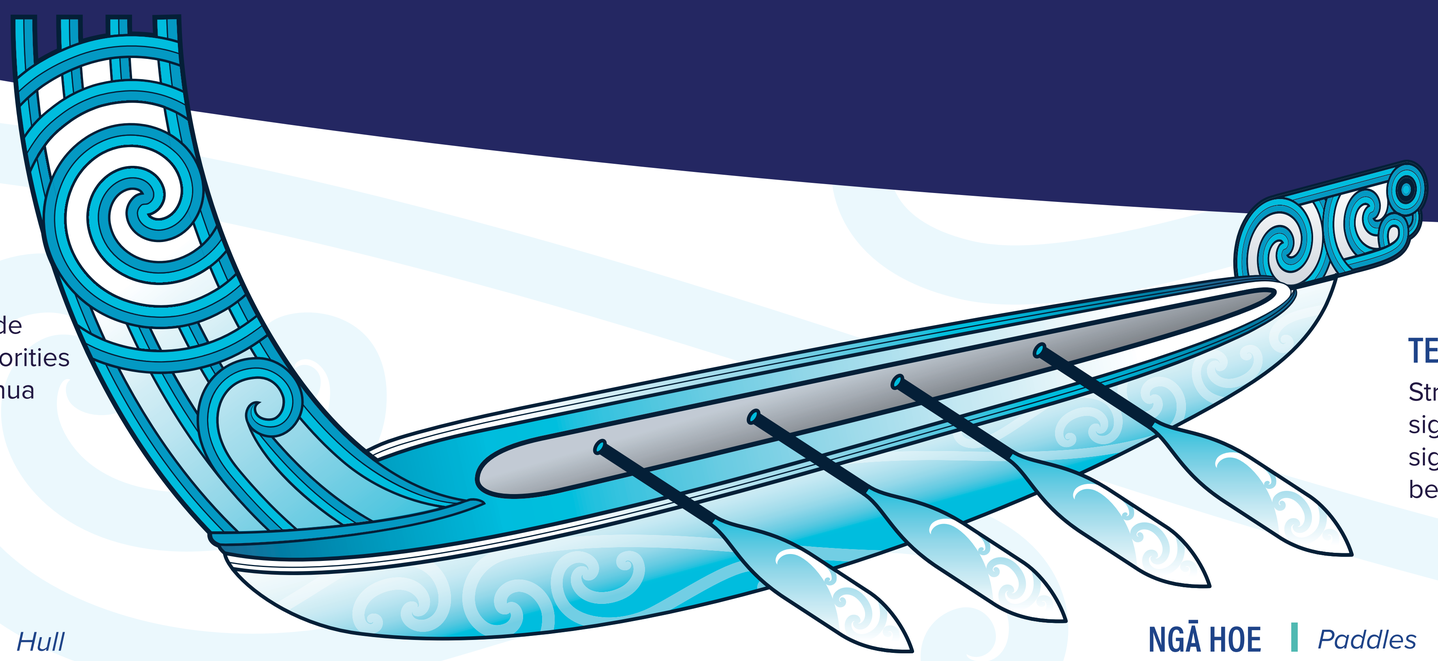
We frame our research programme as a waka (voyaging canoe), with each part of the vessel working together to drive forward understanding of Antarctica's role in the global climate system.

RESEARCH LEADERSHIP TEAM

DIRECTOR
Assoc. Professor Natalie Robinson

SCIENCE IMPACT COORDINATOR
Professor Ian Hawes

SCIENCE ADVISOR
Professor Richard Levy



NGĀ TIAKI | *Navigation guides*
Core research programmes that guide strategy, and deliver government priorities across the moana (marine) and whenua (land) realms.

TE TAURAPA | *Keel*
Structures our research around signposts: early indicators of change that signal how rapidly critical thresholds are being approached.

TE TAKERE | *Hull*
Cross-platform investments that support research delivery and impact, including stakeholder engagement, capability development and innovative technology.

NGĀ HOE | *Paddles*
Smaller, targeted research projects that provide agility to respond to emerging issues and create pathways for new researchers to engage.

TIAKI MOANA
The marine system

Tiaki Moana focuses on interactions and change in the marine realm, with the Ross Sea as the primary region of interest. Research addresses three critical components of the marine ecosystem:

What are the implications of shifts in ocean heat content? We will analyse changes in the volume, properties, and distribution of Circumpolar Deep Water (CDW) and Antarctic Bottom Water (AABW) exchange, and assess their impacts on meltwater production and ice sheet stability.

Is Antarctic sea ice undergoing a fundamental shift? We investigate how sea ice loss influences ice shelf stability and ocean circulation through buffering processes, warm water intrusions, and impacts on carbon uptake.

How is marine primary production affected by physical change? We assess how broad environmental shifts alter productivity, ecosystem functioning and CO_2 uptake and release.

LEADERSHIP

Nancy Bertler

Leigh Tait

Denise Fernandez

TIAKI WHENUA
The terrestrial system

Tiaki Whenua focuses on the vulnerability of Antarctica's ice sheets and glaciers and the con-sequences of ongoing and future melt. Research examines three key areas of land ice and ice sheet vulnerability.

How do extreme weather events affect Antarctic ice sheets and ecosystems? We examine the impacts of intensifying storms and heatwaves on sensitive terrestrial environments.

How will Antarctic ice sheet dynamics change in a warming world? We monitor and conduct detailed geophysical surveys of the Ross Ice Shelf and its ocean cavity to improve understanding of ice behaviour and ice–ocean interactions.

Can we identify when Antarctic ice sheets may exceed stability thresholds? We analyse sediment cores and apply numerical models to identify climate conditions associated with past ice loss and examine future overshoot scenarios.

LEADERSHIP

Marwan Katurji

Georgia Grant

Olivia Truax

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TARGETED RESEARCH PROJECTS

RESEARCH WITH AGILITY

The core research programmes (‘Tiaki Moana’ and Tiaki Whenua’) are supported by smaller, targeted research programmes (ngā hoe) designed to bridge between the physical realms and highlight areas of interest to the New Zealand programme. Hoe provide flexibility to support new researchers and ideas, and can be delivered as shorter, focused projects where appropriate. In addition to ngā hoe established at the outset of Phase 2, it is expected that further hoe will be initiated over the coming seven years.

LEADERSHIP

MESOPREDATORS
Dr Michelle LaRue

MESOPREDATORS
Sarah Wiki-Bennett

ICE SHELF CAVITIES
Dr. Craig Stevens

MODELLING
Dr. Nick Golledge

MESOPREDATORS

as indicators of MPA health

This project assesses how key mesopredators - Adélie penguins, Emperor penguins, and Weddell seals - can serve as indicators of Marine Protected Area (MPA) health.

Spanning both ecological and cultural perspectives, the research integrates satellite imagery, animal tracking, population genetics, environmental modelling, and mātauranga Māori. Key questions include how predator populations are changing, where critical foraging habitats are, and whether prey composition is shifting. The programme will build research capability and deliver open, reproducible science to inform the 2027 MPA review.

ICE SHELF CAVITIES

connecting land and sea

Ice shelf cavities are a critical component of the Ross Sea biophysical system, with strong connections and feedbacks across both marine and terrestrial realms.

This project will assess how rising oceanic heat content within these cavities - driven by increasing inundation of modified Circumpolar Deep Water (mCDW) and production of Antarctic Surface Water (AASW) – is affecting basal melt rates, ice mass loss, and ocean circulation pathways. The work builds on New Zealand’s strong reputation in cavity science and will culminate in the development of a vision for an internationally-collaborative cavity observation programme.

MODELLING

capability and development

This project builds new capability in cutting-edge research by enabling novel, exploratory, and developmental numerical techniques.

Three focal areas - artificial intelligence, complex systems, and model coupling - will be applied in key areas of interest for the ASP, namely sea ice, marine food webs, and interactions at physical interfaces. Embedding this work within the ASP ensures it is both responsive to new observations and informed by the scientists who collected them. This project will pioneer new ways of transforming field measurements into globally-relevant projections that have demonstrable impact in decision-making and policy arenas.

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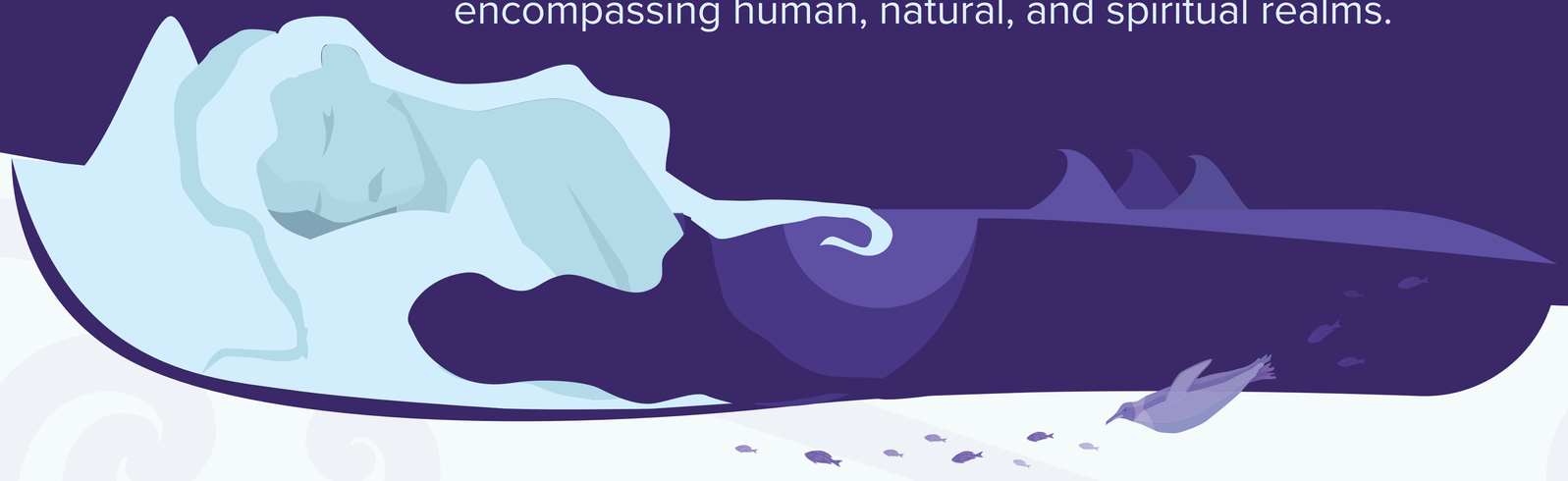
MĀTAURANGA MĀORI

RESEARCH WITH KOTAHITANGA

DELANE LUKE
Ngāti Rarua, Ngāi Tahu

RIKI PARATA
Ngāi Tahu

Mātauranga Māori refers to the traditional knowledge of Aotearoa / New Zealand's indigenous people. Its purpose is to preserve culture and improve quality of life over time, by shaping identity and relationships with the natural environment. As a knowledge system, mātauranga is **dynamic**, integrating traditional and contemporary insights; **multidisciplinary**, reflecting practices of environmental stewardship and economic development; and **holistic**, encompassing human, natural, and spiritual realms.

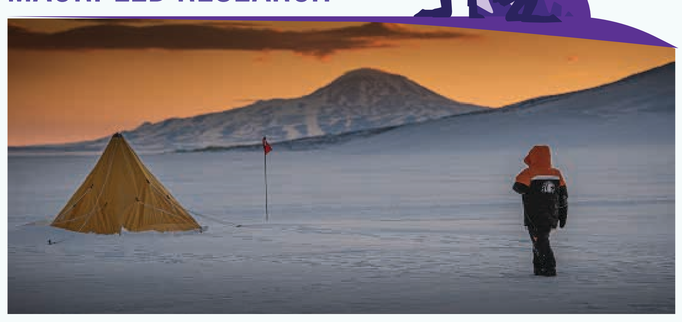


In Phase 2, ASP is placing a major emphasis on increasing Māori participation and investing in Māori-led research, using wānanga (structured discussions / workshops) to grow Māori participation and capability. Our ultimate aspiration is to successfully weave mātauranga Māori and biophysical science together, while respecting Māori sovereignty over their own data.

From a mātauranga Māori perspective, the Antarctic and Southern Oceans is an holistic system where Papatūānuku (Earth Mother) and Ranginui (Sky Father) and their descendants (including other than human species) are in an active sustainable relationship with each other and the wider environment. These knowledge systems hold stories of early journeys into the Southern Oceans, providing tangible points of connection for Māori with Antarctica.

Strategic direction in the mātauranga Māori space is provided by an independent Kāhui Māori (strategic guides). In Phase 1, their focus was on opening up space for mātauranga in Antarctica research, culminating in the appointment of a Kaiārahi Māori (leader of action) in mid-2024. Moving into Phase 2, the focus is on providing strategic oversight and guidance for embedding tikanga (correct practices) across three workstreams.

MĀORI-LED RESEARCH



Design and implement a Māori-led research programme informed by Māori priorities and guided by the research themes:

- **Whakapapa** (history & heritage)
- **Kaitiakitanga** (responsibilities and obligations
- **Whanaungatanga** (Māori participation)
- **Rangitiratanga** (implications of change for Māori)
- **Auahatanga** (innovation)

GROWING TALENT

Identify and support research capability pathways for Māori from kura to early career researchers, through educational initiatives, scholarships, field-based learning, mentoring, and kaupapa Māori-aligned Science, Technology, Engineering and Maths (STEM) initiatives.

MĀORI ENGAGEMENT

Create tailored communication solutions to strengthen research dissemination and two-way knowledge transfer with Māori communities (iwi, hapū and whānau Māori), other end-users, and wider audiences.

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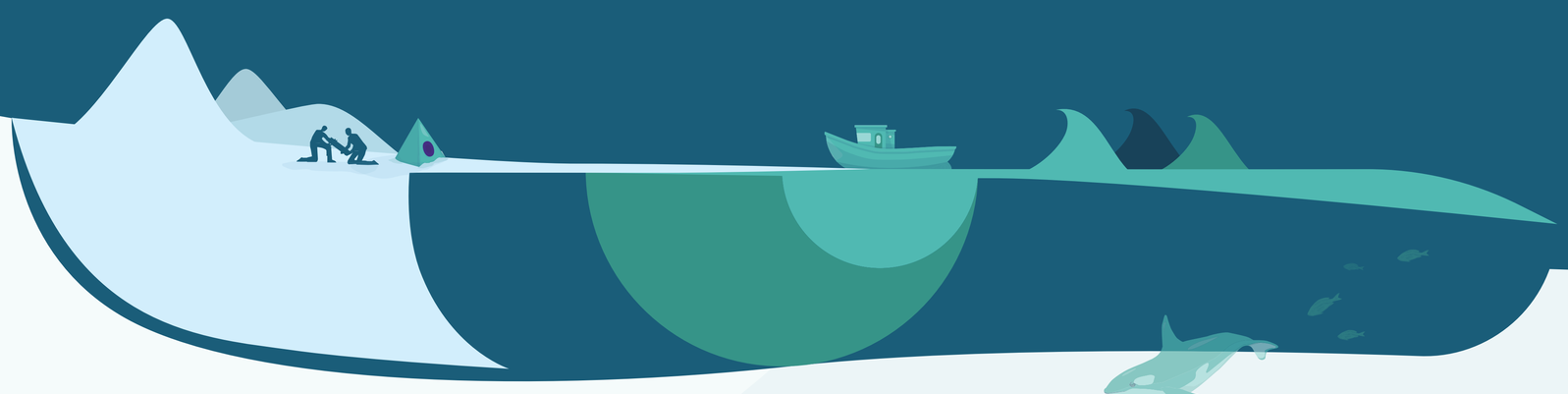
KEY ACTIVITIES

ENABLING AMBITIOUS SCIENCE

The seven-year timeframe of the ASP allows for ambitious long-term planning, both for large-scale field operations and for enduring legacy investments. Here we highlight our flagship activities and invite participation from, or contribution by, interested partners. Do you want to work with us? Please get in touch.

scienceplatform@antarcticanz.govt.nz



OPERATIONAL ACTIVITIES

VOYAGES

Ship-based fieldwork will span gradients associated with polynya operation, continental shelf hydrography, and prominent geographic features.

Key activities include deployment of mooring arrays, floats and gliders, underway sampling, and water column profiling. We will also sample seafloor sediments, undertake visual and capture surveys of benthic, pelagic, and mesopelagic systems, and assess the status and change of biological communities, including through eDNA techniques.

CAPE CROZIER HUB

Hot water drilling will provide access to the ocean cavity beneath the front of the Ross Ice Shelf, enabling in-situ examination of basal melting processes at this critical pinning point.

Sub–ice shelf oceanographic observations will be integrated with a network of surface-mounted ApRES instruments to characterise how basal melt responds to ocean exchange processes, melt–flow coupling, seasonal variability, and tidal phase lag. The hub has capacity to support further uses of borehole and camp for related research.

ICE SHELF TRAVERSE

Working with international partners, we will conduct a high-fold active source seismic survey along the South Pole Overland Traverse, from near the Ross Ice Shelf front to its grounding line.

This will be combined with analysis of seafloor sediment cores linking Ross Sea seismic stratigraphy to Siple Coast ice streams, generating an extensive profile of high-resolution bathymetry and topography. Further connections with ongoing glaciological and oceanographic research will contribute to a holistic understanding of ice shelf evolution and vulnerability.

LEGACY INVESTMENTS

ROSS SEA MONITORING NETWORK

Comprehensive marine observation networks are critical for the timely detection of approaching thresholds in the climate system.

The ASP will support the coordination, design, development, and integration of an internationally collaborative monitoring network for the Ross Sea region. These direct measurements are also essential for improving the models used to predict and project climate change in a +2°C world.

DATA MANAGEMENT & EXPLORATION

We are developing infrastructure and front-end usability for archiving, accessing, exploring, and visualising ASP data.

This facility will be capable of ingesting all file types generated by ASP research and will include tools to support data exploration, interaction, and targeted download. This critical investment underpins our commitment to making ASP data publicly accessible, and provides a framework for collaboration.

TECHNOLOGY DEVELOPMENT

We are designing physical sensor platforms that can support multiple disciplines and purposes simultaneously.

This effort is primarily focused on long-term monitoring, with solutions required for both marine and terrestrial realms. Incorporating extended battery life and satellite telemetry will enable continuous data collection while reducing the ecological footprint of conducting research in remote environments.

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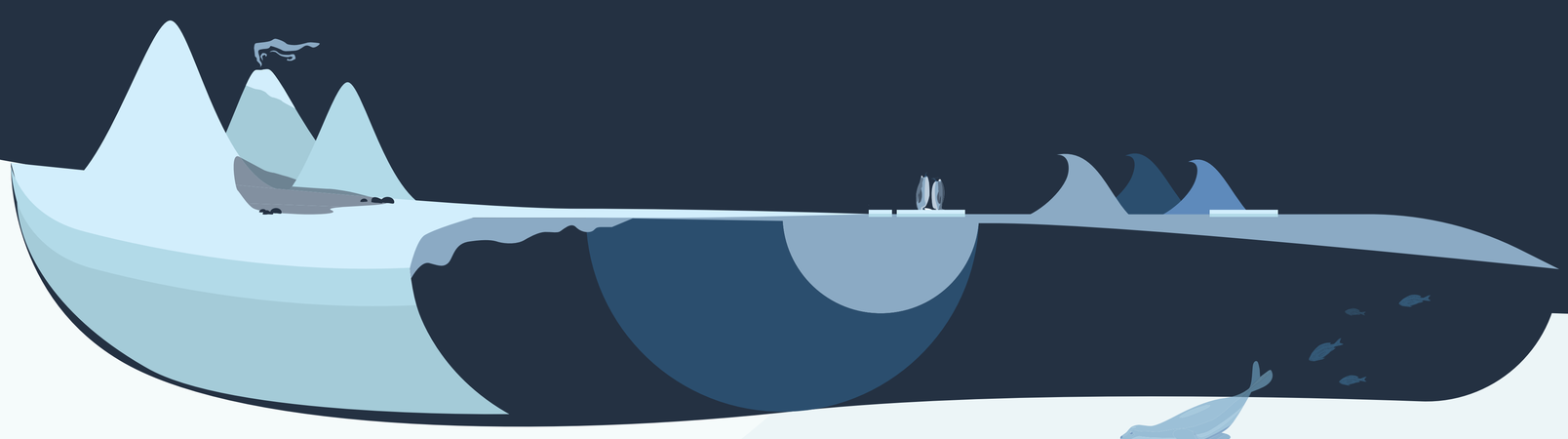
IMPACT TO DATE

RESEARCH WITH IMPACT

The Antarctic Scienc Platform's Impact Portfolio is a collection of plain-language syntheses of key findings from our first seven years' research. Together they provide an integrated picture of how Antarctica is changing and why it matters.

The full impact portfolio is available on the ASP website. Please use the QR codes to explore each topic in more detail.



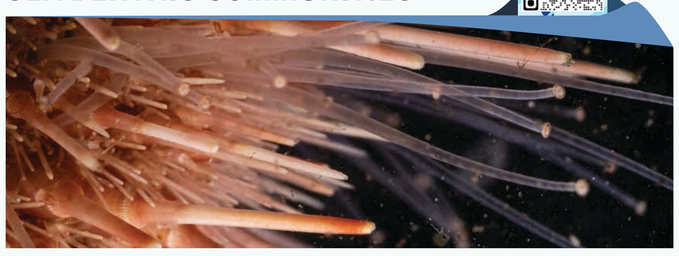
DECLINING SEA ICE HAS CASCADING IMPACTS

The rapid decline in Antarctic sea ice since 2016 is impacting interconnected ocean, atmosphere and ecosystem processes.

ICE MASS LOSS: ICE SHELVES & SHEETS RESPOND TO CLIMATE

Rising temperatures are driving increased melt of the Antarctic Ice Sheet, shifting global climate patterns and accelerating sea level rise.

A LIVING LABORATORY: ROSS SEA BENTHIC COMMUNITIES

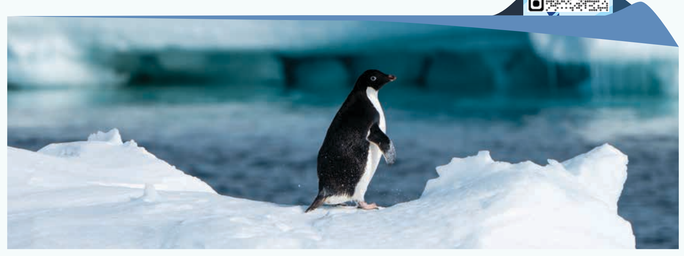


Acidifying oceans, sea ice loss, ice shelf retreat, and extreme weather are reshaping seafloor ecosystems and marine biodiversity.

ANTARCTICA IN A WARMING WORLD

This film reveals the transformations unfolding across Antarctica through scientists' first-hand accounts and striking visuals.

LIFE IN A CHANGING OCEAN: PELAGIC SPECIES



Surface warming and freshening is threatening the stability of Antarctica's unique marine food web and the future of keystone species.

TERRESTRIAL ECOLOGY IN A CHANGING CLIMATE

Climate change is altering species distribution, abundance, and productivity of the Ross Sea region's unique terrestrial ecosystems.

BOTTOM WATER & THE ROSS SEA

Shifts in ocean dynamics have cascading impacts for global circulation through changes to Antarctic Bottom Water formation.

CHANGING WEATHER & CLIMATE

Global climate change translates to shifts in Antarctic local conditions, impacting biodiversity, ice shelf stability, and hydrological systems.

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