Hydrological and Thermal Observations from the Svartisen Glacier and Adjacent Water Bodies, October 2025

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Expedition Team

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Photo A

Svartisen Glacier (Engbreen outlet),
September, 2024
Photo Credit: Alma Gómez

Photo B

Svartisen Glacier (Engabreen outlet),
October 25, 2025
Photo Credit: Dr. Ali Asgary

Abstract

This expedition, titled ***Svartisen Glacier Expedition 2025***, investigated temperature and salinity variations across four hydrological sites in the Saltfjellet–Svartisen National Park, Nordland, Norway, on October 25, 2025. Sea surface temperatures (SST) and salinity (PSU) were measured in both marine (ocean) and lacustrine (lake) environments using calibrated Extech EC170 and Fluke 62 Mini instruments. SST in the Norwegian Sea averaged 10.7 °C, slightly above the 2024 baseline (10.6 °C), supporting evidence of continued marine heatwave conditions in the North Atlantic (Nesje, 2023). In contrast, freshwater readings in Svartisvatnet (the glacial lake at the foot of the Engabreen outlet of the Svartisen Glacier) and sea water readings in Holandsfjorden ranged from 1.3 °C to 3.6 °C, indicating thermal stratification and localized shoreline warming. Salinity readings suggested freshwater input and reduced mineralization relative to prior measurements. In addition to monitoring the rate of decline of the glacier over recent years through digital media documentation of the Engabreen outlet of the Svartisen Glacier (see **Photo A** and **Photo B**), these findings also contribute to longitudinal monitoring of glacial meltwater impacts on regional water systems.

1. Introduction

The Svartisen Glacier, located in Nordland County, Norway, is one of the largest glaciers on the Norwegian mainland. It is the second-largest glacier in mainland Norway, after Jostedalsbreen (Frank et al., 2024)**.** Its retreat has been closely linked to increasing regional temperatures and shifts in oceanic conditions in the North Atlantic. This flag expedition of the Royal Canadian Geographical Society and the Canadian Chapter of The Explorers Club studied the Engabreen outlet and aimed to document the hydrological and thermal characteristics of both marine and lacustrine environments in proximity to the glacier during late October 2025, between 11:30 to 15:35 local time, contributing to a growing dataset on glacial meltwater dynamics and marine heatwave impacts.

2. Materials and Methods

Fieldwork was conducted on October 25–26, 2025, under light rain and temperatures averaging −4 °C. Data were collected using the following instruments: Extech EC170 Salinity/Temperature Meter, Fluke 62 Mini Infrared Thermometer, water sample bottles (50 ml, glass, screw-top), Canon EOS R5 C with a 5 Canon 100-500 lens, iPhone 15, Manfrotto monopod, DJI Mini 5 Pro 4K Wide Camera (handheld use only), and a Zodiac-style rigid inflatable boat (RIB).

Four sampling sites were selected: (1) Land Shoreline of Holandsfjorden, (2) Mid-point of Holandsfjorden, (3) Glacier Shoreline of Svartisvatnet, and (4) Norwegian Sea / North Atlantic Ocean (see **Figure 1** and **Figure 2**). Coordinates were recorded using GPS, and both sea surface temperature and salinity were measured in situ at the time of sampling.

3. Results

Table 1 summarizes the key sea surface temperature (SST) and salinity readings (PSU) recorded at each location.

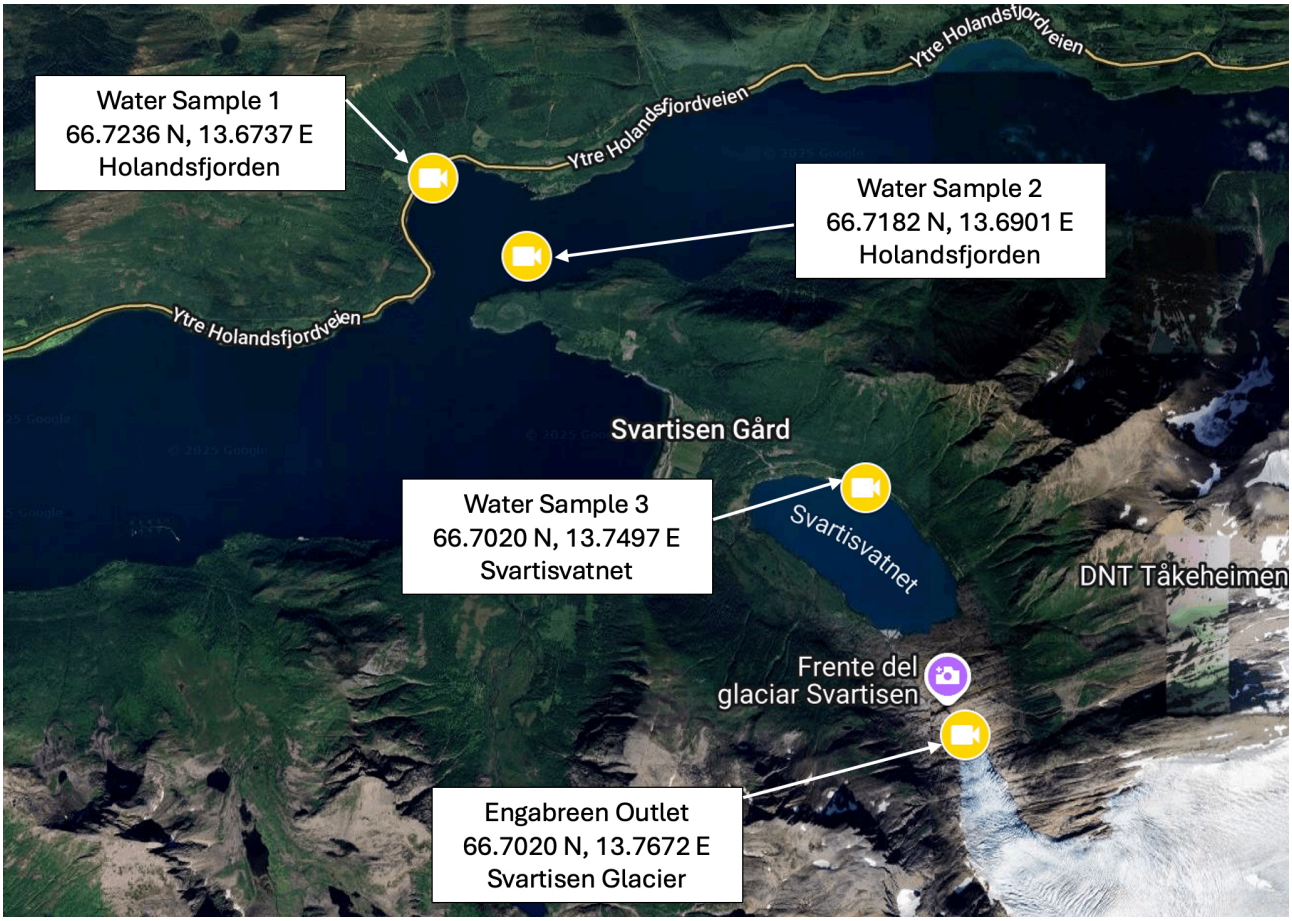
Table 1:

Water Sample	Location	Date / Time	Coordinates	SST (°C)	Salinity (PSU)
1	Land Shoreline Holandsfjorden	25 Oct 2025 11:30	66.7236 N, 13.6737 E	3.6	15.83
2	Mid-point of Holandsfjorden	25 Oct 2025 13:15	66.7182 N, 13.6901 E	1.3	8.01
3	Glacier Shoreline Svartisvatnet	25 Oct 2025 15:35	66.7020 N, 13.7497 E	2.8	0.18
4	Norwegian Sea / Atlantic Ocean	26 Oct 2025 11:16	67.2819 N, 14.3552 E	10.7	31.20

Table 1. Sea surface temperature and salinity data for sampling locations.

Figure 1

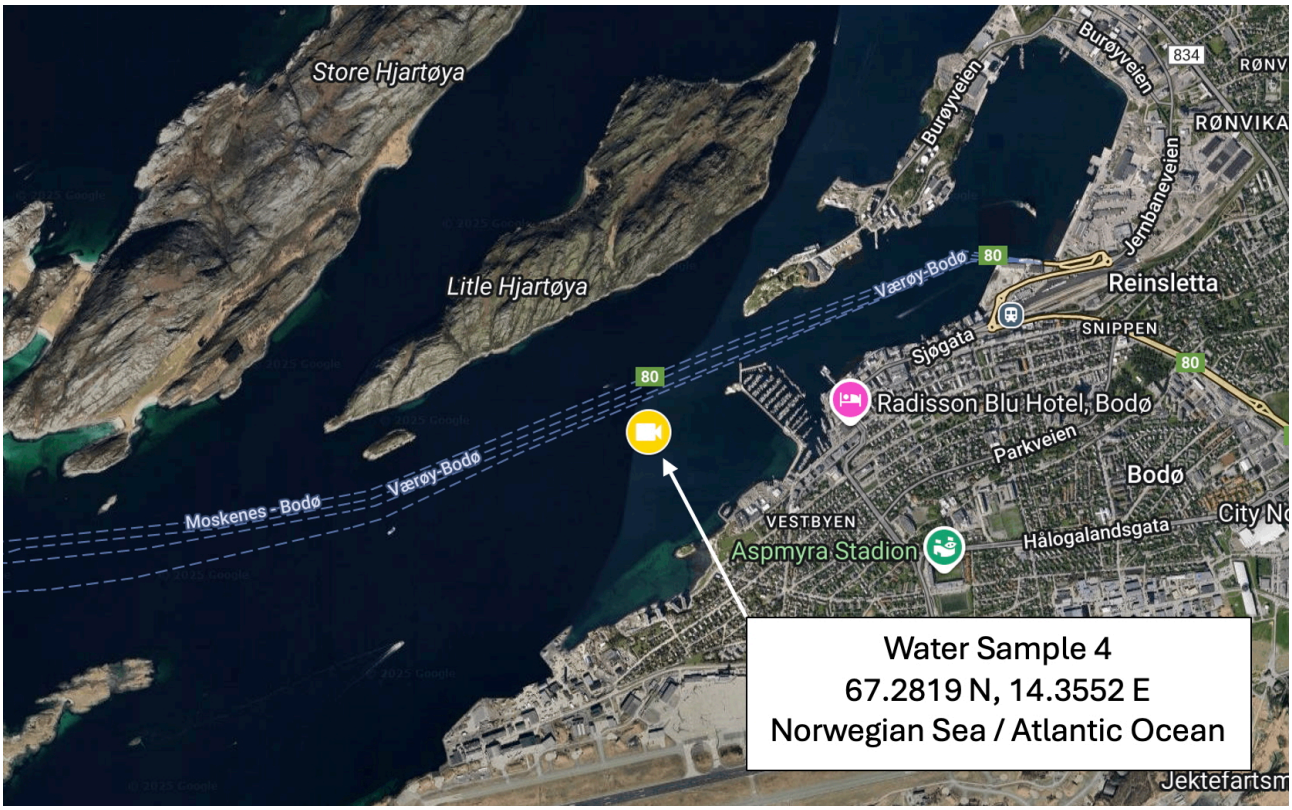
The map below shows the general areas of study in the Saltfjellet–Svartisen National Park, Nordland, Norway. Highlighted by yellow pins are the specific areas of study where we collected three samples of water aligning with the geographic coordinates recorded in situ.



Source: Youth Climate Report | Google MyMaps, 2025

Figure 2

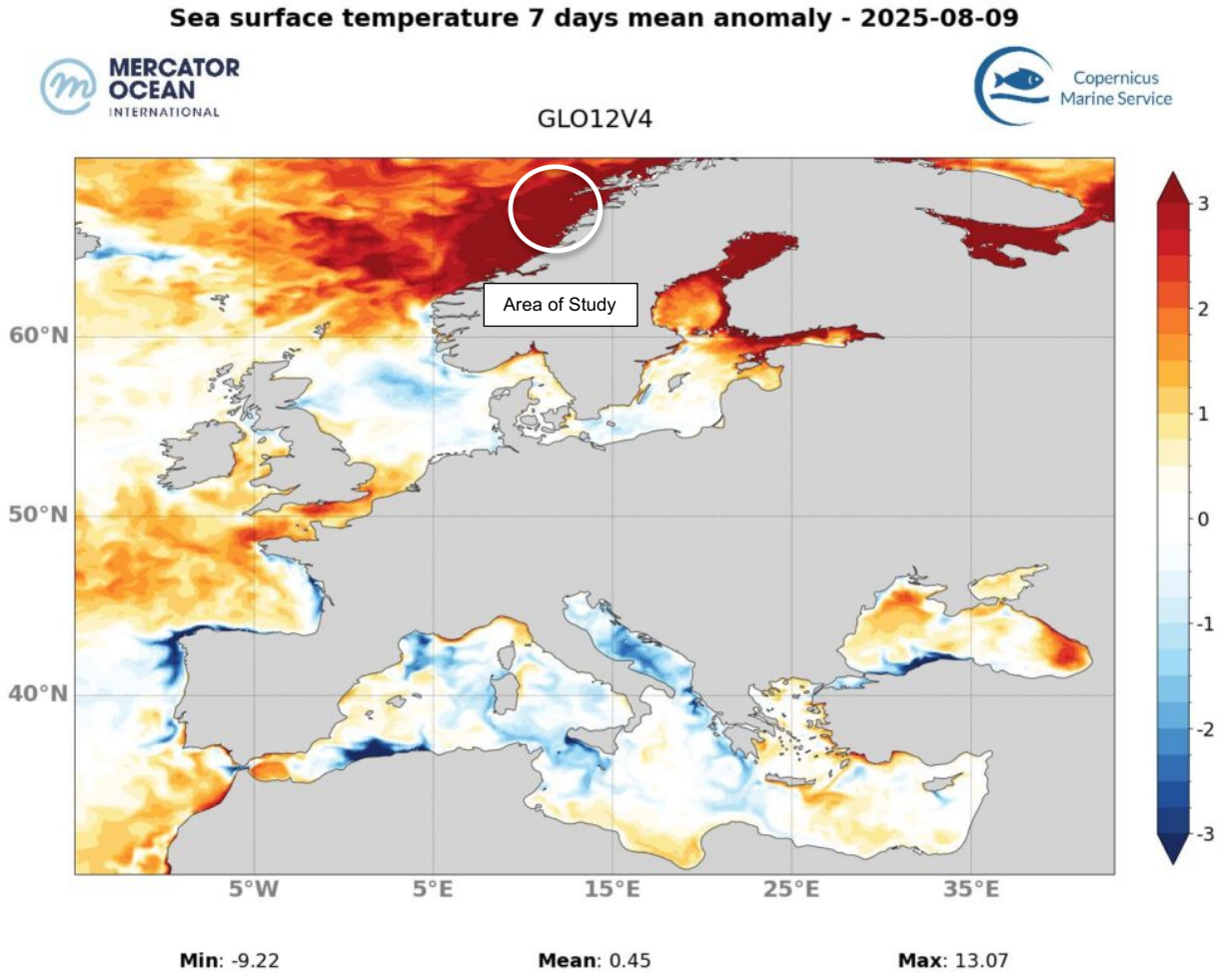
The map below shows the general area of study in the Norwegian Sea/Atlantic Ocean waterways near Bodø, Norway. Highlighted by a yellow pin is the specific area of our fourth sample of water aligning with the geographic coordinates recorded in situ.



Source: Youth Climate Report | Google MyMaps, 2025

Figure 3

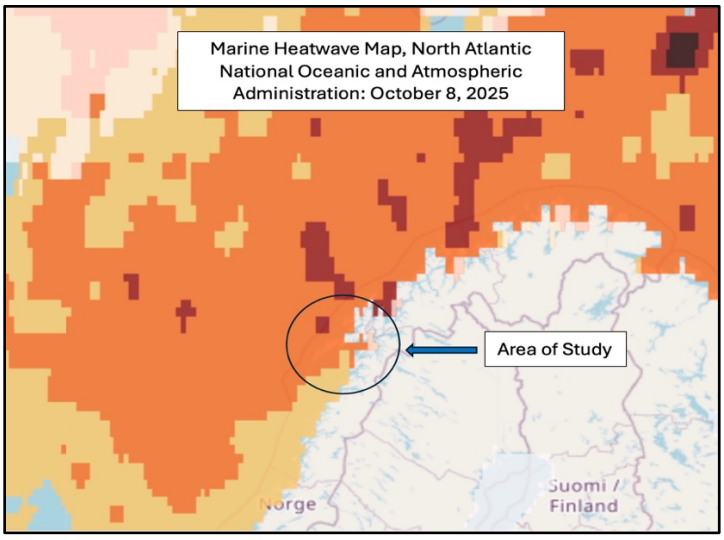
This heatmap indicates marine heatwave (MHW) temperatures in our area of study (indicated by a circle) as of August 9, 2025. Normal SST temperatures in this area at this time are between 12 and 13 degrees Celsius. The heatmap indicates the SST for this area is 3 degrees higher than normal categorizing the August readings as MHW temperatures. For October, the historical average for this area is 8 to 10 degrees Celsius. Our reading of 10.7 degrees Celsius indicates a slight persistence of the summer MHW temperatures as it exceeds the seasonal average by 0.7 degrees Celsius; however, it falls into the “Moderate” MHW category compared to the “Severe” MHW category as defined by the National Oceanic and Atmospheric Administration (NOAA) suggesting the MHW in this area is currently in recession.



Source: Mercator Ocean International, 2025

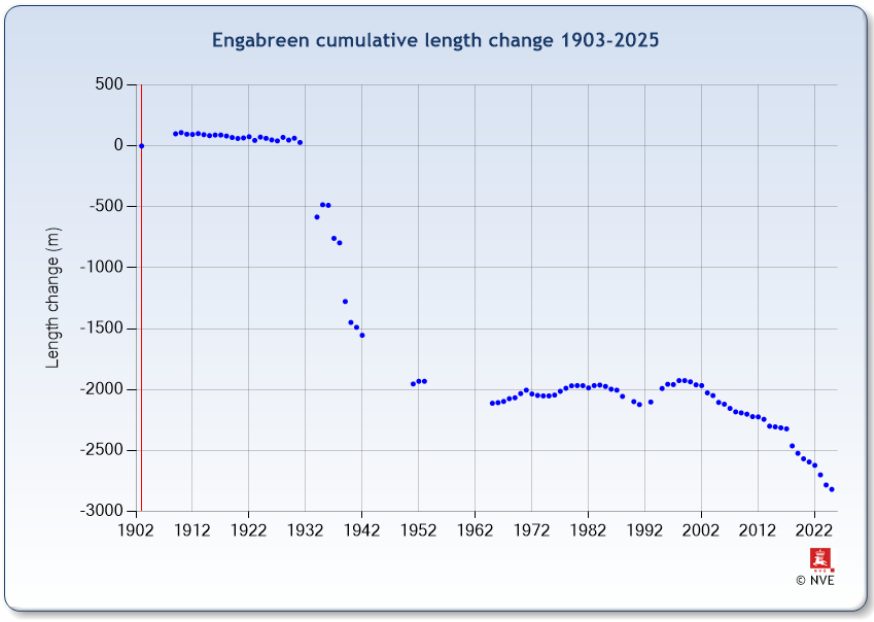
Figure 4

This is a heatwave map created by NOAA on October 8, 2025. The orange area indicates heatwave temperatures in North Atlantic waters in Europe. The darker the shade, the warmer the surface water. Our area of study was impacted by recent marine heatwave temperatures and is currently measured at 11.6 degrees Celsius on October 11, 2025, about one degree higher than average for this time of year. Our field temperature measurements on October 25, 2025, in this area were 10.7 degrees Celsius indicating a cooling, but still in the range defined as an MHW.



Source: NOAA Climate Change Institute, University of Maine, 2025

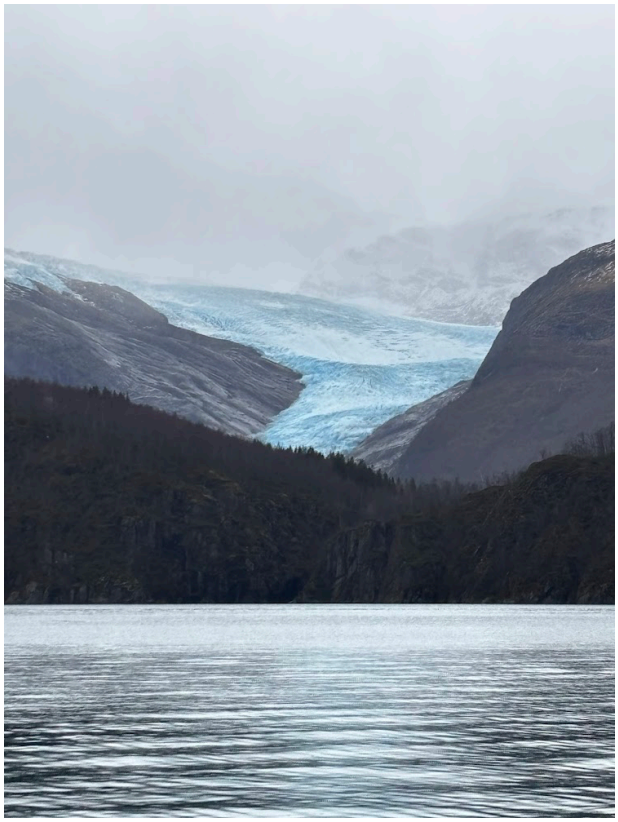
Figure 5 summarizes the amount of ice loss of the Engabreen outlet of the Svartisen Glacier between September 2024 and October 2025, representing a period of 13 months. In this time, the Norwegian Water Resources and Energy Directorate (NVE) reports a loss of 36 meters of ice (see Photo A and Photo B). Overall, since the NVE has been keeping records beginning in 1903, the glacier terminus had retreated about 2.8 kilometers.

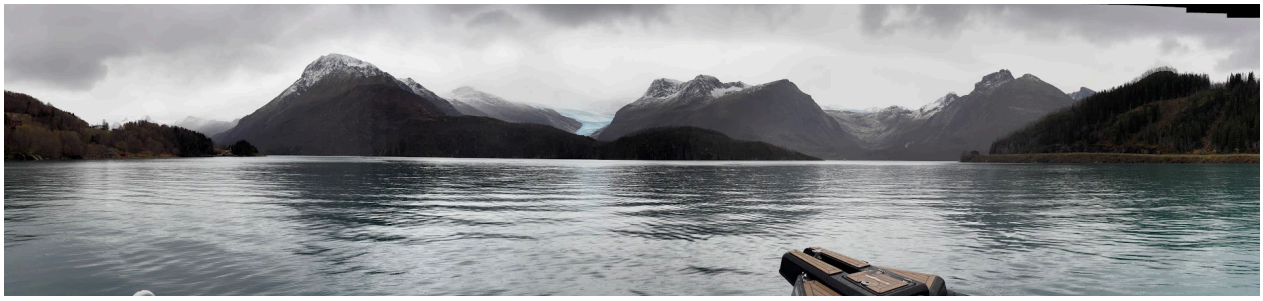


Source: Norwegian Meteorological Institute, 2025

4. Image Captures (Photography and Video)

1. iPhone 15 Pro Camera Photos:
https://photos.app.goo.gl/aiLbJCcFPo7FMw4W6
Sample photos:





2. DJI Mini 5 Pro Wide Camera Photo (stationary):
https://drive.google.com/drive/folders/19iX8e4kxnqF8vzT95_C57H1UFXWLvLcx?usp=drive_link
Sample photos:

3. Canon EOS R5 C with 5 Canon 100-500 Lens:
https://drive.google.com/drive/folders/1W-QQbIA521NZhvTmjwu4tr9XlmUVO8IR?usp=drive_link
Sample photos:

5. Discussion

The observed SST of 10.7 °C in the Norwegian Sea taken midday on October 26, 2025, was marginally higher than the October 2024 mean (10.6 °C), suggesting possible continued regional ocean warming consistent with marine heatwave classifications. The stratification between Holandsfjorden (an ocean fjord) and Svartisvatnet (a glacial lake), with a 2.3 °C range, reflects differential heating due to solar exposure and water depth. Salinity values indicate significant freshwater influence near the glacier in its lake and further out in its fjord, with concentrations dropping to 0.18 PSU at the glacier shoreline. This trend suggests ongoing glacial meltwater inflow diluting the lake's and fjord's mineral (salt) content.

6. Education Component

The expedition also included an educational component offered by the Planetary Health Film Lab (PHFL) program of the United Nations Framework Convention on Climate Change's (UNFCCC) Youth Climate Report in association with Dr. Kate Tilleczek's Young Lives Research Lab at York University and CIFAL York (affiliated with UNITAR) Citizen Science Labs at York University led by Dr. Ali Asgary and Dr. Maleknaz Nayebi. The PHFL workshop was coordinated by Dr. Ensieh Roud of Nord University. It was led by Dr. Mark Terry of York University and was attended both in-person and online by 17 local students and faculty members of Nord University on October 24, 2025, at the Center for Crisis Management and Collaboration-Nordlab at Nord University. One participant, Dr. Nadezda Nazarova, joined the expedition in situ the following day, October 25, contributing to our data collection as a digital media documentarian.

The workshop trained registered participants in field research techniques, data collection, and documentary film production for UNFCCC reporting. The two-hour lecture presented methodologies proven in the field and designed in collaboration with UNFCCC Communications officials. Attending participants are expected to deliver a 3-5-minute video report of climate research or impacts in the Bodø, Norway area by the end of November 2025. The videos will be shared with the review committee of the Youth Climate Report and, if eligible and if approved, will be added to the UN database which currently includes more than 1,200 similar video report in 160 countries worldwide.

Link to database: http://tiny.cc/UNFCCC

All attending participants received a Certificate of Participation from CIFAL York and UNITAR and those who complete the assignment and submit a film report will receive a second Certificate of Completion for the course.

Presentations slides are available here:
https://www.dropbox.com/scl/fo/u7wa2qvpkz4739p0elsu1/ACxlSnvtfe-9yQq8nPEsx2A?rlkey=k9lovl9b0qrtpncsodhf8md90&st=rhqgv14e&dl=0

Finally, the data and images collected during the field trip will be used in future sessions of the Environmental Communication course instructed by Dr. Mark Terry and youth summer camps organized by CIFAL York.

7. Conclusion

This field investigation highlights measurable thermal and salinity gradients within the Svartisen region. Comparative analyses with NOAA and Mercator Ocean International datasets reinforce the presence of a marine heatwave in the North Atlantic and underscore the hydrological impact of glacier meltwater on adjacent freshwater systems. Long-term monitoring of this region is recommended to quantify the rate of change and predict hydrological shifts under future climate scenarios. It should be noted that our in-situ hydrology research only took place in three lacustrine locations and one marine location over a two-day period.

8. Acknowledgments

The expedition was supported by CIFAL York, UNITAR, Nord University, and Wilfrid Laurier University. Special thanks to the Canadian Chapter of The Explorers Club, the Royal Canadian Geographical Society, the UNFCCC's Youth Climate Report's Planetary Health Film Lab program, the Center for Crisis Management and Collaboration-Nordlab at Nord University, and York University's Young Lives Research Lab for educational collaboration.

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- Youth Climate Report (2025), Google MyMaps | UNFCCC, https://www.google.com/maps/d/edit?mid=13sPbdmhKOFINj9WsPllhmN_rAaHdhncV&usp=sharing

Abbreviations

CIFAL	Centre International de Formation des Autorités et Leaders (International Training Centre for Authorities and Leaders)
GPS	Global Positioning System
NOAA	National Oceanic and Atmospheric Administration
NVE	Norwegian Water Resources and Energy Directorate
PHFL	Planetary Health Film Lab
PSU	Practical Salinity Unit
RIB	Rigid Inflatable Boat
SST	Sea Surface Temperature
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
YCR	Youth Climate Report

Dr. Ali Asgary and Dr. Mark Terry with Explorers Club (Canadian Chapter) flag

Photo Credit: Dr. Nadezda Nazarova

Dr. Ali Asgary and Dr. Mark Terry with the Royal Canadian Geographical Society flag

Photo Credit: Dr. Nadezda Nazarova