Antarctica New Zealand

Antarctic Science Programme Summary

2015-16 Season

K001-1516-C

Past Antarctic Climate (PAC) - Dr Richard Levy

GNS Science in collaboration with Victoria University of Wellington, The University of Otago, NIWA, and University of Canterbury

Event summary

This research aims to examine the effect of climate warming on Antarctica's ice sheets. This season we will collect geological data from ancient beach deposits that now sit on the lower slopes of Mount Discovery. These deposits help us understand past environments and climate in the Ross Sea region and identify how the Antarctic ice sheet responded to past periods of warm climate similar to that projected for our future.

Data collected by K001 are used to develop and test numerical climate and ice sheet models, which are used to simulate Antarctic ice sheet response to a range of future climate scenarios. These outcomes will improve our capacity to project future global sea-level rise by reducing uncertainties around the magnitude and rate of Antarctic ice sheet contributions. This new information will help guide research into the impacts of sea level rise on New Zealand.

Why is this research important?

This work will contribute to the global community understanding of ice sheet behaviour and sea level change. It will help New Zealanders understand that the polar environment has changed in the past, and that ice sheets retreat when climate warms.

Ultimately, the research will help New Zealanders learn more about how our coastal environment will change over the coming centuries as climate warms and the Antarctic ice sheets lose mass.

Quick fact

K001 will uncover an ancient beach teeming with fossilised remains of sea life that lived when the waters around Antarctica were warmer than the sub-zero temperatures that occur today. This beach now sits about 300 metres above present day sea level and we aim to figure out how it got there.

K001-1516-D

Sampling of Nunataks on Mawson Glacier - Prof Andrew Mackintosh

Victoria University of Wellington

Event summary

We, a 4-person party, will be visiting Mawson Glacier, which flows from the East Antarctic Ice Sheet, through the Transantarctic Mountains, to the Ross Sea. We will be camping at two nunataks (ice-free areas of land) near the coast and near the ice sheet plateau, and will be visiting a series of mountain ridges. Our objective is to collect rock samples at different elevations above the adjacent glacier. These rocks will then be analysed to reveal when and by how much the glacier thinned in the past.

Why is this research important?

Outlet glaciers of the Antarctic ice sheet are experiencing rapid thinning, retreat and mass loss. However, we are currently unable to accurately predict their future response. We are investigating the drivers and mechanisms responsible for such changes by studying the behaviour of an outlet glacier in the geological past. We will test whether Mawson Glacier thinned rapidly in response to ocean warming and/or retreat into a deep glacial trough following the last ice age. This work will provide insight into the potential response of such glaciers to both climatic change and glacier feedbacks.

Quick fact

We will be using circular saws, chisels and hammers to obtain rock samples.

We will likely have to walk many kilometres with 10s of kilograms of tools and rocks over unstable rocky terrain and snow every day.

K011-1516-A

Use of Unmanned Aerial Systems to assess Human Impacts - Dr Barbara Breen

Auckland University of Technology

Event summary

Conservation outcomes in the Ross Sea Region are limited by resources for monitoring past and cumulative effects of human impacts on vulnerable ecosystems. Our team are leaders in the development of novel 'zero-harm' remote survey tools for conservation solutions. This research will provide high resolution maps obtained from unmanned aerial systems (UAS) developed specifically for use in harsh Antarctic environments. We will link these data with social analyses to understand human interactions with Antarctic sites, thus providing solution-focused outcomes to conserve Antarctic landforms at risk from climate change.

Why is this research important?

The proposed research will address the two key factors identified as limiting conservation outcomes in the Ross Sea Region: (1) limited resources for monitoring past and cumulative effects of human impacts on vulnerable ecosystems and (2) a lack of understanding of the relationships between visitor values and the environment in the Ross Sea Region. Outcomes will provide a meaningful step–change in addressing these issues. The research will involve the development of sophisticated new remote sensing technologies using UAS, combined with a novel scientific approach to enhance understanding of the impacts of humans on this fragile ecosystem in the context of a changing climate and increasing visitation. It is anticipated that the research will provide meaningful input to the development of better environmental impact assessment protocols for Antarctica New Zealand.

Quick fact

We will be using unmanned aerial vehicles (UAV) to map areas in Taylor Valley, Botany Bay and Cape Evans in high resolution.

We will also be creating 3D visualisations of these same locations (all of which are ASPAs) which will be available for the public to view.

K020-1516-A

Dry Valley Ecosystem Resilience (DryVER) Project - Prof Craig Cary

University of Waikato

Event summary

This is the first field season for the DryVER project, a comprehensive research programme to deliver objective, evidence-based planning and management tools for the McMurdo Dry Valleys. The project seeks to understand the resilience and sensitivity of Dry Valley habitats to human impacts and invasive species. K020 will gain this understanding through field measurements and experimentation as well as remote-sensing (both satellite and Unmanned Aerial Systems-based) and instrument-based data collection. They will collect data on desert pavement stability, wind and airborne particle movements, microbial and genetic footprints of human impacts on terrestrial and aquatic habitats, and attempt to understand the interconnectivity between various habitats. These data will underpin the development of protocols to measure, mitigate, and minimise direct human impacts and risk from invasive species, leading to informed management and protection of the Antarctic Dry Valleys.

Why is this research important?

Although a consensus exists internationally that Antarctica is vulnerable to invasive species, climate change, and increasing human presence and activity, there is a notable lack of objective measures that facilitate evidence-based environmental management and clearly articulated conservation goals. K020 will inform and enhance direct engagement with primary end users, including MFAT, DOC and Antarctica New Zealand, to ensure implementation of research outputs. This will also assure New Zealand's continued leadership in conservation planning at the Antarctic Treaty Consultative Meetings and Committee for Environmental Protection. By enabling world-leading management of the McMurdo Dry Valleys, our research will maintain New Zealand's status as a leading Antarctic nation and fulfil New Zealanders' expectation of expert environmental stewardship by Antarctica New Zealand and Antarctic scientists.

Quick fact

K020 will use Unmanned Aerial Vehicles to create 3D maps of air movements in the Dry Valleys to complete a physics-based model of climate in the Dry Valleys region.

K020 will develop molecular genetic tools to detect the microbial and genetic signals left behind by visitors across the Dry Valleys. Such data, combined with historical records of scientific activities in the Dry Valleys, will give us an unprecedented view of human impact on the Dry Valleys landscape.

K040-1516-A

Siple Coast - Dr Huw Horgan

Victoria University of Wellington

Event summary

This project will focus on understanding the ice sheet—ice shelf transition (the grounding zone) of Kamb Ice Stream, in West Antarctica. Kamb Ice Stream is a major drainage conduit from the West Antarctic Ice Sheet into the Ross Ice Shelf that is currently stagnant. We hypothesise that despite the thickening of the ice stream brought about by its stagnation, the grounding zone location is stable over decadal timescales due to the deposition of sedimentary deposits beneath the ice. We will test this hypothesis by acquiring active source geophysical data. We will use radar and active source seismic methods to image structures within the ice, in the ice shelf cavity, and in the underlying rock and sediment.

Why is this research important?

The grounding zone transition between the West Antarctic Ice Sheet and its floating ice shelves is considered inherently unstable. Theoretical and remote sensing studies of grounding zones have added to our knowledge, yet little is known about the modern grounding zone environment.

The increased ice flux into the ocean resulting from a rapidly retreating grounding line would immediately raise sea level. In West Antarctica, the amount of ice considered vulnerable to this style of grounding line retreat is estimated to be equivalent to 3.3 m of global sea level rise. A lack of understanding of the dynamic response of ice sheets results in much of the uncertainty surrounding predictions of future sea level rise.

Quick fact

The ice streams along the Siple Coast currently drain approximately one third of the ice from West Antarctica.

Kamb Ice Stream stopped flowing about 160 years ago. This stoppage was likely due to changes in the way water was routed at the base of the ice stream.

K055-1516-A

Southerly storms and their impact on sea ice - Dr Adrian McDonald

University of Canterbury

Event summary

Increases in Antarctic sea ice extent are a puzzling trend in a warming world, especially when compared to decreases in the Arctic. Unfortunately, climate models have difficulty in reproducing this Antarctic trend which casts doubt on predictions. Changes in weather patterns over the Ross Sea and particularly the frequency of southerly storms, which act to promote ice production and push the sea ice away from the Antarctic coast, may be poorly simulated in global models, thus understanding them offers a potential solution to this problem.

K055 aim to test this possibility and determine whether small scale circulation changes are the missing piece in the sea ice puzzle by using satellite observations, model output and detailed information from the SNOW WEB system to analyse storms in the vicinity of the ice shelf edge and their impact on sea ice.

Why is this research important?

It is currently not understood why Antarctic sea ice is increasing and whether this is a result of natural variability or man-made climate change. Climate models cannot reproduce the patterns of change in the period since satellite observations began, which is one of the major problems left in these models.

This work is therefore significant in examining whether changes in weather patterns cause the observed changes in sea ice. Sea ice is arguably the largest seasonally changing variable in the climate system, with changes in sea ice extent varying by more than 15 million km^2. Sea ice has a profound impact on the atmosphere and ocean which potentially lead to changes in the positions of storm tracks, thus influencing everyday weather over New Zealand.

Quick fact

SNOW WEB is a unique system allowing us to deploy 20 weather stations that talk to each other via Wi-Fi in a very short time.

Antarctica has less permanent weather stations than the South Island.

K060-1516-A

Space Weather Monitoring (AARDDVARK) - Prof Craig Rodger

University of Otago

Event summary

We are operating a very low frequency radio receiver near Scott Base. This receiver provides data to the AARDDVARK and WWLLN international networks.

The main aim of AARDDVARK is to study energy inputs into the polar atmosphere - the main cause of these are due to changes in the output from the Sun, whether from explosions on the Sun (like solar flares) or the ~500 km/s wind which blows outwards from the solar atmosphere. AARDDVARK is primarily a New Zealand (Otago) and UK (British Antarctic Survey) experiment with collaborators from Finland, Canada, Australia, South Africa and Hungary.

The main aim of WWLLN is real time lightning location across the globe. WWLLN consists of about 70 radio receivers scattered around the world, listening for radio pulses generated by lightning. The timing of the pulses is sent to Dunedin and Seattle, from which the location of the lightning can be found.

Why is this research important?

The Sun influences our environment in multiple ways. It is particularly effective at disrupting technological systems, for example, long range radio communications used by aircraft for polar communications. Of great interest is the danger posed to Earth-orbiting satellites which are so important. We are part of an effort to understand the processes occurring in space which can disrupt, damage or kill these satellites.

In addition, there are strong suggestions that the Sun impacts the surface climate in the polar regions by affecting high-altitude atmospheric chemistry. AARDDVARK and its researchers are particularly involved in trying to characterise the chemical changes, and building collaborations to try and work out its significance to climate.

There are many reasons for focusing on lightning too. These range from the obvious (like lightning as a proxy for severe weather) to the unexpected (lightning as an early-warning for volcanic eruptions).

Quick fact

The radio waves we focus on have wavelengths of ~10 km (or more). For lightning, the radio waves come from the lightning discharge itself. We can detect the radio waves many thousands of kilometres from Scott Base.

If you listen to our radio noise (by playing it into a speaker), global lightning data sounds like frying bacon. Sometimes we detect the radio waves produced from lightning which is occurring on the other side of the Earth!

Our experimental networks are called AARDDVARK and WWLLN (which is pronounced "woollen" as it was invented in NZ).

K061-1516

Ross Ice Shelf - Dr Christina Hulbe

University of Otago

Event summary

The programme aims to make the observations that matter most to understanding how the Ross Ice Shelf will respond to future warming of the ocean and atmosphere. This field work will take place at two sites on the ice shelf where interdisciplinary teams will work together.

K061 will drill through the Ross Ice Shelf to directly observe the ice/ocean interface, measure ocean properties, and sample sediments on the sea floor. They will use active seismic methods to image the sea floor and layers of sediments. Radar imaging, snow sampling, and weather observations will be used to study snow accumulation and snow processes. They will investigate ice mechanics, and will use deep sounding radar to study interactions between basal ice and the underlying ocean.

Why is this research important?

Understanding change in the Ross Sea and on the Ross Ice Shelf is important because it affects sea level, the positions of fronts in the ocean and atmosphere, and marine resources, among other things. The Antarctic community has learnt a lot over the last decade about how real and how large the impacts of environmental change can be in Antarctica, and thus how large its influence may be as the planet continues to warm.

This awareness leads to new challenges to improve the state of knowledge and new opportunities for leadership in the global scientific community. New Zealand has a special connection to the Antarctic and an obligation to be among those leaders.

Quick fact

The Ross Ice Shelf is geographically about the same size as France.

The field camp will be floating on a layer of ice 350 meters thick and moving all the time: up and down with the tide, and about a meter and half closer to the open ocean every day.

K070-1516-C

Top marine mammal predators of the Ross Sea region - Dr Regina Eisert

Gateway Antarctica (University of Canterbury)

Event summary

The primary research goal of K070 is to study Ross Sea killer whales to provide the scientific information needed to (a) monitor and protect the Ross Sea ecosystem; and (b) support the proposal for a Ross Sea Marine Protected Area. This includes finding ways to obtain basic information on whale abundance, diet, foraging habitat, and movements.

Top consumers such as killer whales integrate the complex effects of multiple ecological drivers and thereby act as sentinels of the impacts of climate change and fishing on the Ross Sea. As toothfish predators, killer whales are among the species most likely to be affected by fishing for toothfish, if the fishery reduces the availability of toothfish in areas where the whales feed. Killer whales also represent an ideal 'flagship species' for providing a focus for environmental protection and for raising awareness of the fundamental connectivity between New Zealand and the Southern Ocean.

Why is this research important?

Cultural heritage: supports the protection of the Ross Sea region of Antarctica and its charismatic inhabitants, something that is important to many New Zealanders as a result of a strong national conservation ethic and long-standing cultural and historic ties to the region.

Love of nature: the research team will share results, as well as stories, images and sounds, to give people the opportunity to experience the wonders of the southern Continent and its inhabitants and help inspire young people to value, protect, and understand Antarctica.

Economic benefits: provides a scientific basis for the precautionary management, and contributes to the recognition of the New Zealand toothfish fishery as sustainable, which provides a significant benefit to New Zealand companies.

International Mana: contributes scientific results to international fora such as CCAMLR and IWC, and helps to maintain New Zealand's reputation as a leader in Antarctic Research.

Quick fact

We can identify individual whales based on colour patterns, scars, the shape of their dorsal fins, and any marks or nicks on the fin. We are currently building a photo-identification database of whales to determine how many killer whales live in the Ross Sea, and where they go.

Last season, together with scientists from the Italian station in Terra Nova Bay, K070 found that Antarctic killer whales 'commute' to the waters off northern New Zealand, and return to the same places both in Antarctica and in New Zealand.

K085-1516

Arrival Heights - Dr Dan Smale

NIWA

Event summary

K085 measures the Antarctic atmospheric composition throughout the year using ground-based remote sensing instruments and surface in-situ air samples, from Scott Base and Arrival Heights. The Antarctic atmosphere is an important and unique part of the global climate system. It provides a rare opportunity for us to measure global trends in atmospheric trace gases at sites isolated from anthropogenic sources.

This research will improve the understanding of how Antarctic atmospheric chemistry drives and responds to global atmospheric change. Research topics include: ozone depletion chemistry, greenhouse gas measurements, sea-ice/atmosphere interactions and more!

Why is this research important?

By using measurements in the tropics, mid latitudes (such as those from Lauder, Central Otago) and high latitudes (Scott Base) we can track the changes in the global atmospheric composition on a hemispheric scale. These measurements are used to parameterise and validate climate model simulations as well as for validating satellite data.

For global climate and ozone changes and their associated downstream impact on New Zealand climate, sun burn radiation levels and extreme weather events we need accurate, stable, long term measurements across the entire globe.

Quick fact

Some of the instruments we use are extremely rare and highly specialised. There are only three 'Chloe' instruments in the entire world.

Arrival Heights is the only Antarctic base with this range of stratospheric measurements and provides some of the longest time series of data in the Antarctic/Southern Hemisphere.

K086-1516

Toothfish - Dr Steve Parker

MPI, NIWA

Event summary

We will conduct a survey through the sea ice in McMurdo Sound for Antarctic toothfish. We will do this by making a hole in the ice, placing a small hut over the hole and fishing with baited hooks in a standardised manner. We will collect information about toothfish abundance, spatial distribution, size, condition, diet, age (from otoliths), and long term movements (from muscle tissue and otolith analysis).

This work forms the basis for monitoring the ecosystem interactions of Antarctic toothfish with killer whales and Weddell Seals in the Southwestern Ross Sea. The monitoring programme will inform evaluations of the effectiveness of the proposed Ross Sea Marine Protected Area and also serve to characterise the ecology of top predators in the Southwestern Ross Sea.

Why is this research important?

Antarctic toothfish found in McMurdo Sound are likely to have travelled thousands of kilometres. Most spawning occurs 1000-1500 km to the north of Scott Base on deep seamounts in the northern Ross Sea.

A monitoring programme is in place to detect changes in the Antarctic marine ecosystem due to the effects of fishing and/or climate change. New Zealanders might not be aware of the species that live near Antarctica, how they are connected to New Zealand, or how they interact and are vulnerable to disturbance.

This research will be used to support a research and monitoring plan for a proposed Marine Protected Area in the Ross Sea, one of the largest ever proposed.

Quick fact

We are studying huge fish (most weigh more than 30 kg) that live in deep water (> 500 m) in complete darkness for most of the year.

K089-1516-A

The ongoing climate record from Scott Base - Andrew Harper

NIWA

Event summary

Weather readings are made by Scott Base Science staff at 9 am each day. The readings of daily maximum and minimum temperature have been made at this time every day since 1957, providing one of the longest continuous climate records in Antarctica. The method used has not changed in this period so this is an incredibly important dataset for the monitoring of global climate change.

From 1996, an automatic weather station was installed alongside the manual station to make use of better technology to provide more frequent data and additional parameters. Ten minute and hourly data are now collected for wind, temperature and solar radiation. Scott Base is one of five stations managed by New Zealand that measures direct, diffuse and global solar radiation. The others are on mainland New Zealand.

Why is this research important?

The ongoing climate record from Scott Base is unique (especially in Antarctica) in that the method of observation has remained unchanged since it began in 1957.

Climate change affects everybody everywhere. Climate change is a statistically significant variation in either the average state of the climate or its variability, persisting for an extended period, typically decades or longer.

Observations underpin all efforts to the UN Framework Convention on Climate Change to mitigate and adapt to climate change. Our observation programmes allow us to contribute to national and international datasets and research with a consistent methodology.

Quick fact

New Zealand has one of, if not the longest, continuous climate records of any country working in Antarctica.

The wooden louvered thermometer screen is still the original screen that was installed in 1957.

K108-1516-A

Mt Erebus - Dr Graeme Hill

GNS Science

Event summary

Mt Erebus on Ross Island, is the world's southernmost active volcano, and one of a handful of volcanoes in the world with a persistent lava lake. We're imaging the Mt Erebus magmatic system from source to surface. Lack of population and vegetation, as well as proximity (~35 km) to logistical support at Scott Base, makes Mt Erebus one of the most accessible volcanoes in the world to survey.

Previous geophysical studies suggest that the crust within the Terror Rift is thin under Mt Erebus (~20 km), enabling K108 to follow the magmatic pathway into the upper mantle. K108 will construct a 3D electrical conductivity image of the magmatic system and its environs for comparison against theoretical models.

Why is this research important?

Our work will continue New Zealand's leadership in investigating the role of geofluids in both volcanic and tectonics studies using geophysics. Improvements in survey methodology and modelling techniques will directly benefit similar work in New Zealand.

The project will also directly further Antarctica New Zealand's goals by continuing a significant and effective scientific presence in the Ross Dependency. The work will not only improve the understanding of Antarctic geology but enable Antarctica to make a very real and relevant contribution to understanding the geology of phonolitic magma systems globally.

Quick fact

Mt Erebus has an active summit lava lake - one of only a handful in the world.

K123-1516

Soil climate and mapping human movement - Dr Fraser Morgan

Landcare Research

Event summary

K123 have three broad goals for this Event - Understanding and mapping soils within the Ross Sea region; visualising and modelling the historic and future level of human activity and footprint within the Ross Sea region; and monitoring soil climate through a network of nine soil climate stations and two boreholes to provide information about changes in soil temperature and climate.

For the soil climate stations, data will be collected for analysis back in New Zealand. For the human movement aspect, they will collect data on a couple of events to observe how they move within the landscape and the types of activities they undertake. This will inform the development of a model of human movement within the Ross Sea region.

Why is this research important?

K123 uses new and existing environmental data for the Ross Sea region to undertake 'regional scale' climate, water, soil, biology, and human movement research. The outcomes will be combined through an Environmental Impact Assessment to provide insight into the environmental pressures facing the Ross Sea region. This is important because the region hosts some of the most extreme forms of life, and to understand the organisms that live there, we need to understand their habitat, the soil.

This research supports New Zealand's call for evidence-based management of the Ross Sea region, and strengthens our environmental leadership role in Antarctica.

Quick fact

We've collected data since 1999/2000 at 11 sites monitoring soil climate in Antarctica.

Antarctic soils are some of the most extreme, unusual and oldest soils on Earth.

K123 will use Antarctica New Zealand's historical record to get an understanding of the size of the human footprint within the Ross Sea region.

K131-1516

Supercooled Sea Water - Dr Craig Stevens

NIWA

Event summary

We are measuring how "supercool" seawater helps drive sea ice growth, and in turn, how the growth of that ice feeds back and affects how the supercooled water moves and warms.

From a global perspective, the atmosphere is warming and ocean temperatures rising. So why, in stark contrast to the Arctic, is Antarctic sea ice coverage not shrinking? The answer may lie in the preconditioning of ocean surface waters by the giant Antarctic ice shelves. These often kilometre-thick ice shelves lie over oceanic cavities that maintain seawater at the in-situ freezing point (a function of salinity and pressure). Therefore, if the water entering the cavity from the open ocean is warmed, even by just a fraction of a degree relative to present conditions, melting will occur where previously there was none.

Why is this research important?

Sea ice coverage of the ocean is one of the big challenges in predicting climate for the next century – current models don't do so well with sea ice. This work seeks to improve those predictive tools. If we can build better models, we can provide more certainty for planners as our society and cultures adjust to changing climate. This may be as serious as having to relocate coastal towns and cities over the next 100 years, dealing with shifts in primary production, modified ecosystems, and changed storm frequency.

Quick fact

K131 are looking at super-cooled seawater – this is ocean water that is colder than its freezing point but still liquid! This is because of the high pressures experienced beneath ice shelves and the lack of suspended material in the water.

K150-1516

Surveying and tide gauge calibration - Graeme Blick

Land Information New Zealand

Event summary

Land Information New Zealand work to maintain tide gauges which gives scientists consistent, authoritative data for monitoring sea levels near Scott Base, to contribute to research into climate change and sea level rise. Similarly, our absolute gravity work also contributes to monitoring of global change, by providing a benchmark for measuring movement of the earth as well as sea levels.

Monitoring surveys of heritage sites such as the huts and the cliff by Vince's Cross is essential for the long term preservation of these sites. They help to show whether there is any risk to these historic structures. Surveys for monitoring the Crater Hill wind farm contribute to the maintenance of this important part of Scott Base's infrastructure.

Why is this research important?

Our work on the huts is a part of ensuring New Zealanders can be confident that these sites remain intact, preserving the memory of earlier polar explorers such as Scott and Hillary and ensuring future generations have the same insights into those expeditions.

Antarctica and the Arctic are both important indicators of changes to the world's climate, and the more we know about them, the better we can understand the effects that global phenomena like sea level rise have on all of us. Collecting accurate, authoritative data on Antarctic sea levels as well as gravity contributes to this understanding by giving researchers benchmarks to monitor seismic activity and sea levels in the region.

Quick fact

LINZ and its predecessor organisations have been involved in Antarctica since the 1950s. Surveyors have played a part in building some of the same huts we are now working to preserve for their heritage value.

Tide information has been recorded at the Scott Base site since 1957 and provides many years of tide and sea level records, which are vital for monitoring longer term change.

K703-1516-C

Toothfish survey - Dr Steve Parker

NIWA

Event summary

One scientist from NIWA and one international scientist will transit through Scott Base to join a vessel for a standardised longline survey of Antarctic toothfish in the southern Ross Sea.

The survey will cover areas from McMurdo Sound to the eastern part of the ice shelf in deep water, from 500-900 m depth.

Why is this research important?

The data from the survey are used to index year class strength and variability of young fish just entering the commercial fishery so that stock assessors and managers can better understand stock dynamics. The data provide an "early warning" system so that managers can take appropriate actions if a series of weak year classes are observed.

Quick fact

Longline surveys are difficult to standardise and conduct. One tricky feature in Antarctica is that giant marauding icebergs, which move at about 3 km per hour, can sweep through an area where the survey gear is set, making the act of leaving a longline for 12 hours a risky proposition.

Although the survey targets areas where juveniles are found, they are not hatched there. They likely hatch 1000 km to the north and follow ocean currents for more than a year in the plankton before settling to the bottom and then slowly moving back to the Ross Sea.

The 2015/16 survey will be the fifth in a series. Previous surveys have included scientists from Korea, Spain, United Kingdom, and Italy.

K707-1516

Adélie Penguin Census - Dr Nicole Stahlmann

Antarctica New Zealand

Event summary

We use aerial photography to collect high resolution images of the Adélie penguin colonies on Ross Island and Northern Victorialand. The pictures have to be taken during a specific window of time (26 Nov - 4 Dec) to coincide with the first incubation shift when the male is sitting on the eggs and the female is at sea foraging.

Why is this research important?

New Zealand has done an annual census of Adélie penguin colonies in the Ross Sea region since the early 1980s. The aim is to relate annual changes in numbers of penguins breeding to weather, sea ice and other climate parameters in order to distinguish between responses due to natural events and those induced by commercial exploitation, such as overfishing. The data are submitted to the CCAMLR Ecosystem Monitoring Programme (CEMP) and inform catch limits for fisheries.

Quick fact

We are continuing to build a database that tracks the Adelie penguin population in the Ross Sea over a 30-year time period.

K800-1516-A

Cape Adare biological survey - Prof Gary Wilson

New Zealand Antarctic Research Institute (NZARI)

Event summary

We are undertaking a survey of the biological life at Cape Adare and in nearby Robertson Bay. We are also putting in a series of monitoring stations so that we can relate our findings to the local climate and ocean conditions.

Cape Adare is at the Northern extent of the Ross Sea (750 km from Scott Base) and is home to Antarctica's largest Adelie Penguin colony.

Why is this research important?

If continued warming of the planet is going to affect Antarctica's ice sheets (i.e. melt them), it will most likely be from warm ocean water spilling over the continent edge and into the interior of Antarctica beneath its floating ice shelves. We hope to identify species at Cape Adare that can tell us if this is already happening. Cape Adare is also within the proposed Ross Sea Marine Protected Area and we hope to identify what species might help us monitor the effectiveness of future marine protection.

Quick fact

Our camp will be at the site of the first British expedition to Antarctica and home to Borchgrevink's Hut built in 1899.

The site is also home to more than 500,000 penguins.