

The background of the image shows two whales swimming in deep blue water. The whale in the foreground is larger and more prominent, swimming towards the right. The second whale is smaller and positioned behind the first, also swimming towards the right. The water has a slight gradient from light blue at the top to darker blue at the bottom. Large, semi-transparent letters 'I', 'H', and 'W' are overlaid on the left side of the image.

Science & Education Report

MS Spitsbergen 2024

MS Spitsbergen

Circumnavigating Spitsbergen – The
Ultimate Expedition

02.09.2024 – 12.09.2024





Science & Education Program

The Science and Education Team onboard accompanied you in an expedition cruise through the Svalbard archipelago.

Through lectures, discovery sessions, nature walks and cultural visits ashore, they aimed at making every expedition day a unique learning experience.



Lectures

Lectures covering history & culture, geology, and wildlife (bird, land and marine mammals) aimed at understanding the culture and biodiversity of Svalbard.



Workshops

Hands-on, interactive sessions and short talks were held in the science center to introduce you to plankton, rocks, seaweeds, feathers, cetacean sounds, ocean currents, and to the use of microscopes.

History & Culture

The history of coal mining in Svalbard dates back to the early 20th century and has played a crucial role in the archipelago's development. Norwegian and American companies were among the first to establish mining operations, attracted by the rich coal seams discovered in the area. In 1906, the town of Longyearbyen was founded by the American John Munroe Longyearbyen's Arctic Coal Company, becoming the largest settlement in Svalbard and a key mining hub.

Norway's Store Norske Spitsbergen Kulkompani took over operations in the 1910s, expanding mining activities. Other settlements, such as Ny-Ålesund and Barentsburg, also grew around coal mining, with companies from various countries, including Russia, contributing to the industry. Coal mining not only provided economic sustenance to these communities but also established Norway's sovereignty over Svalbard, formalized by the Svalbard Treaty of 1920. Despite its decline in recent years due to environmental concerns and economic shifts, the legacy of coal mining remains a significant chapter in Svalbard's history.



Credit: Tommy Simonsen/ HX

History & Culture

Ny-Ålesund, a research town in Svalbard, Norway, has played a significant role in the history of polar exploration. It served as a base for several pioneering expeditions in the early 20th century. Notably, Roald Amundsen, a famed Norwegian explorer, launched his successful airship expedition to the North Pole from Ny-Ålesund in 1926, along with the Italian engineer Umberto Nobile and American explorer Lincoln Ellsworth. This expedition, aboard the airship *Norge*, was the first verified flight over the North Pole. Later, Nobile returned to Ny-Ålesund in 1928 for another polar expedition with the airship *Italia*, which ended in a tragic crash. American explorer Richard E. Byrd also used the area for his Arctic flights, contributing to the era of intense exploration that marked Ny-Ålesund as a crucial hub for Arctic ventures.



Credit: Tommy Simonsen/ HX

History & Culture



Mushamna, located on Woodfjorden's eastern shore in Svalbard, houses a cabin built from driftwood in 1987 by Karl Olsen and Bård Fougner. Initially constructed for hunting and fishing, it is now managed by the Governor of Svalbard, with tenants rotating annually. Activities include hunting Arctic foxes, seals, and reindeer, and fishing Arctic char. Visits require pre-arrangement. The surrounding area, home to nesting common eiders and Arctic terns, demands careful navigation to avoid disturbances.

Credit: Tommy Simonsen/ HX

History & Culture

Chermsideøya, a small, rocky island on the north coast of Nordaustland in Svalbard, is known for its unique geoglyphs—rock formations left by various expeditions in the late 19th and early 20th centuries. One of the earliest geoglyphs is "Jäderin," inscribed in 1898 by the Swedish Arc-of-Meridian expedition led by Edvard Jäderin. Another notable marking is the Cyrillic "Красин," honoring the Russian icebreaker that rescued Nobile's crew in 1928.

A more controversial addition is a swastika, likely created by German forces during World War II, though its exact origins remain debated. Despite repeated attempts to destroy it, the swastika has been reconstructed over the years. These geoglyphs, particularly concentrated on the island's southern tip, provide a striking record of the diverse and sometimes troubling history of Arctic exploration.

Credit: Tommy Simonsen/ HX



History & Culture

Bamsebu is a historical whaling station located in Ingebrigtsenbukta on the southern shore of Van Keulenfjorden. Established around 1930 by Ingvald Svendsen for hunting white whales (belugas), it is the only remaining example of such a station in Svalbard. The station includes the main cabin, smaller buildings, boats, and a notable pile of white whale bones, evidence of the large-scale whale hunting that took place. Bamsebu is a unique cultural and archaeological site, showcasing Svalbard's whaling heritage.

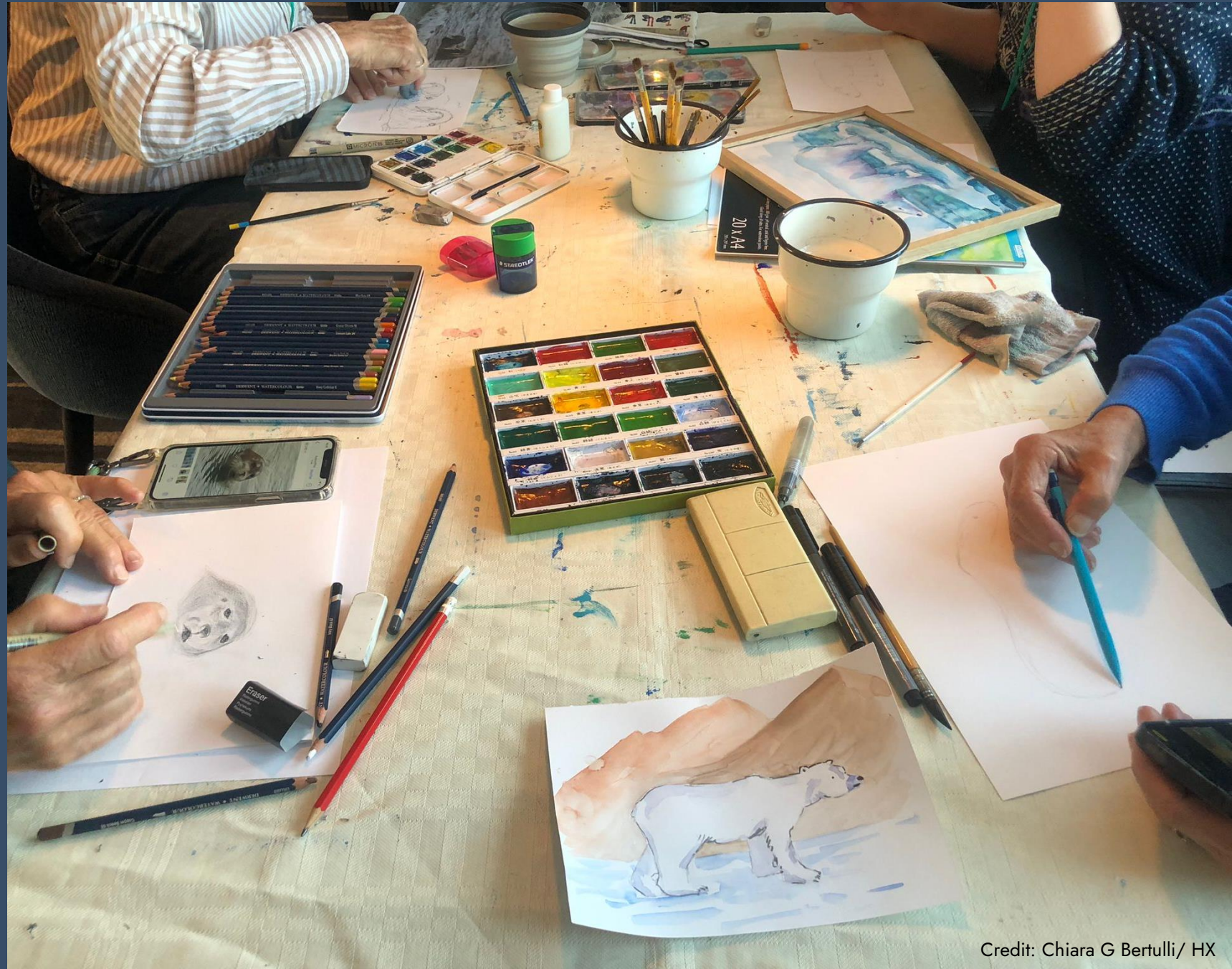


Credit: Tommy Simonsen/ HX

Arts & Crafts

You got inspired by various local animals and learned how to draw beautiful images and paint them with watercolours, even without prior experience.

This was an excellent opportunity to share stories and get to know your fellow travellers while relaxing on board.





Credit: Chiara G Berulli/ HX

Svalbard's Captivating Geology

On your voyage, you discovered Europe's most diverse region for geological features and periods. In such a compact area, it was possible to observe all types of rock: sedimentary, metamorphic, and igneous, including gneiss, dolerite, granite, sandstone, limestone, and many more. The landscape showcased the dynamics of folding and faulting in the rocks. Additionally, the journey took you through numerous glaciers and fjords, offering breathtaking views as you sailed up them.



Monacobreen Glacier

Located in Liefdefjorden, Monacobreen is a tidewater glacier, meaning it terminates in the sea, calving off pieces to produce icebergs.

At its front, the glacier is 7 km wide and 60 m high, one of the larger glaciers in Spitsbergen.

The blue tint of the glacial ice comes from the compaction of snow and the squeezing out of the air. Allowing the red, long wavelength light to be absorbed and the blue, short wavelength to be reflected back.



Bråsvellbreen

Bråsvellbreen is part of the Austfonna Ice Cap on Nordaustlandet. The glacial ice juts out 10 km over the water due to glacier surging in the late 1930s. The front of the glacier spans 180 km, making it the longest glacier front in the Northern Hemisphere.

The glacier is covered with waterfalls and surrounded by icebergs and bergy bits.

The blue tint of the glacial ice comes from the compaction of snow and the squeezing out of the air. Allowing the red, long wavelength light to be absorbed and the blue, short wavelength to be reflected back.



Kapp Lee Sedimentary Strata

The mountains either side of Freemandsundet show great layering of sedimentary rocks from the Sassendalen Group, deposited in the middle Jurassic around 150 million years ago. The rocks are shale and siltstone, cut through by glacial meltwater.



NASA cloud observer

MS Spitsbergen 2024
02nd – 12th September 2024

2 Globe Cloud observations were collected on:

September 6th (at-sea)
September 9th (at-sea)

Your observations will help NASA improve the understanding of Earth's atmosphere and climate by providing valuable data for scientific research and climate modeling.

View our data on the global map, using the QR code.








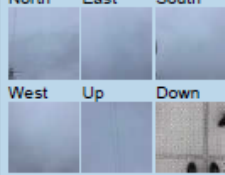

Credit: Chiara G Bertulli/ HX



GLOBE Cloud Observations Paired with NASA Satellite Data

Total Satellite Comparisons: 88

Useful Resources: [How to Read My NASA GLOBE Clouds Satellite Comparison Table](#), [How to Compare My Cloud Observations with Satellite Data](#), [Cloud Cover](#), [Cloud Type](#), [Cloud Opacity](#), [Satellites](#)

| Observation | GLOBE | NOAA-20 Satellite |
|---|---|--|
| Universal Date/Time | 2024-09-06 11:45:00 | 2024-09-06 11:38 |
| Latitude | 80.59 | 80.22 to 81.02 |
| Longitude | 20.97 | 20.34 to 21.14 |
| Total Cloud Cover | Sky Obscured  | Overcast 96.79%  |
| High Clouds | Sky Obscured by Fog/Stratus Clouds/Contrails > 25% Obscured  | Cover: Isolated 18.74%  Altitude: 6.72 (km) Phase: Ice/Water Mix 240.94 (K) Opacity: Opaque |
| Mid Clouds | | Cover: Broken 78.05%  Altitude: 5.54 (km) Phase: Ice/Water Mix 249.36 (K) Opacity: Opaque |
| Low Clouds | | |
| GLOBE Cloud Photos and Corresponding NASA Satellite Images. Click image to view ---> <i>Note: Photos submitted though GLOBE need approval before being displayed, this may take a few days.</i> | GLOBE Photos North East South  West Up Down | VIIRS NOAA-20  Worldview Worldview Tutorial |
| Sky Conditions, Surface Conditions and Observer Comments | Sky Conditions Sky Visibility : no report Sky Color : no report Surface Conditions Snow/Ice : No Standing Water : Yes Muddy : No Dry Ground : No Leaves on Trees : No Raining or Snowing : Yes | Are there any comments you would like to add? Be sure to add the name of the satellite for our record. <div style="border: 1px solid black; height: 100px; width: 100%;"></div> <div style="text-align: right;"><input type="button" value="Submit Comment"/></div> |

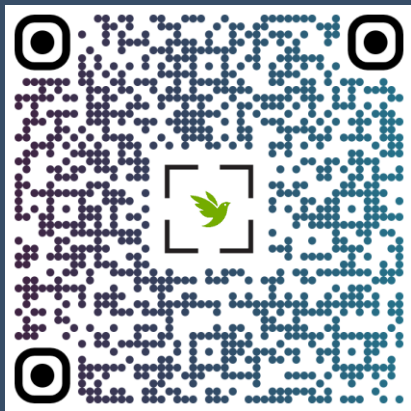
iNaturalist

MS Spitsbergen 2024
02nd – 12th September 2024

Biodiversity data collected & people
involved in it included:

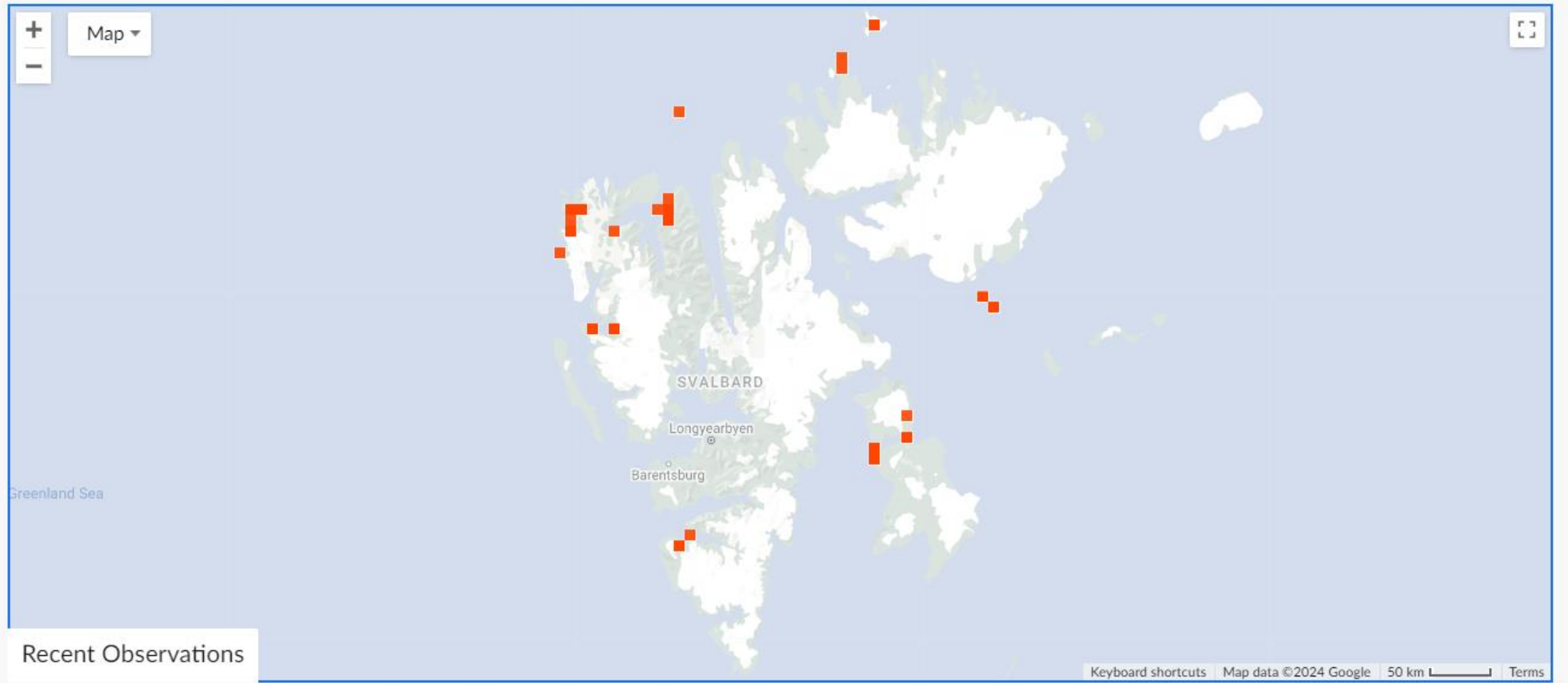
- 87 Observations
- 33 Species
- 29 Identifiers
- 4 Observers

View our data on the global map, using the
QR code.

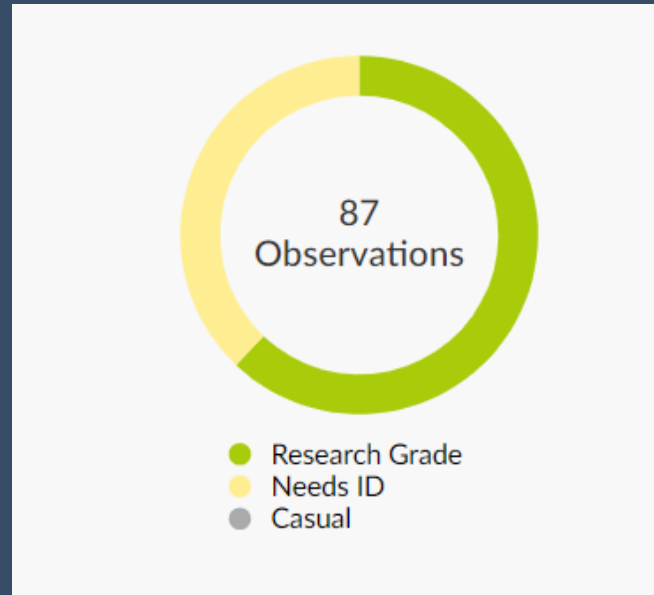


SBSPI2426 - MS Spitsbergen 02-12.09.2024

Map of Observations



SBSPI2426 - MS Spitsbergen 02-12.09.2024



Common Eider
Somateria mollissima



1 d



Svalbard Reindeer
Rangifer tarandus
ssp. *platyrhynchus*



2 1d



Atlantic Walrus
Odobenus rosmarus
ssp. *rosmarus*



3 1d



Black-legged Kittiwake
Rissa tridactyla



1 d



Science Boat

Over the course of seven scientific boat sessions, two in Mushamna, two in Chermideøya, two in Kapp Waldburg, and one in Recherchebreen, the onboard science and education coordinator, Chiara, and marine scientist, Dougie, led you in conducting water sampling and measurements to explore the diversity and density of plankton and measure the physical properties of water at different depths in the ocean.



The following three instruments were used:

- 1) Plankton net, to collect samples of plankton from the water for study;
- 2) CTD (Conductivity, Temperature, and Depth device), to measure properties of seawater such as salinity, temperature, and depth;
- 3) Secchi disk, to determine water clarity by measuring the depth at which the disk becomes invisible, indicating the abundance of phytoplankton.

Credit: Chiara G Bertulli / HX

Secchi Disk

In Mushamna, Chermsideøya, Kapp Waldburg and in Recherchebreen, the Secchi depths were of 3.8 & 9.2 m, 0.4 m, and 3.3 m, respectively.

These measurements were submitted via the Secchi app and contributed to a worldwide database in order to support the study of marine phytoplankton and to investigate the changes in abundance of plant-like organisms over time.





CTD

The CTD was deployed in Mushmna, Chermsideøya, in Kapp Waldburg and Recherchebreen, to determine changes in conductivity (C), salinity, and temperature (T) with increasing water depth (D).

Water Sampling

Three water samples were collected from different locations including Mushamna, Chermideøya, Kapp Waldburg and Recherchebreen, when the net was towed during science boat.

The nets used had a mesh size of $20\mu\text{m}$ (for phytoplankton) and $100\mu\text{m}$ (for zooplankton).





EPIC Project: eDNA

During three of the Science Boats in Mushamna, Chermsideøya and Recherchebreen, environmental DNA samples were collected with a Niskin bottle at 10-20m depths for the EPIC project.

This research project supported by Hurtigruten Foundation uses environmental DNA (eDNA) technology and citizen science to protect marine biodiversity and safeguard our oceans. eDNA involves collecting genetic material shed by organisms, such as skin cells and waste, from water samples. By analysing these samples, scientists can identify and monitor a wide range of marine species without capturing or directly observing them. This non-invasive, cost-effective, and efficient method is invaluable for studying and conserving marine life.



Plankton samples

Plankton are ancient drifters transported by currents and tides which lack the ability to navigate against these natural forces.

Animals (zooplankton) and plants-like (phytoplankton), millimetres to centimetres sized-creatures, with a central role in supporting the marine food-web and the health of our oceans.

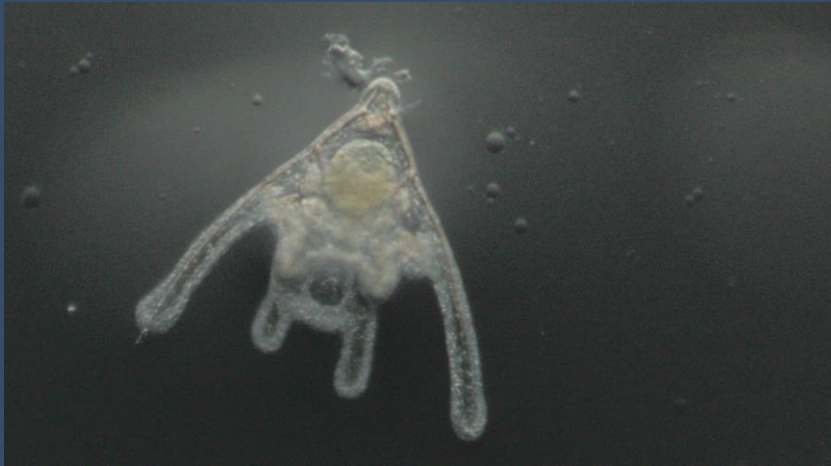
Samples collected in:
Mushamna (September 5th)
Chermsideøya (September 6th)
Kapp Waldburg (September 8th)
Recherchebreen (September 10th)



Copepod – *Calanus* sp.



Bristle worm



Larvae of an echinoderm, probably
bristle star



Sea butterfly - *Limacina helicina*



Dinoflagellate - Phytoplankton



Comb jelly – Ctenophora

Credit: Tommy Simonsen/ HX



Beach Clean-up

One beach clean-up was organized during this voyage, resulting in approximately 138 kg of waste collected during the afternoon of September 6th at Isflakbukta which included fishing ropes, microplastics, and other items.

The efforts in the Clean-up Svalbard project contributed directly to the preservation of Arctic ecosystems, enhancing environmental sustainability and fostering a cleaner, healthier future for the region.



Wildlife Watch

While sailing, you were invited to join the expedition team on the deck to scan for marine life and admire the breathtaking scenery of Svalbard.

Our sightings included various avian and mammal species such as arctic skuas, Brünnich guillemots, king eiders, bearded seals, and polar bears among others.



Wildlife List — Birds



Wildlife List – Seabirds

| SCIENTIFIC NAME | ENGLISH | DEUTSCH | FRANÇAIS |
|---------------------------------|------------------------|---------------------|-----------------------|
| <i>Uria lomvia</i> | Brünnich Guillemot | Dickschnabellumme | Guillemot de Brünnich |
| <i>Cephus grylle</i> | Black Guillemot | Gryllteiste | Guillemot à miroir |
| <i>Fratercula arctica</i> | Atlantic Puffin | Papageitaucher | Macareux moine |
| <i>Fulmarus glacialis</i> | Northern Fulmar | Eissturmvogel | Fulmar boréal |
| <i>Rissa tridactyla</i> | Black-legged Kittiwake | Dreizehenmöwe | Mouette tridactyle |
| <i>Larus hyperboreus</i> | Glaucous Gull | Eismöwe | Goéland bourgmestre |
| <i>Xema sabini</i> | Sabine's gull | Schwalbenmöwe | Mouette de Sabine |
| <i>Sterna paradisaea</i> | Arctic Tern | Küstenseeschwalbe | Sterne arctique |
| <i>Stercorarius parasiticus</i> | Arctic skua | Schmarotzerraubmöwe | Labbe parasite |
| <i>Stercorarius pomarinus</i> | Pomarine skua | Spatelraubmöwe | Labbe pomarin |
| <i>Stercorarius skua</i> | Great skua | Große Raubmöwe | Grand Labbe |

Wildlife List – Waterbirds

| SCIENTIFIC NAME | ENGLISH | DEUTSCH | FRANÇAIS |
|------------------------------|--------------------|------------------|--------------------|
| <i>Gavia stellata</i> | Red-throated diver | Sterntaucher | Plongeon catmarin |
| <i>Anser brachyrhynchus</i> | Pink-footed Goose | Kurzschnabelgans | Oie à bec court |
| <i>Branta bernicla</i> | Brant goose | Ringelgans | Bernache cravant |
| <i>Branta leucopsis</i> | Barnacle Goose | Weißwangengans | Bernache nonnette |
| <i>Clangula hyemalis</i> | Long-tailed Duck | Eisente | Harelde kakawi |
| <i>Somateria mollissima</i> | Common Eider | Eiderente | Eider à duvet |
| <i>Somateria spectabilis</i> | King eider | Prachteiderente | Eider à tête grise |

Wildlife List – Shorebirds



| SCIENTIFIC NAME | ENGLISH | DEUTSCH | FRANÇAIS |
|---------------------------|------------------|------------------|------------------------|
| <i>Arenaria interpres</i> | Ruddy turnstone | Steinwälzer | Tournepierre à collier |
| <i>Calidris maritima</i> | Purple Sandpiper | Meerstrandläufer | Bécasseau violet |

Wildlife List – Landbirds



| SCIENTIFIC NAME | ENGLISH | DEUTSCH | FRANÇAIS |
|------------------------------|--------------|-------------|-------------------------|
| <i>Plectrophenax nivalis</i> | Snow Bunting | Schneeammer | Plectrophane des neiges |



Black-legged kittiwake (*Rissa tridactyla*)



Purple sandpiper (*Calidris maritima*)



Arctic tern (*Sterna paradisaea*)



Snow bunting (*Plectrophenax nivalis*)



Long-tailed duck (*Clangula hyemalis*)

Wildlife List – Marine Mammals

Credit: Tommy Simonsen/ HX



Wildlife List – Marine Mammals



| SCIENTIFIC NAME | ENGLISH | DEUTSCH | FRANÇAIS |
|----------------------------|-----------------------|-----------|---------------|
| <i>Phoca vitulina</i> | Common (harbour) seal | Seehund | Phoque commun |
| <i>Odobenus rosmarus</i> | Walrus | Walross | Morse |
| <i>Erignathus barbatus</i> | Bearded seal | Bartrobbe | Phoque barbu |

Selection of marine mammal pictures



Atlantic walrus (*Odobenus rosmarus rosmarus*)



Bearded seal (*Erignathus barbatus*)



E-bird

eBird is an online platform and citizen science project allowing birdwatchers and ornithologists to record, share, and explore bird sightings from around the world.

Bird data collected included:
83 checklists completed
25 species recorded

View our data on the global map, using the QR code.



E-bird List

| Species Observed | | Show all details |
|------------------|------------------------|----------------------------------|
| 73 | Pink-footed Goose | 6 |
| 39 | Brant | 2 |
| 36 | Barnacle Goose | 5 |
| 93 | Common Eider | 17 |
| 28 | Long-tailed Duck | 2 |
| 2 | Common Ringed Plover | 1 |
| 5 | Ruddy Turnstone | 1 |
| 2 | Dunlin | 1 |
| 166 | Purple Sandpiper | 20 |
| 92 | Parasitic Jaeger | 37 |
| 3 | Pomarine Jaeger | 2 |
| 3 | Great Skua | 3 |
| 55 | Atlantic Puffin | 7 |
| 22 | Black Guillemot | 10 |
| 185 | Thick-billed Murre | 8 |
| 1515 | Black-legged Kittiwake | 72 |
| 1 | Sabine's Gull | 1 |
| 101 | Glaucous Gull | 23 |
| 1 | Iceland Gull | 1 |
| 232 | Arctic Tern | 25 |
| 20 | Red-throated Loon | 9 |
| 620 | Northern Fulmar | 71 |
| 1 | Sooty Shearwater | 1 |
| 1 | White Wagtail | 1 |
| 150 | Snow Bunting | 10 |

Wildlife List – Land Mammals



Credit: Tommy Simonsen/ HX



Svalbard reindeer (*Rangifer tarandus platyrhynchus*)



Arctic fox (*Vulpes lagopus*)

Wildlife List – Other Mammals



| SCIENTIFIC NAME | ENGLISH | DEUTSCH | FRANÇAIS |
|--|-------------------|-----------------|-------------------|
| <i>Rangifer tarandus platyrhynchus</i> | Svalbard reindeer | Spitzbergen-Ren | Renne de Svalbard |
| <i>Vulpes lagopus</i> | Arctic fox | Polarfuchs | Renard arctique |
| <i>Ursus maritimus</i> | Polar bear | Eisbär | Ours blanc |



Polar bear (*Ursus maritimus*)



Polar bear (*Ursus maritimus*)

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