### Science & Education Report

MS Roald Amundsen 2025



Photo: Oscar Farrera

### MS Roald Amundsen

Highlights of Antarctica 1 Mar 2025 – 11 Mar 2025





### Science & Education Program

From Ushuaia to the vast white expanse of Antarctica, the Science and Education Team journeyed with you, uncovering the wonders of this remote world.

Through lectures, hands-on workshops, and cultural visits ashore, we explored the resilience of wildlife, the region's storied history, and the dynamic forces shaping this frozen frontier.

We hope these moments—watching penguins waddle along icy shores or listening to the distant crack of calving glaciers—have deepened your appreciation for Antarctica and inspired a lasting curiosity for the natural world.



### Science & Education Program

Aboard HX vessels, we are guests in Antarctica—but through citizen science, you've become part of something bigger. Science is for everyone, happening everywhere, every day, and your participation makes a difference.

By observing, collecting data, and contributing to global research, you've gained a deeper connection to the natural world—one that sustains us all. This journey doesn't end here. The tools are in your hands to continue exploring, documenting, and protecting nature wherever you go.

Together, we can turn curiosity into action, ensuring a future where people and the planet thrive.

### History

History is not something that simply happens to you—it is something you create. And this journey has been proof of that. You are now part of the **0.00008 percent** of humanity to have set foot in Antarctica. That is no small feat, but with it comes a responsibility: it is up to you to keep the stories you have heard alive.

Throughout our expedition, we have encountered a remarkable array of historical sites and monuments—plaques weathered by time, abandoned bases frozen in history, silent relics of past expeditions. We have reflected on the struggles and triumphs of those who came before us, peeling back the layers of Antarctica's past. In this stark, inhospitable landscape, these very human elements stand as a testament to resilience, grit, and the relentless drive to explore the unknown.

Thanks to the passion and expertise of our onboard historians, you may have found yourself immersed in stories you had never considered before—perhaps the significance of cultural heritage in the far south, or the realization that Shackleton's legendary journey was far from an isolated event.

So whatever you do, give history the attention it deserves. Because the past is never just the past it is the foundation upon which the present, and the future, is built.



### Explorers

What is it about explorers that captivates us? Is it their skill, their determination, their resilience—or is it simply that they look effortlessly cool? No matter who you are, every exploration story holds something to inspire, challenge, or ignite curiosity.

Throughout this journey, we've retraced the footsteps of legendary figures like Amundsen and Shackleton, but we've also uncovered the stories of lesser-known pioneers, such as Jackie Ronne the first woman to spend an entire winter in Antarctica. Yet, in sharing these tales, we have only scratched the proverbial tip of the iceberg. Our hope is that, when you return home, you will continue the adventure—diving deeper into the extraordinary stories from the golden age of exploration.

And when you do, remember this: you are now part of that legacy. You have faced the Antarctic challenge head-on and emerged (mostly) unscathed. We are proud to have stood alongside you in the winter wilderness of the far south, and we can't wait to join you on your next great expedition.



### Your inner explorer

Sometimes, a journey is about more than just admiring the places you visit. It's about feeling the raw power of nature, marvelling at the wildlife, and embracing the thrill of adventure. But in a place like Antarctica, it's almost impossible not to find yourself contemplating something deeper: Why did I come here? What drives people to venture into these frozen landscapes, to challenge themselves against the extremes?

We believe that every journey leaves its mark. It may not be obvious at first, but once you return home, the memories of the Seventh Continent will begin to shift the way you see the world. One day, you might be walking through a supermarket, lost in thought, when—just for a moment—you glimpse something familiar: the endless, silent slopes of the far south. And in that instant, you'll remember that the world is still wild... and you have seen that wilderness with your own eyes.

Our memories are among our most precious possessions. They shape us, define us, and remind us of who we truly are. We are simply honoured to have been part of your journey, and to have witnessed your transformation into a true explorer.





The Antarctic Peninsula is a testament to the power of deep time, its geology dominated by ancient igneous and metamorphic rocks. This dramatic landscape was forged between 201 and 66 million years ago, when the oceanic Phoenix Plate plunged beneath Gondwana's eastern margin, driving the subduction that shaped the region.

Today, the legacy of that fiery past is revealed in the exposed Antarctic Peninsula Batholith—a massive body of intrusive igneous rock that cooled and solidified over millions of years. Erosion has since stripped away the overlying layers, unveiling striking formations diorite gabbro and granite of Damoy point.

Every towering peak, every polished shoreline, every rock beneath your feet tells a story of deep Earth processes that continue to shape our planet today. By understanding Antarctica's geology, we gain insight not only into its past but also into the forces still at work across the globe—reminding us that the world beneath us is always shifting, always evolving, and always worth exploring.



### Cryosphere

Antarctica's vast, frozen landscapes are more than just breathtaking—they are vital. The glaciers, sea ice, and towering icebergs we have explored together form part of the cryosphere, a key regulator of our planet's climate. Ice reflects sunlight, helps stabilize global temperatures, and stores the world's largest reservoir of freshwater. It is not just Antarctica's lifeblood, but ours as well.

Yet, as we admire its beauty, we cannot ignore the signs of change. Climate shifts are altering this frozen world at an alarming rate, threatening not only polar ecosystems but global weather patterns and sea levels. Understanding the cryosphere is not just about studying Antarctica it's about understanding our planet's future.

May the memories of this journey remind you that what happens here affects us all. Carry this knowledge forward, share what you've seen, and become an advocate for the ice that sustains life on Earth.



### Arts, Crafts & Creativity

Antarctica's beauty is more than something to be seen—it's something to be felt, interpreted, and expressed. Through bottle, watercolour, and species painting, clay modelling, and memory drawing, you transformed inspiration into art, capturing the essence of this remote and breathtaking world.

No prior experience was needed—just an open mind and a willingness to explore creativity in new ways. From delicate brushstrokes to sketches drawn from memory, each creation became a personal tribute to the landscapes and wildlife that surrounded us.

More than just an artistic escape, these sessions provided a space to connect sharing stories, laughter, and quiet moments of reflection as the icy world drifted by. May these creations serve as reminders of this journey, sparking inspiration long after you've returned home.





# GREAT



### Wildlife Watch

As we sailed through the icy waters of Antarctica, you were invited to step onto the deck and take in the breathtaking scenery—an ever-changing panorama of towering glaciers, sculpted icebergs, and endless ocean. But the true magic came in the moments of discovery, as we scanned the horizon for signs of life.

Together, we spotted a remarkable array of wildlife, from the soaring South Polar skuas to the bustling colonies of Chinstrap and Gentoo penguins. The ocean revealed its giants as well—graceful humpback whales, elusive Antarctic minkes, and Crabeater seals resting on drifting ice.

Each sighting was a reminder that Antarctica is anything but empty; it is alive, dynamic, and teeming with stories waiting to be observed. May these moments stay with you, inspiring a deeper appreciation for the fragile and extraordinary life of the Southern Ocean.



### **Science Boat**

Over ten science boat sessions, we ventured beyond observation, diving into hands-on exploration of the Antarctic Ocean. With each drop of a net, each measurement taken, and each sample collected, we weren't just witnessing science—we were part of it.

Using a plankton net, we revealed the tiny, drifting organisms that sustain Antarctica's entire marine ecosystem. A CTD device helped us uncover the hidden world beneath the surface, measuring the ocean's temperature, salinity, and depth. And with a simple Secchi disk, we gauged water clarity, offering insights into the abundance of phytoplankton—the foundation of this fragile food web.

These sessions weren't just about data collection; they were about curiosity, discovery, and connection. Science isn't something distant—it's a way of seeing, questioning, and understanding the world around us. As you return home, may this journey inspire you to keep exploring, keep asking questions, and never stop being amazed by the natural world.

### FjordPhyto

Science in Antarctica isn't just for researchers—it's for all of us. Through **FjordPhyto**, you stepped into the role of a scientist, helping to uncover how glacial melt is shaping the Antarctic marine ecosystem.

Armed with a plankton net, you carefully towed the waters, gathering samples teeming with microscopic life. Using a filtration system, you concentrated phytoplankton onto filters—tiny organisms that fuel the entire food web. These samples, now bound for microscopic and DNA analysis, will contribute to ongoing research on how climate change is altering phytoplankton communities.

During our voyage, we collected samples from **Orne** and **Neko Harbours**, each site offering a unique snapshot of Antarctic fjord ecosystems. Your participation in this project wasn't just an activity—it was a meaningful step in understanding and protecting this fragile environment. Science thrives on curiosity, and by taking part, you've helped advance knowledge that reaches far beyond these icy waters.



### Secchi Disk

Gazing into the Antarctic waters, it's easy to forget they are full of hidden life. With a simple tool—the **Secchi Disk**—you helped reveal what the eye alone cannot see. By lowering the disk into the water and noting the depth at which it disappeared, you measured clarity, offering clues about plankton abundance and shifting ocean conditions.

Some days, strong currents made measurements impossible—a reminder that nature sets the terms here. But on calmer days, each reading became part of something bigger: a global effort to track water transparency and a key addition to FjordPhyto's research on Antarctic fjords. What may have felt like a simple act watching a disk sink into the depths—was a moment of discovery. By taking part, you helped scientists better understand a changing ocean, one measurement at a time.





### CTD

Beneath the surface, the ocean holds stories of change—stories revealed through science. With the CTD device, you helped uncover key details about Antarctic waters, measuring **salinity**, **temperature**, and **depth** to paint a picture of ocean conditions.

Lowered on a tethered line, the CTD captured water column profiles, offering insights into how glacial melt shapes fjords, how currents mix the sea, and where phytoplankton thrive. These data are not just numbers—they are puzzle pieces in understanding a changing climate. Each measurement taken adds to a growing body of research, helping scientists track long-term shifts in Antarctic ecosystems. By participating, you've played a role in unravelling the mysteries of these remote waters—one drop at a time.

#### Depth Profile: Damoy Point, Wiencke Island



Temperature (°C) Salinity (PSU) Our CTD profile from Damoy shows an increasing salinity which we expect since salt water is more dense than freshwater. But the temperature also increases despite cold water being more dense than warm water. This is because salinity 'trumps' temperature, so this is likely due to cold, fresh water melt from glaciers or icebergs.

When looking at the scale bars we can see these are relatively small changes, suggesting a well-mixed water column. This allows nutrients to be replenished to the surface waters for phytoplankton to use in photosynthesis.

### Water Sampling

During our expedition, we collected water samples from four Pleneau Island, Damoy Point, Orne Harbour, and Neko Harbour.

From the science boat, we deployed **plankton nets**, towing them through the water for 5–10 minutes to capture these drifting life forms. The **phytoplankton net** (20µm mesh) gathered microscopic plant-like organisms, while the **zooplankton net** (200µm mesh) caught tiny marine animals, each playing a vital role in the Antarctic food web.

Every tow provided a glimpse into the hidden world beneath the surface, helping us understand how these foundational species sustain life in the Southern Ocean.





### Plankton Samples

Back in the science centre, we brought the ocean into focus—examining our water samples under the microscope to uncover the hidden world of **phytoplankton** and **zooplankton**.

Using microscopes, we projected magnified images onto the screen, allowing everyone to see the intricate details of these tiny organisms. Smaller binocular microscopes offered a hands-on experience, inviting you to search for life in each drop of water.

The samples revealed a world dominated by diatoms, a type of phytoplankton that forms the foundation of the Antarctic food web. What seemed invisible to the eye became a vivid reminder that even the smallest life forms shape this vast and wild ecosystem.



B) Harpacticoida (copepod) – zooplankton





#### D) Euphasia superba (krill) – zooplankton





### NASA Cloud Observer

During our voyage, we contributed to NASA's **GLOBE Cloud Observations**, collecting data on:

- March 3<sup>rd</sup> (Drake Passage)
- March 7<sup>th</sup> (Neko Harbour)
- March 9<sup>th</sup> (Drake Passage)

By comparing your ground-based observations with satellite measurements, scientists can refine cloud classifications, enhance climate models, and improve weather predictions—advancing our understanding of Earth's atmosphere and climate.

Curious to continue? You can keep observing and submitting data from home using the **GLOBE Observer** app, turning everyday cloud-watching into real scientific impact.

<u>View our data on the global map</u>



#### S'COOL Cloud Identification Chart



### NASA Cloud Observer

High Clouds (Base above 6,000 meters):

**Cirrus**: Thin, wispy clouds composed of ice crystals. They often appear as delicate streaks or feathery wisps high in the sky.

**Cirrostratus**: Thin, sheet-like clouds that cover large portions of the sky. They can create a halo around the sun or moon.

**Cirrocumulus**: Small, fluffy clouds in a regular pattern, resembling fish scales or ripples.

#### Medium Clouds (Base between 2,000 and 6,000 meters):

**Altocumulus**: Puffy, grayish-white clouds with rounded edges. They often form parallel rows or patches.

**Altostratus**: Thick, grayish clouds that partially obscure the sun or moon. They lack the distinct features of cirrostratus.

#### Low Clouds (Base below 2,000 meters):

**Stratus**: Uniform, grayish clouds that cover the sky like a blanket. They can bring drizzle or light rain.

**Stratocumulus**: Low, lumpy clouds with defined edges. They often appear in rows or patches.

Nimbostratus: Thick, dark gray clouds associated with steady rain or snow.

Remember that these cloud types can vary in appearance and behaviour, but this basic classification helps meteorologists understand weather patterns and atmospheric conditions. If you'd like to explore more examples, you can check out NASA's <u>On-Line Cloud Chart</u>.

View our data on the global map

### iNaturalist

Throughout this voyage, you played a vital role in documenting the incredible biodiversity of Antarctica. By capturing and submitting images of wildlife and plant life, you contributed to a global effort to track species distribution and monitor ecosystems in one of the most remote places on Earth.

Together, we gathered: 163 Observations 48 Species Identified 13 Observers Participating

Each observation helps scientists build a clearer picture of biodiversity in polar regions. Want to explore our findings? Scan the **QR code** to view our collective data and see the impact of your contributions:





### AMANT2504 – MS Roald Amundsen 1.-11.3.2025

#### Map of Observations



### AMANT2504 – MS Roald Amundsen 1.-11.3.2025



#### Recent Observations 😜







### eBird

Bird-watching isn't just a hobby—it's a powerful tool for science. eBird, a global citizen science platform, allows bird enthusiasts to record and share sightings, contributing valuable data for research and conservation.

During our voyage, our onboard conducted 9 wildlife ornithologists watches, completing 49 checklists and recording 34 bird species along the way. Every entry adds to a growing database that helps scientists track migration patterns, monitor populations, and understand bird behaviour in remote regions like Antarctica. Scan the QR code to explore our data and see how your observations contribute to a global effort in avian research:



#### eBird



#### K My Trip Reports

AMANT2504 -Highlights of Antarctica on MS Amundsen

1 – 11 Mar 2025 (11 days) Public

Antarctica | Argentina | Chile | High Seas
Subregions

 M/S Roald Amundsen Science Center, Brendan Murtha, Ingvild Riska





### Happywhale

5 species of whales were encountered during this voyage. A total of 21 ID pictures uploaded of humpback whale flukes to Happywhale, out of which 8 have already been identified as individuals in the Happywhale catalogue.

These findings are a valuable contribution to science, helping to enhance our understanding of whale populations on a global scale.

Guests from this trip are also encouraged to submit their own photos of individual whales to Happywhale, contributing to their worldwide catalogue of identified whales.

View the MS Roald Amundsen's submissions to Happywhale during our voyage: <u>ttps://happywhale.com/user/11890;svy=</u> <u>120597</u>



### **Guest Scientists**

Conflicted melting lce in a lifetime lernesswhales many tourists isolated climate change wildlife cold remote 1110

What understanding do you get out of visiting Antarctica that you couldn't otherwise?

### Antarctic Haiku

i.Fussy gentoos hoprock to rock in soiled white shirts;heedless of the smell.

#### **ii.** Cold shocking bare skin

like a live current: this is

the price of the plunge.

### Human-like noses huffing, white parts iceberg blue,

humpback whales sleep deep.

#### iv.

**v.** 

Sheer white exposed spine: the glacier lies in waiting to shake itself free.

## Sly-eyed leopard seal slips between the zodiacs:

iii.

guests in her ice world.

### Snow algae

Antarctica's icy landscape may seem inhospitable, but even here, life finds a way. The Snow Algae Project investigates microscopic algae that thrive in melting snow, turning it shades of red, green, or orange. These blooms, primarily from the *Chlamydomonas* genus, flourish in nutrient-rich meltwater, creating vibrant streaks across the frozen terrain.

Beyond their striking colours, snow algae play a vital role in polar ecosystems. They influence biogeochemical cycles, provide nutrients to microbial communities, and even impact surface albedo—the ability of snow to reflect sunlight. As climate change accelerates melting, these algae may further contribute to ice loss, creating a feedback loop that scientists are eager to understand.

Through field sampling and lab analysis, researchers are uncovering how these tiny organisms survive in extreme conditions and what their presence reveals about Antarctica's changing environment. Every snow sample collected brings us closer to understanding the delicate balance of life in one of the harshest places on Earth.



### Snow Algae

We collected and filtered...

### What's next?

- Wet lab processing:
  - Nutrients in snow
  - Trace metals in snow
  - Snow algae cell density and pigmentation
- Model albedo using the SNICAR model
- Compare results to our snow algae studies in Alaska and Washington, USA

3 snow samples 2 rBC samples

9 snow samples 4 rBC samples

7 snow samples

18 snow samples4 rBC samples

3 snow samples 2 rBC samples

6 snow samples 2 rBC samples

9 snow samples2 rBC samples

7 snow samples 2 rBC samples



# Wildlife List - Birds

Credit: Brendan Murtha

### Wildlife List – Birds

Scientific Name	English	Deutsch	Francais	Chinese
Chionis albus	Snowy Sheathbill	Weißgesicht-Scheidenschnabel	Chionis blanc	白鞘嘴鸥
Stercorarius chilensis	Chilean Skua	Chileskua	Labbe du Chili	智利贼鸥
Stercorarius antarcticus	Brown Skua	Subantarktikskua	Labbe antarctique	棕贼鸥
Stercorarius maccormicki	South Polar Skua	Antarktikskua	Labbe de McCormick	麦氏贼鸥
Chroicocephalus maculipennis	Brown-hooded Gull	Patagonienmöwe	Mouette de Patagonie	褐头鸥
Leucophaeus scoresbii	Dolphin Gull	Blutschnabelmöwe	Goéland de Scoresby	豚鸥
Larus dominicanus	Kelp Gull	Dominikanermöwe	Goéland dominicain	黑背鸥
Sterna vittata	Antarctic Tern	Antarktikseeschwalbe	Sterne couronnée	南极燕鸥
Sterna hirundinacea	South American Tern	Falklandseeschwalbe	Sterne hirundinacée	南美燕鸥
Spheniscus magellanicus	Magellanic Penguin	Magellanpinguin	Manchot de Magellan	南美企鹅
Pygoscelis papua	Gentoo Penguin	Eselspinguin	Manchot papou	白眉企鹅
Pygoscelis antarcticus	Chinstrap Penguin	Kehlstreifpinguin	Manchot à jugulaire	纹颊企鹅
Diomedea exulans	Snowy Albatross	Wanderalbatros	Albatros hurleur	漂泊信天翁
Phoebetria palpebrata	Light-mantled Albatross	Graumantelalbatros	Albatros fuligineux	灰背信天翁
Thalassarche chrysostoma	Grey-headed Albatross	Graukopfalbatros	Albatros à tête grise	灰头信天翁
Thalassarche melanophris	Black-browed Albatross	Schwarzbrauenalbatros	Albatros à sourcils noirs	黑眉信天翁
Oceanites oceanicus	Wilson's Storm Petrel	Buntfuß-Sturmschwalbe	Océanite de Wilson	烟黑叉尾海燕
Fregetta tropica	Black-bellied Storm Petrel	Schwarzbauch-Sturmschwalbe	Océanite à ventre noir	黑腹舰海燕

### Wildlife List – Birds

Scientific Name	English	Deutsch	Francais	Chinese
Macronectes giganteus	Southern Giant Petrel	Riesensturmvogel	Pétrel géant	巨鹱
Fulmarus glacialoides	Southern Fulmar	Silbersturmvogel	Fulmar argenté	银灰暴风鹱
Daption capense	Cape Petrel	Kapsturmvogel	Damier du Cap	花斑鹱
Pagodroma nivea	Snow Petrel	Schneesturmvogel	Pétrel des neiges	雪鹱
Pterodroma mollis	Soft-plumaged Petrel	Weichfeder-Sturmvogel	Pétrel soyeux	柔羽圆尾鹱
Pachyptila desolata	Antarctic Prion	Taubensturmvogel	Prion de la Désolation	鸽锯鹱
Pachyptila belcheri	Slender-billed Prion	Dünnschnabel-Sturmvogel	Prion de Belcher	细嘴锯鹱
Ardenna grisea	Sooty Shearwater	Dunkler Sturmtaucher	Puffin fuligineux	灰鹱
Pelecanoides urinatrix	Common Diving Petrel	Subantarktis-Lummensturmvogel	Puffinure plongeur	鹈燕
Phalacrocorax magellanicus	Magellanic Cormorant	Felsenscharbe	Cormoran de Magellan	岩鸬鹚
Leucocarbo atriceps	Imperial Shag	Kaiserscharbe	Cormoran impérial	蓝眼鸬鹚
Leucocarbo bransfieldensis	Antarctic Shag	Antarktikscharbe	Cormoran antarctique	南极鸬鹚
Theristicus melanopis	Black-faced Ibis	Schwarzzügelibis	Ibis à face noire	黑脸鹮

Southern fulmar (Fulmarus glacialoides)

Credit: Ted Gatlin/HX

# Wildlife List - Marine Mammals

### Wildlife List – Marine Mammals

SCIENTIFIC NAME	ENGLISH	DEUTSCH	FRANÇAIS	Chinese
Balaenoptera bonaerensis	Antarctic minke whale	Südlicher Zwergwal	Rorqual à museau pointu de l'Antarctique	南极小须鲸
Balaenoptera acutorostrata subsp.	Dwarf minke whale	Zwergzwergwal	Petit rorqual nain	矮小鲸
Megaptera novaeangliae	Humpback whale	Buckelwal	Baleine à bosse	大翅鲸
Hyperoodon planifrons	Southern bottlenose whale	Südlicher Entenwal	Hyperoodon austral	南瓶鼻鲸
Berardius arnuxii	Arnoux's beaked whale	Südlicher Schwarzwal	Bérardius d'Arnoux	阿诺喙鲸
Arctocephalus gazella	Antarctic fur seal	Antartischer Seebär	Otarie à fourrure antarctique	南极毛皮海狮
Leptonychotes weddellii	Weddell seal	Weddelrobbe	Phoque de Weddell	韦德尔氏海豹
Hydrurga leptonyx	Leopard seal	Seeleopard	Léopard de mer	豹海豹
Lobodon carcinophaga	Crabeater seal	Krabbenfresser	Phoque crabier	食蟹海豹
Mirounga leonina	Southern elephant seal	Südlicher See-Elefant	Eléphant de mer austral	南象海豹
Otaria byronia	South American sea lion	Mähnenrobbe	Lion de mer d'Amérique du Sud	南海狮
Balaenoptera borealis	Sei whale	Seiwal	Rorqual de Rudolphi	塞鲸
Lagenorhynchus australis	Peale's dolphin	Peale-Delfin	Lagénorhynque de Peale	皮氏斑纹海豚
Arctocephalus australis	South American fur seal	Südamerikanischer Seebär	Otarie à fourrure australe	南美毛皮海狮

Antarctic fur seal (Arctocephalus gazella)

Credit: Ted Gatlin/HX

### Connect With Your Inner Scientist

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