Australian Antarctic Science Program 2019-20 and 2020-21

Australian Antarctic Science Program

Overview

The Australian Antarctic Science Program is made up of Australian government agencies and Australian and international universities and research institutions. In 2019/20 and 2020/21 the program undertook 69 science projects across multiple disciplines. More than 50 per cent of these projects included international collaborations involving 65 international institutions across 21 countries. The science program continues to benefit enormously from national and international research and operational collaborations.

The Australian Antarctic Science Program has a strong focus on research designed to inform the protection and management of Antarctica. This includes research that contributes to understanding and addressing regional and global issues through international organisations such as the Committee for Environmental Protection (CEP) and Antarctic Treaty Consultative Meeting (ATCM), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the Intergovernmental Panel on Climate Change (IPCC), International Whaling Commission (IWC), and Agreement on the Conservation of Albatrosses and Petrels (ACAP).

The Australian Antarctic Division (AAD) of the Department of Agriculture, Water and Environment, leads, manages and coordinates the Australian Antarctic Science Program. Public summaries of all science projects, past and present, are available on the [AAD website](https://secure3.aad.gov.au/public/projects/).

Research Highlights 2019 - 2021

In the 2019-20 season, there were two major field programs undertaken. The International Collaborative Exploration of the Cryosphere though Airborne Profiling (ICECAP) East Antarctic Grounding Line Experiment (EAGLE) project continued the previous ICECAP research program utilizing geophysical airborne surveys in East Antarctica to measure ice thickness, surface elevation and bedrock properties over the East Antarctic ice sheet. The Australian Antarctic Science Program also continued ecological research and monitoring on breeding seabirds including snow petrels, Adélie penguins and emperor penguins to improve management strategies and conservation outcomes.

COVID-19 has affected the delivery of a number of science projects since 2020, as the AAD has had a focus on sustaining Australia’s research stations in the 2020-21 season. The Australian Antarctic Science Program operates a number of projects supported by station-based personnel for observations and data collection and a further suite of projects utilising automated instrumentation at or proximate to Australian research stations. This includes upper atmosphere, cryosphere and geophysical monitoring across each of Australia’s Antarctic research stations. Ensuring the ongoing operation and continuity of long-term data sets has been a key priority for the science program during this period.

The AAD led a highly successful marine science expedition in 2021 on RV *Investigator,* an Australian Marine National Facility with Southern Ocean research capabilities. The eight week ‘Trends in *Euphausiids* off Mawson, Predators and Oceanography’ (TEMPO) voyage deployed new camera technologies to gather information on krill locations, density and population dynamics. For the first time large krill super swarm, with active predators including whales and seabirds, was observed and recorded using multiple sensors (echo sounders, underwater cameras) CTD, trawling and systematic predator observations, which may provide unprecedented insight into krill/predator interactions and swarming behaviour. This information will contribute to the development of reliable krill biomass estimates to support the work of CCAMLR.

In 2020-21 the AAD commenced a research program with the University of Tasmania School of Social Sciences. The research is examining individual attitudes and expectations of organisational culture, encompassing Australia-based staff and expeditioners in Antarctica. This study addresses a gap in organisational research (in particular National Antarctic Programs) and is contributing to efforts to support a diverse and inclusive Australian Antarctic Program.

This period, from 2019, has also seen the completion of a number of highly successful Australian Antarctic Program research projects including for example:

* **Large-scale Change and Variability in Antarctic Sea Ice and links with the Ice Sheet.** This project made groundbreaking and highly original findings on sea ice changes and drivers of change, combining observations and modelling.
* **Integrated Marine Observing System Southern Ocean Time Series automated moorings for climate and carbon cycle studies southwest of Tasmania**. This project used deep ocean moorings to deliver automated observations of the exchanges of heat, carbon dioxide, and oxygen between the ocean and atmosphere and the physical and biological processes that control them.
* **Evidence-based spatial protection of Antarctica’s biodiversity.** This project contributed to ensuring a solid scientific foundation for the further systematic development of the Antarctic protected area system, including by establishing a biodiversity database for terrestrial ecosystems.

Australian Antarctic Science Strategic Plan

In April 2020 the Australian Antarctic Science Council released the *Australian Antarctic Science Strategic Plan*. The plan provides high-level guidance on priority research areas and the key principles for achieving scientific objectives. Priorities for the Australian Antarctic Science Program include:

**Environmental Protection and Management:** this includes ecosystem conservation and management, fisheries management, environmental monitoring and assessment and environmental remediation.

**Ice, Ocean, Atmosphere and Earth Systems:** including high latitude climate science, million year ice core projects, and atmosphere and weather research.

**Human Presence and Activities in Antarctica:** including biosecurity, astronomy, medicine and human biology, and social sciences.

**Digital Integration:** to promote innovation in data collection and analysis.

The plan sets out a clear commitment to work with Australian and international research, and industry and policy partners encouraging collaboration with recent and new Antarctic science participants. The Australian Antarctic Science Strategic Plan is at **Attachment A.**

New Science Research Partnerships

In addition to the Antarctic research led by the Australian Antarctic Division, Australia has also established three new Antarctic research partnerships to deliver integrated and collaborative science under the Australian Antarctic Science Strategic Plan:

**Australian Antarctic Program Partnership** – Led by the University of Tasmania with partners from the Australian Antarctic Division and agencies with Antarctic research interests. This program focusses on improving understanding of the role of Antarctica and the Southern Ocean within the global climate system and its implication for marine ecosystems. It has a particular focus on teaching and early career researcher development.

**Excellence in Antarctic Science Special Research Initiative** (Australian Research Council):

**Securing Antarctica’s Environmental Future** (led by Monash University) – this is an international research program with interdisciplinary science focussed on climate processes and change, biodiversity status and trends, and supporting environmental stewardship.

**Australian Centre for Excellence in Antarctic Science** (led by University of Tasmania): conducting research into changes that are happening in the Antarctic and Southern Ocean and the impact those changes are having on the global climate system.

Australian Antarctic Science Program Research Priorities

Million Year Ice Core

Australia continues its progress towards drilling a deep ice core at Little Dome C (some 30 km south of Dome C and Concordia Station (Italy/France)). Progress has been made on construction of a deep ice drill and the acquisition of traverse vehicles, vans and sleds. Deployment will occur over the coming two seasons. A scientific steering committee is developing collaborative frameworks and guiding preparatory work in lab development and final site selection.

Krill Research

In addition to the krill biomass research such as that undertaken on the TEMPO expedition in early 2021, research on krill reproduction, development and physiology, and the response of krill to the effects of climate change remain a high priority for the Australian Antarctic Science Program and the Australian Antarctic Division. This research contributes to Australia’s engagement in CCAMLR and in particular the work of the Scientific Committee.

Science to support the Davis Aerodrome Project

Australia has been undertaking a range of scientific and engineering investigations to inform the environmental impact assessment for the proposed Davis Aerodrome. In the 2019-20 season, a team of researchers undertook further fieldwork in the Davis region and Vestfold Hills. Research included assessments of biodiversity and wildlife population dynamics to assess potential impacts of the Davis Aerodrome construction and operation on flora, fauna, and geography.

Interfaz de usuario gráfica

Descripción generada automáticamente