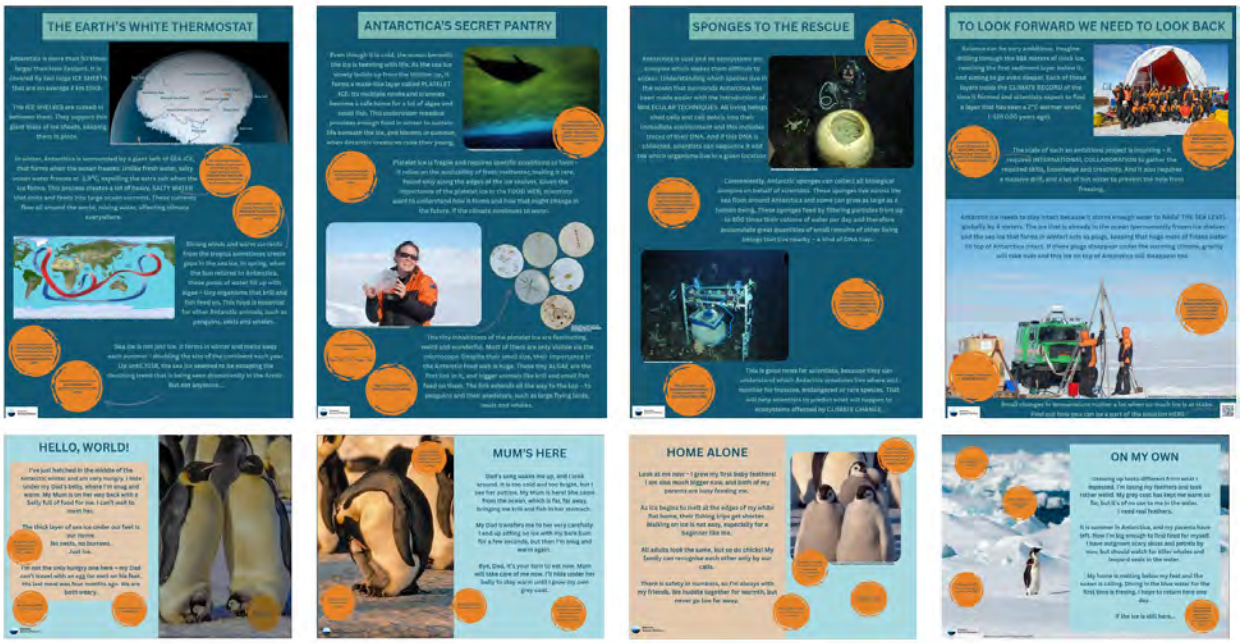
Antarctic science poster sets for children and adults

The suggested arrangement of the posters on the poster wall:



The A0 posters (top row) feature information organised topically across four main themes – Introduction to Antarctica, Sea ice, Antarctic food webs and Climate change. The bright orange bubbles with "cool facts" will attract reluctant readers.

All eight posters are best used together to facilitate the reading vertically from top to bottom as suggested above. The A1 chick's story (bottom row) acts as a unifying, main theme, providing a more personal story structure, alongside which the science would be drawn into the context more organically.

It is highly recommended to use the accompanying quiz, as it increases engagement with the posters and facilitates the retention of information.

Key words:

Sea ice, Food webs, Climate change, Emperor penguin life cycle.

THE EARTH'S WHITE THERMOSTAT

Antarctica is more than 50 times larger than New Zealand. It is covered by two large ICE SHEETS that are on average 2 km thick.

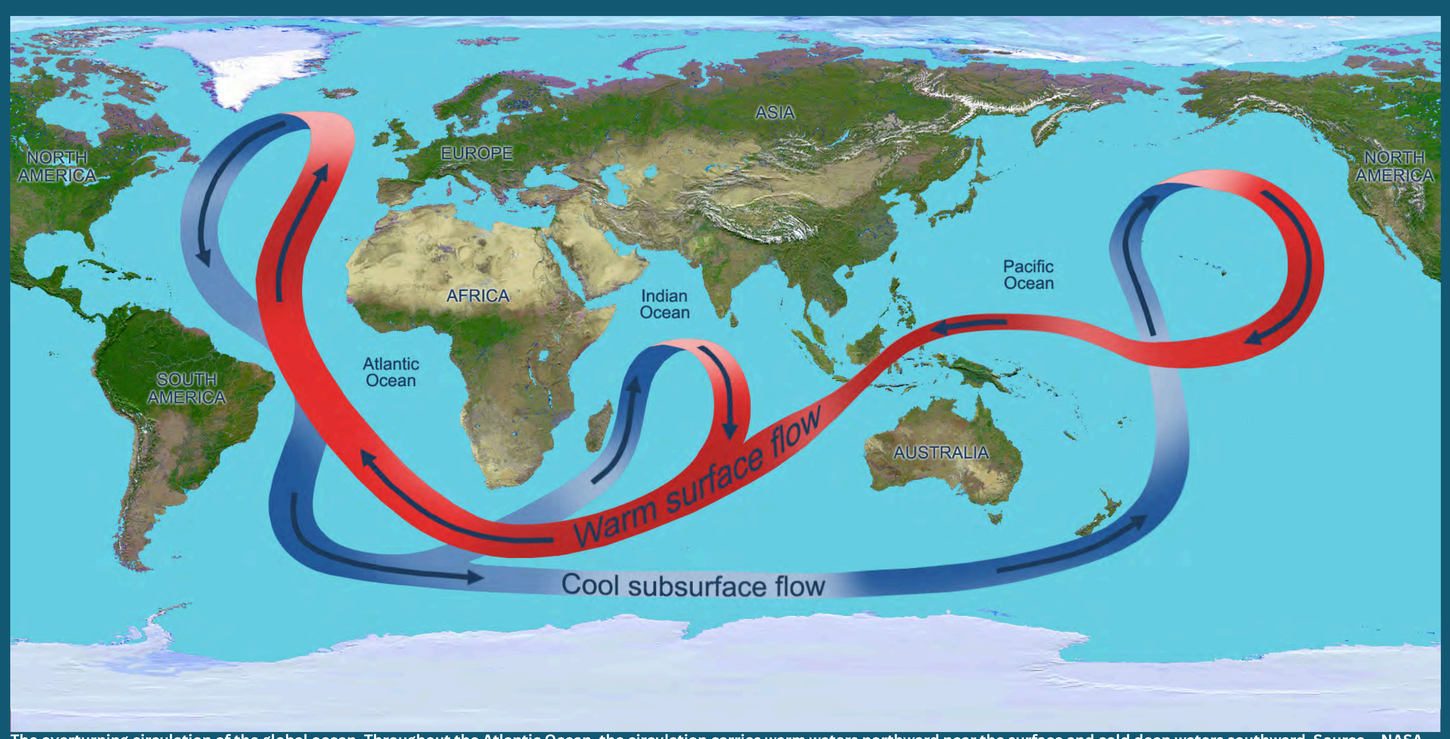
The ICE SHELVES are tucked in between them. They support this giant mass of ice sheets, keeping them in place.

Antarctic sea ice maximum extent, September 10 2023. NASA's Scientific Visualization Studio - Trent L. Schindler, Grace Weikert, Ian Jones, Laurence Schuler.

In winter, Antarctica is surrounded by a giant belt of SEA ICE, that forms when the ocean freezes. Unlike fresh water, salty ocean water freezes at -1.9°C, expelling the extra salt when the ice forms. This process creates a lot of heavy, SALTY WATER that sinks and feeds into large ocean currents. These currents flow all around the world, mixing water, affecting climate everywhere.

This is known as Antarctic Bottom Water. A huge volume of it forms over winter, triggering the flow of the ocean currents that mix the water globally and influence climate around the world.

A phenomenon called polynya. These pools form naturally and are also known as ice factories, replacing lost sea ice.



The overturning circulation of the global ocean. Throughout the Atlantic Ocean, the circulation carries warm waters northward near the surface and cold deep waters southward. Source – NASA.

Strong winds and warm currents from the tropics sometimes create gaps in the sea ice. In spring, when the Sun returns to Antarctica, these pools of water fill up with algae – tiny organisms that krill and fish feed on. This food is essential for other Antarctic animals, such as penguins, seals and whales.

Huge quantity of salty water that forms during the winter in Antarctica and the Arctic, power the circulation of other ocean currents across the globe.

Since 2017 the extent of the sea ice formation was significantly below the normal average.

Sea ice is not just ice. It forms in winter and melts away each summer - doubling the size of the continent each year. Up until 2016, the sea ice seemed to be escaping the declining trend that is being seen dramatically in the Arctic. But not anymore...

Antarctic Science Platform

ANTARCTICA'S SECRET PANTRY

Even though it is cold, the ocean beneath the ice is teeming with life. As the sea ice slowly builds up from the bottom up, it forms a maze-like layer called PLATELET ICE. Its multiple nooks and crannies become a safe home for a lot of algae and small fish. This underwater meadow provides enough food in winter to sustain life beneath the ice, and blooms in summer, when Antarctic creatures raise their young.

Weddell seal under platelet ice. Photo by Natalie Robinson / ASP

Green algae are called phytoplankton and are often described as the "grass of the ocean". They obtain their energy from the Sun (just like plants) and are made of just one cell.

Food web shows the transfer of energy and nutrients as organisms consume each other.

Platelet ice is fragile and requires specific conditions to form – it relies on the availability of fresh meltwater, making it rare, found only along the edges of the ice shelves. Given the importance of the platelet ice in the FOOD WEB, scientists want to understand how it forms and how that might change in the future, if the climate continues to warm.

Dr Natalie Robinson holding platelet ice. Photo by Rebecca McLeod / Antarctica New Zealand

Phytoplankton, as seen under the microscope. Photo by Jacqui Stuart, Svenja Halfter, Ken Ryan.

The tiny inhabitants of the platelet ice are fascinating, weird and wonderful. Most of them are only visible via the microscope. Despite their small size, their importance in the Antarctic food web is huge. These tiny ALGAE are the first link in it, and bigger animals like krill and small fish feed on them. The link extends all the way to the top – to penguins and their predators, such as large flying birds, seals and whales.

An example of a food web in Antarctica:

Algae → Krill → Fish → Penguin → Seal

Algae are the essential first step in all Antarctic food webs

Antarctic Science Platform

SPONGES TO THE RESCUE

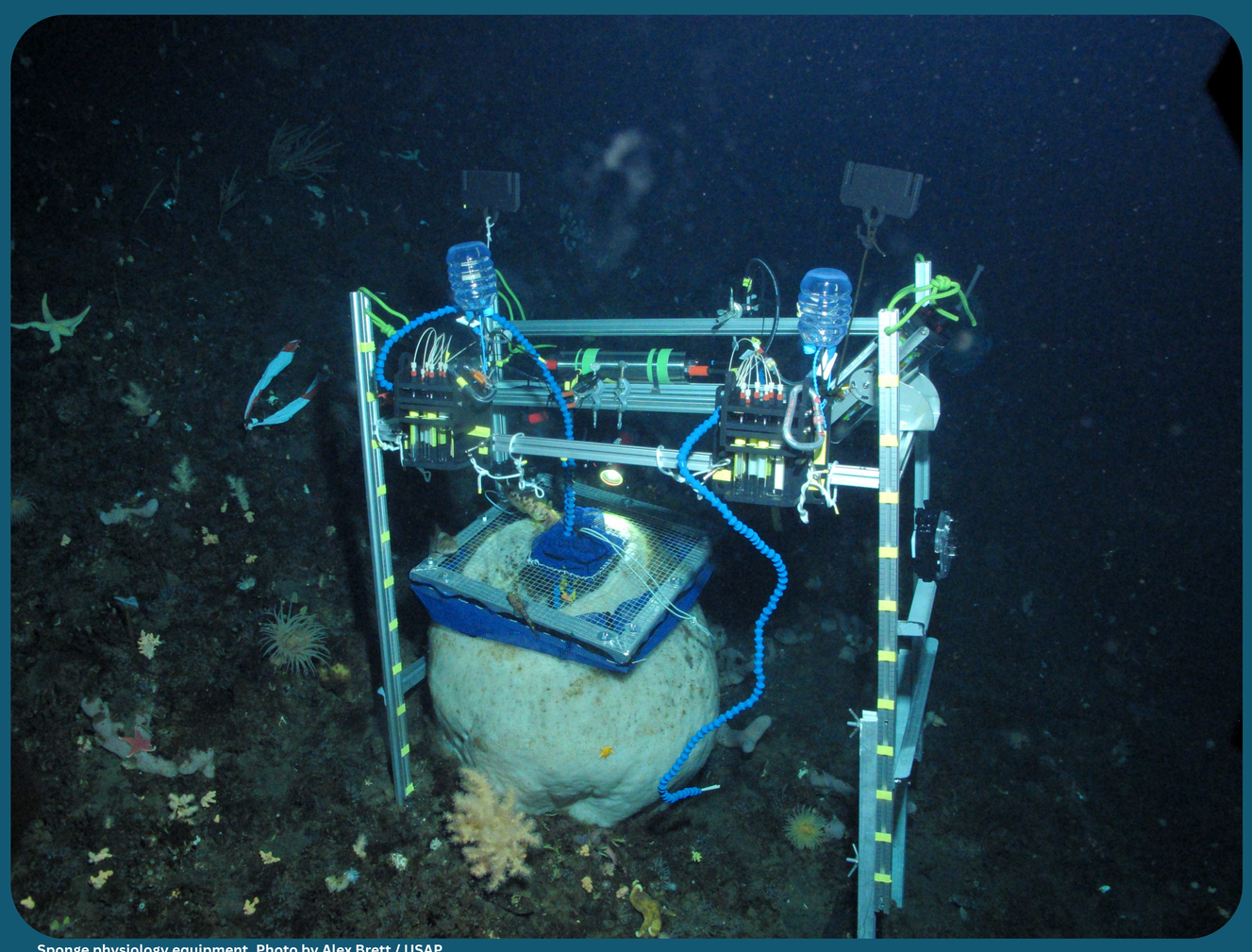
Biological sampling in coastal and marine environments requires boats, helicopters, planes, equipment to drill holes in the ice, specially-trained divers... and a lot of good luck

Antarctica is vast and its ecosystems are complex which makes them difficult to access. Understanding which species live in the ocean that surrounds Antarctica has been made easier with the introduction of MOLECULAR TECHNIQUES. All living beings shed cells and cell debris into their immediate environment and this includes traces of their DNA. And if this DNA is collected, scientists can sequence it and tell which organisms live in a given location.

Diver with Antarctic sponge. Photo by Alex Brett / USAP

Molecular techniques allow scientists to study processes that happen inside a living cell. Molecular scientists work with complex molecules, such as DNA and proteins.

Conveniently, Antarctic sponges can collect all biological samples on behalf of scientists. These sponges live across the sea floor around Antarctica and some can grow as large as a human being. These sponges feed by filtering particles from up to 900 times their volume of water per day and therefore accumulate great quantities of small remains of other living beings that live nearby – a kind of DNA trap.



Sponge physiology equipment. Photo by Alex Brett / USAP

Sequencing even short stretches of DNA allows scientists to determine the species of an organism or at least a group of organisms, to which that DNA may belong (e.g. krill or fish).

DNA collected from the environment (as opposed to a single organism) is called environmental DNA (eDNA)

This is good news for scientists, because they can understand which Antarctic creatures live where and monitor for invasive, endangered or rare species. That will help scientists to predict what will happen to ecosystems affected by CLIMATE CHANGE.

Antarctic Science Platform

TO LOOK FORWARD WE NEED TO LOOK BACK

Science can be very ambitious. Imagine drilling through the 588 meters of thick ice, reaching the first sediment layer below it, and aiming to go even deeper. Each of these layers holds the CLIMATE RECORD of the time it formed and scientists expect to find a layer that has seen a 2°C warmer world (~125 000 years ago).

International team of experts, at the drilling site. Photo by Anthony Powell / Antarctica New Zealand

Drilling site is located on the West Antarctic Ice Sheet, ~800 km away from the Scott base.
Look for a small sticker on the map of Antarctica!

Countries involved in the project - New Zealand, the United States, Germany, Australia, Italy, Japan, Spain, South Korea, the Netherlands, and the United Kingdom.

The scale of such an ambitious project is inspiring – it requires INTERNATIONAL COLLABORATION to gather the required skills, knowledge and creativity. And it also requires a massive drill, and a lot of hot water to prevent the hole from freezing.

Antarctic ice needs to stay intact because it stores enough water to RAISE THE SEA LEVEL globally by 4 meters. The ice that is already in the ocean (permanently frozen ice shelves and the sea ice that forms in winter) acts as plugs, keeping that huge mass of frozen water on top of Antarctica intact. If these plugs disappear under the warming climate, gravity will take over and this ice on top of Antarctica will disappear too.

The Paris Agreement is a legally binding international treaty on climate change, adopted in 2015 by 195 countries to limit global warming to well below 2°C

What happens in Antarctica matters to all of us!

Melting a hole through the sea ice to deploy oceanographic instruments. Photo by Natalie Robinson / ASP

Small changes in temperature matter a lot when so much ice is at stake.

Find out how you can be a part of the solution HERE

Antarctic Science Platform

HELLO, WORLD!

I've just hatched in the middle of the Antarctic winter and am very hungry. I hide under my Dad's belly, where I'm snug and warm. My Mum is on her way back with a belly full of food for me. I can't wait to meet her.

The thick layer of sea ice under our feet is our home.
No nests, no burrows.
Just ice.

My dad belly is at a comfortable 38°C, compared with -35°C outside!

I'm not the only hungry one here – my Dad can't travel with an egg (or me!) on his feet. His last meal was four months ago. We are both weary.

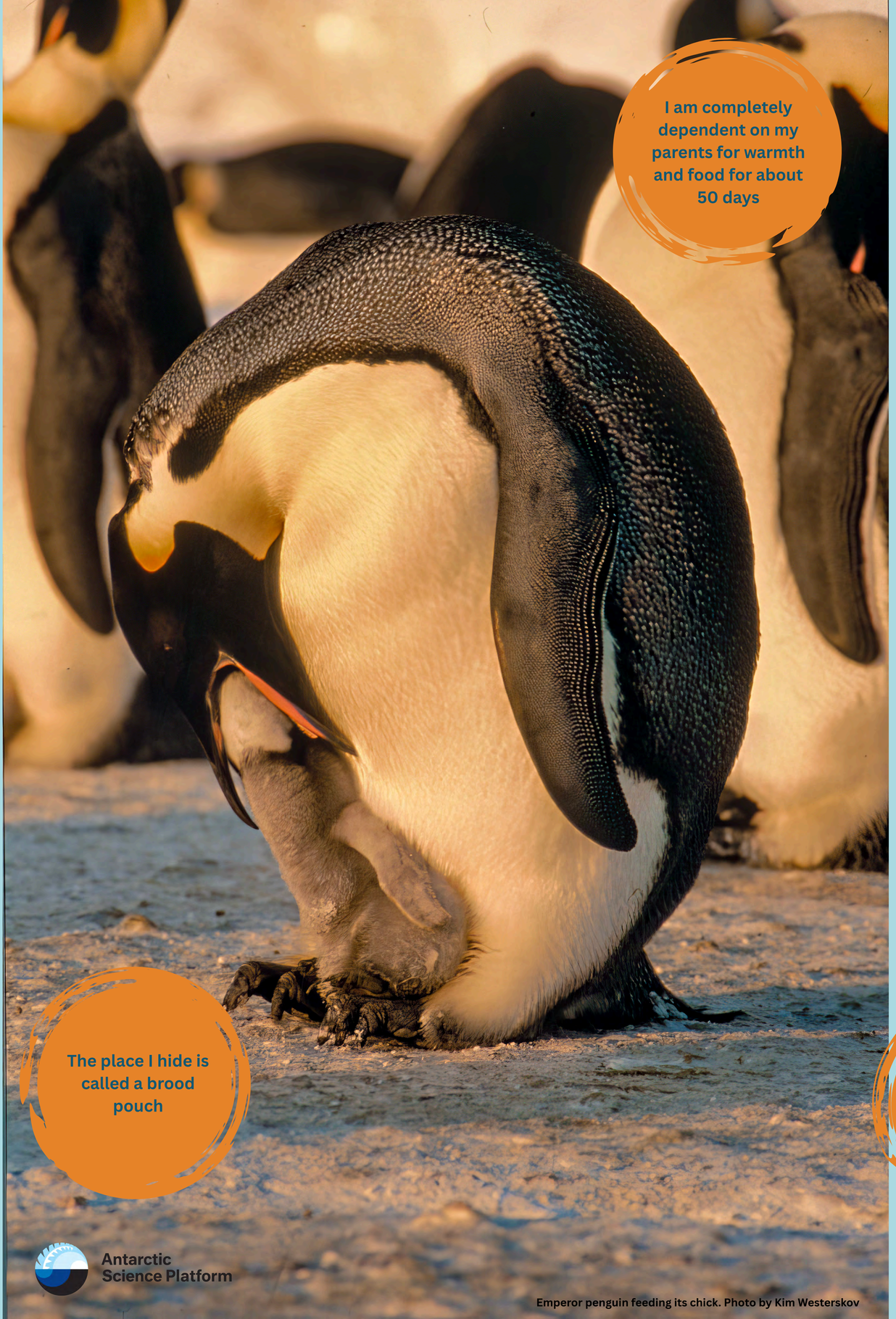
My parents travelled ~100 km to have me

It takes ~70 days for me to hatch

Antarctic Science Platform

When I'm born, I weigh just 200 g

Molting Emperor penguin chick. Photo by Lana Young / ASP



Emperor penguin feeding its chick. Photo by Kim Westerskov

MUM'S HERE

Dad's song wakes me up, and I look around. It is too cold and too bright, but I see her outline. My Mum is here! She came from the ocean, which is far, far away, bringing me krill and fish in her stomach.

My Dad transfers me to her very carefully. I end up sitting on ice with my bare bum for a few seconds, but then I'm snug and warm again.

Bye, Dad, it's your turn to eat now. Mum will take care of me now. I'll hide under her belly to stay warm until I grow my own grey coat.

My Dad lost half of his weight by now

The bond I have with my Dad is so strong that he does not want to let me go when Mum arrives

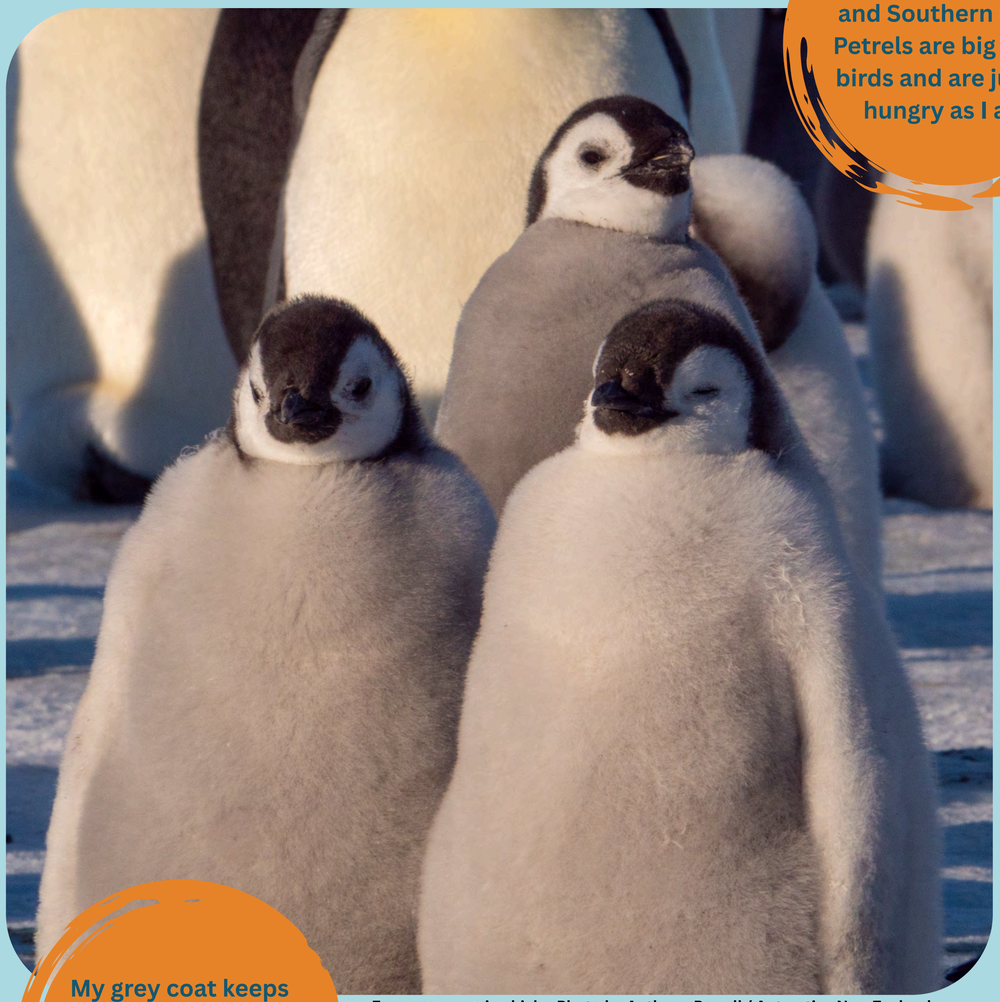
HOME ALONE

Look at me now – I grew my first baby feathers! I am also much bigger now, and both of my parents are busy feeding me.

As ice begins to melt at the edges of my white flat home, their fishing trips get shorter. Walking on ice is not easy, especially for a beginner like me.

All adults look the same, but so do chicks! My family can recognise each other only by our calls.

There is safety in numbers, so I’m always with my friends. We huddle together for warmth, but never go too far away.



Emperor penguin chicks. Photo by Anthony Powell / Antarctica New Zealand

South Polar Skuas and Southern Giant Petrels are big flying birds and are just as hungry as I am!

My grey coat keeps me warm, but is not waterproof. I stay away from water

I’m learning to walk on my feet and can be clumsy

A huddle of chicks is called a crèche

Antarctic Science Platform

I like eating fish, krill and squid

My scientific name is *Aptenodytes forsteri*

If things go well for me, I can live up to 20 years in the wild.

ON MY OWN

Growing up looks different from what I expected. I’m losing my feathers and look rather weird. My grey coat has kept me warm so far, but it's of no use to me in the water. I need real feathers.

It is summer in Antarctica, and my parents have left. Now I’m big enough to find food for myself. I have outgrown scary skuas and petrels by now, but should watch for killer whales and leopard seals in the water.

My home is melting below my feet and the ocean is calling. Diving in the blue water for the first time is freeing. I hope to return here one day.

If the ice is still here...

I will spend my entire life in the ocean and ice surrounding Antarctica. It’s my home.

Antarctic Science Platform

Molting Emperor penguin chick. Photo by Lana Young / ASP

QUIZ TIME

1. How many more times is Antarctica larger than NZ?
    - ❑ 2 times
    - ❑ 50 times
    - ❑ They are both the same size

2. What does a penguin chick eat?
    - ❑ Fish and krill
    - ❑ Milk
    - ❑ Seaweed

3. Antarctic glass sponges:
    - ❑ Can be as large as humans
    - ❑ Are very tasty
    - ❑ Have tiny legs and can move across the ocean floor

4. Emperor Penguin chicks:
    - ❑ Can find food on their own
    - ❑ Huddle together for warmth and safety
    - ❑ Can always hide under their parent’s belly

5. Emperor penguins breed on ice, mainly because:
    - ❑ That’s the only home they have
    - ❑ They like it cold
    - ❑ They can make nests and burrows out of snow

More questions 👉

6. What is the name of New Zealand’s base in Antarctica?
    - ❑ McMurdo Station
    - ❑ Scott base
    - ❑ New Zealand Base for Scientific Research and Penguin Ecology

7. What is NOT correct?
    - ❑ If algae disappear, there will be no food for other animals in Antarctica
    - ❑ A food web shows what eats what
    - ❑ Green algae are too small to be important

8. Why do scientists study Antarctica?
    - ❑ Because there is nothing else left to study.
    - ❑ If the ice in Antarctica melts, the water level will rise up to 4 meters worldwide
    - ❑ There are no scientists in Antarctica – it is just too cold for people to be there.