

Polar Front ecosystem studies using novel autonomous technologies: Providing a knowledge base and data archive for environmental management and assessing ecological risk

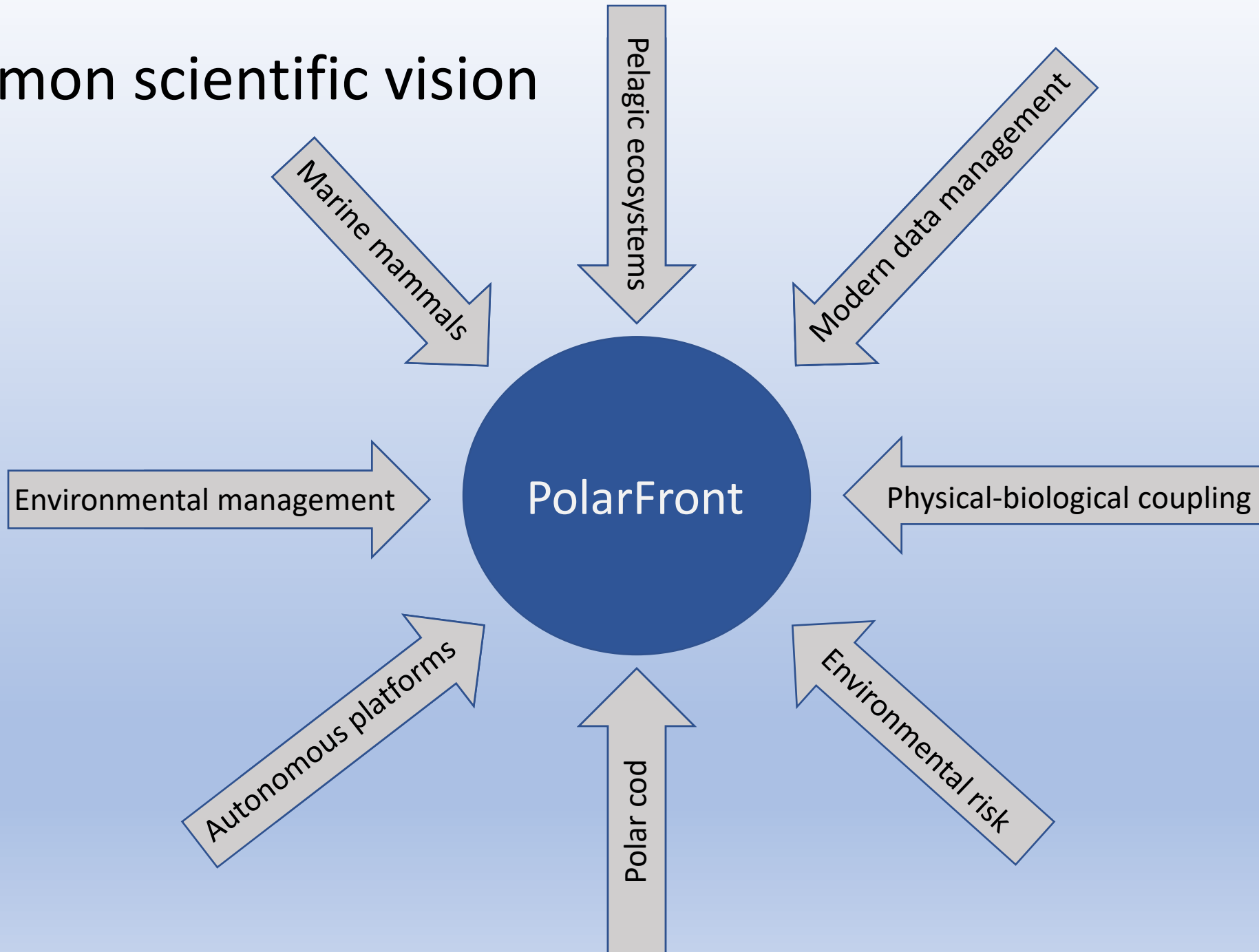
Main objective: To evaluate the impact of the physical-chemical characteristics of the Polar Front on productivity and food-web dynamics to facilitate ecosystem-based management and mitigate potential risks of future petroleum development.

- Funded by  Forskningsrådet
- 2021-2024

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Common scientific vision



Industry-relevant research project

- Addresses industry needs
- Clear expectations/ambitions
- Work plans designed to address goals and ambitions
- Strong communication required



Plans for today

- Project progress so far
- PolarFront cruise Aug 2023
- Work package updates
- Cruise planning for Jan 2024
- Discussions



Photo: Njal Heddle

Agenda

- 1215 Begin meeting. Welcome. Introduce new people. (Paul/Malin)
- 1230 Where are we in the project? (Paul/Malin)
- 1245 Snapshots from August 2023 cruise: I propose the following present 2-5 min on activities/results/observations/etc.
Rolf
Eva
Malin
Nicolas
Sunnje
Gisle
Einat
Frida
- 1330 Work package update (ONE WP co-leader prepares a short presentation, approx. 10-15 min each, on the status of sample/data analyses, status of milestones/deliverables, proposed papers (including titles), needs, etc.). Please provide a pdf of your presentation at the meeting so it can be published on our Zenodo site. WP leads may need to contact several people in advance so they can do this properly, and/or consult the project proposal.
- Mismatch paper status: Paul
WP0: Lionel – summarize use, success, challenges of autonomous vehicle use
Communications: Trude
- 1400 Coffee break
- 1420 WP1: Malin/Max
WP2: Eva/Sunnje
WP3: Kanchana
WP4: Geir Morten/Conrad
- 1515 General discussion, coffee refill
- 1530 Cruise January 2024 (Rolf/Malin)
Timing, administration, logistics,
Cruise plan, packing, equipment, personnel
@Fredrika Norrbin <fredrika.norrbin@uit.no>: new activities
@mathieu.lutier@ibv.uio.no: new activities
Questions/discussion
- 1630 Other topics?
- 1700 End

Project structure

WP0: Sampling, infrastructure, methods
- including May 2021 Polar Front cruise

WP1: Pelagic ecosystem structure

WP2: Pelagic productivity

WP3: Food-web interactions

WP4: Data management and communication

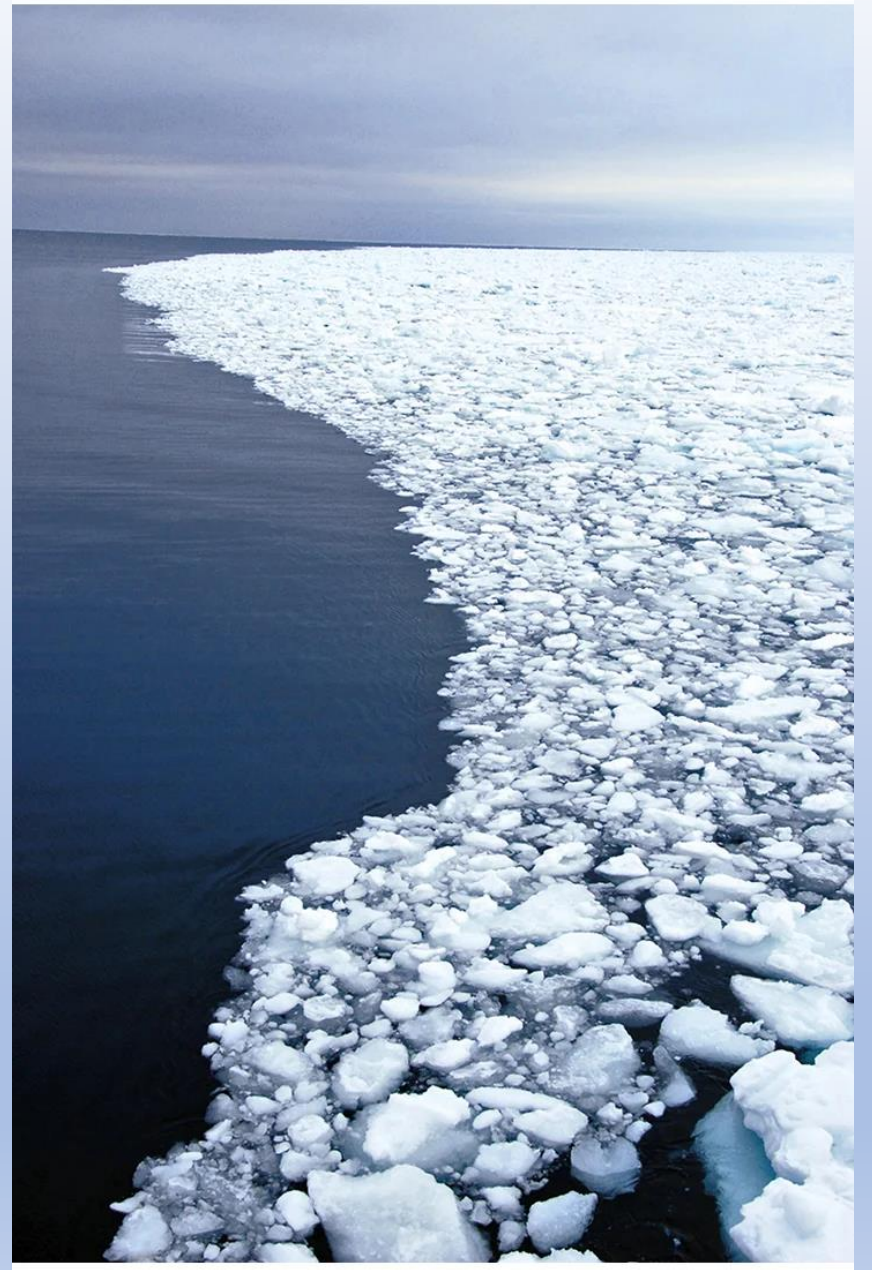


Photo: H. Hop

	Deliverable	Who?	Done?
D1.1	Identification of the physical drivers of pelagic community size- and species structure	SB, ET++	
D1.2	Documentation of seasonal variation in pelagic communities at the Polar Front	MD, MG++	
D2.1	Estimates of phytoplankton, net community and bacterial production	KC, RG	
D2.2	Spatio-temporal patterns of algal photophysiology	EL, RG	
D2.3	Community-level estimates of secondary production with high spatial resolution	SB, ET, MD	
D2.4	Rates of local production vs. aggregation of secondary producers	SB++	
D3.1	Seasonal patterns of trophic transfer between primary producers and consumers	MD++	
D3.2	Seasonal and spatial quantification of foraging by different species of fish and microzooplankton	KB, MG++	
D3.3	Seasonal/spatial descriptors of overlap between densities of marine mammals and their prey		
D4.1	Machine processable Data Management Plan	CH	😊
D4.2	Data set catalog linking to all primary data sets and derived data products	CH, all	😊 (partly)
D4.3	Open source data translation toolbox for processing data into formats	GMS, CH	
D4.4	Data visualization and communication, including real-time data preview during cruise operations	LC	😊
D4.5	Data paper on the data management and key datasets	CH++	

Major Milestones

- ✓ WPO cruise, May 2021
- ✓ Cruise May 2022
- ~~Cruise January 2023~~
- ✓ Cruise August 2023
- Cruise January 2024
(thank you, UiT!)

Snapshots August 2023 😊...



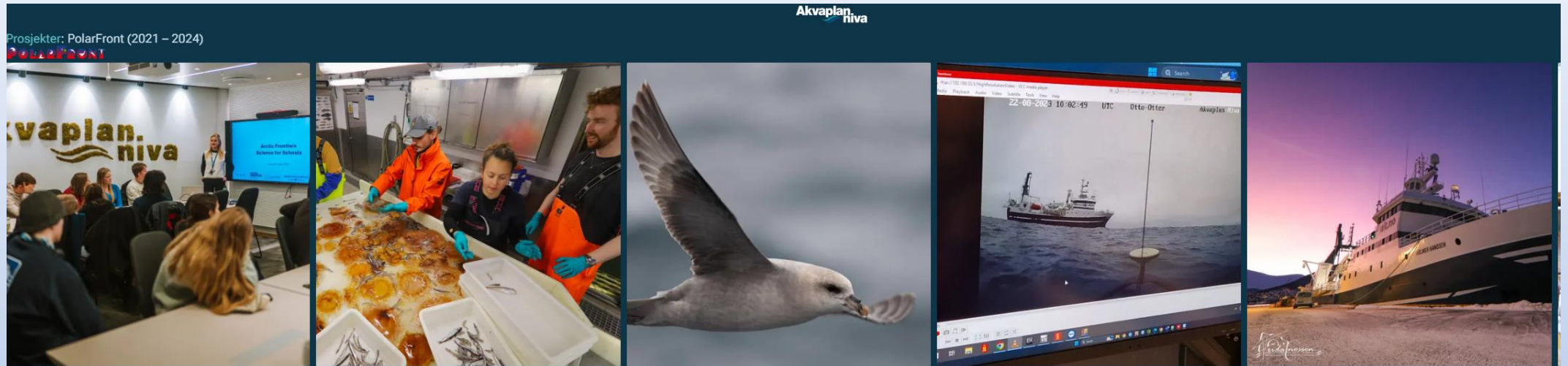


Communication

The Polar Front project

Period January 2023 – December 2023

Project site at akvaplan.no



Akvaplan-niva scientist inspires young students
2023-11-15 (engelsk)

Update from the polar front (jellyfish group)
2023-08-29 (engelsk)

Arctic wildlife at polar front research cruise
2023-08-29

Gjennombrudd i bruk av autonom teknologi i studie av polarfronten
2023-08-23

To the Polar Front in the Polar Night
2023-01-06 (engelsk)



PolarFront cruise

Summary

PolarFront is an open science project, designed to collect reference data on distribution, productivity, and food-web dynamics in the European polar front area, in the period 2021–2024.

The Barents Sea polar front, which often matches the southern extent of the seasonal ice zone, is known to be of particular importance for primary production, spawning, and feeding by various components of the pelagic ecosystem.

Using shipboard sampling and the Akvaplan-niva fleet of autonomous sampling platforms, the project will investigate this ecosystem during three seasons, including the poorly known Polar Night.

Open science

PolarFront is based on open science principles, with a commitment to publish all research articles and datasets as open access.

Data is managed in accordance with FAIR principles and W3C's best practices for publishing data on the web.

Industry and management end-user groups are integrated into the project to assure that scientific results


January 2023

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[Forside](#) | [Rådgivning](#) | [Forskning](#) | [Analysetjenester](#) | [Teknisk inspeksjon](#) | [Prosjekter & te](#)

[Forside](#) › [To the Polar Front in the Polar Night](#)



6. januar 2023 news

To the Polar Front in the Polar Night

After successful cruises to the Polar Front region in May 2021 and May 2022, a consortium of researchers on this week left Tromsø aboard the IUT research vessel Helmer Hanssen to the Polar Front

Gjennombrudd i bruk av autonom teknologi (august 2023)



Live kamera fra Otter USV med FF Helmer Hanssen i bakgrunnen, på 74 grader nord (Foto: Trude Borch/Akvaplan-niva)

Den 15. august 2023 gikk forskningsfartøyet *Helmer Hanssen* ut fra Tromsø mot polarfronten med et team fra Akvaplan-niva, UiT Norges arktiske universitet, Memorial University og Equinor ombord. Forskningsfartøyet skal ta prøver på ulike stasjoner øst for Svalbard, fra 75 grader nord til 78 grader nord langs 29.5 grader øst.



Teamet før avreise fra Tromsø (Frida Cnossen, Akvaplan-niva) mangler på bildet). (Foto: Njal Heddle).

Blogg-posts by Lars U. and Frida C. and Ingvild U.

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Denne siden finnes bare på engelsk



Arctic wildlife at polar front research cruise

The northern fulmar (Photo: Lars Ursem)

By MSc student Lars Ursem (lars.ursem@wur.nl)

When writing this it has been over a week since I left Tromsø to go on this research cruise to the polar front. Unfortunately, we do not have a dedicated marine mammal and seabird survey going on onboard as we have encountered a lot of wildlife over the past few days.

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Denne siden finnes bare på engelsk



Update from the polar front (jelly)fish group

Sorting jellyfish (Photo: Frida Cossen/Akvaplan-niva)

By Frida Cossen and Ingvild Ytterhus Utengen, Akvaplan-niva

Greetings from 78 degrees North! We have just spent 12 days on a research cruise for the PolarFront project onboard RV Helmer Hanssen collecting and identifying a variety of macrozooplankton and pelagic fish. We have also looked at fish stomachs and collected samples for stable isotope analysis to study trophic interactions.

Arctic Frontiers Science for Schools



Akvaplan-niva scientist inspires young students

Ingvid Utengen talks about her career path and work at Akvaplan-niva at Arctic Frontiers Science for Schools event (Photo: Arctic Frontiers)

Earlier this month Akvaplan-niva scientist Ingvid Utengen held a so called "Inspiration talk" as part of the Arctic Frontiers Young program "Science for Schools" with high school students from the Tromsø area. The turnout of the whole Inspiration Days arranged this time was fantastic, with altogether 400 enthusiastic students and 30 dedicated teachers joining the events.

Congratulations, Emilia!



Trudnowska, E, et al. 2023. Structures of coexisting marine snow and zooplankton in coastal waters of Svalbard (European Arctic). *Elem Sci Anth*, 11: 1. DOI: <https://doi.org/10.1525/elementa.2023.00010>

RESEARCH ARTICLE

Structures of coexisting marine snow and zooplankton in coastal waters of Svalbard (European Arctic)

Emilia Trudnowska^{1,*}, Katarzyna Błachowiak-Samołyk¹, and Lars Stemmann²

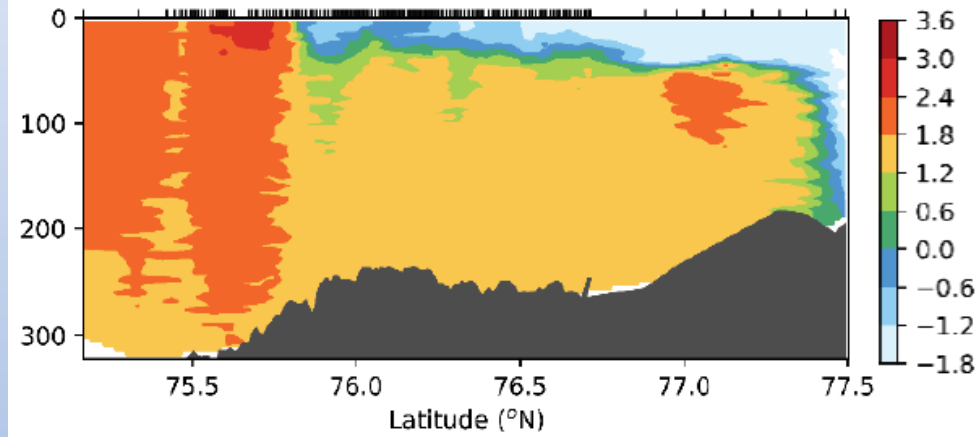
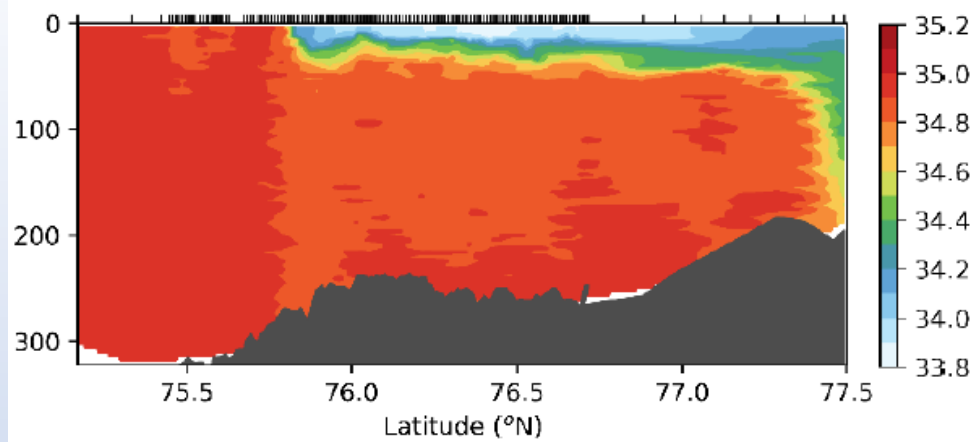
From the project description

ACTIVITY PLAN	COMMUNICATION PLATFORM
2-3 Scientific publications	Peer-reviewed journals
Scientific conference presentations	Relevant conferences?
Industry and management workshops	
Meetings industry advisory panel	Digital/physical meetings
Meetings with management relevant expert groups	Digital/physical meetings
Teaching programs all partner countries	Classes (digital and physical)
Teaching program UiT, Tromsø, Norway	UiT course BI-8510 Arctos RC
Short videos from cruise operations	YouTube, other SoMe
Articles in local media (Norway?)	Local newspapers
Articles for forskning.no	forskning.no
Articles for ScienceNorway	ScienceNorway
Lectures "Lørdagsuniversitetet" Tromsø, Norway	Lørdagsuniversitetet
Visualization material	GoogleEarth and our data landing page
Overall - dissemination of methods, technology and results	Web, Social media

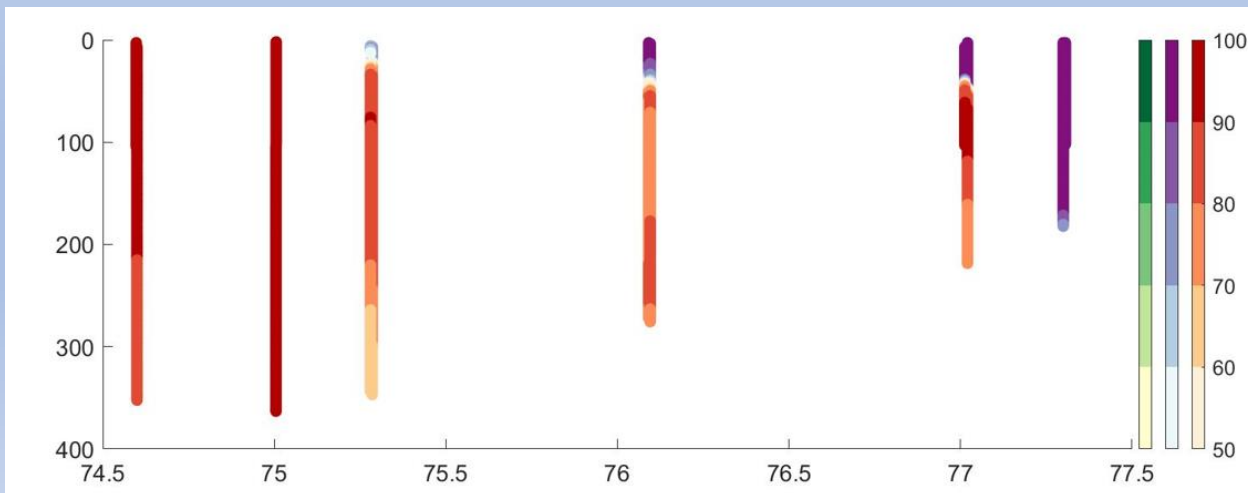
Mismatch ms update

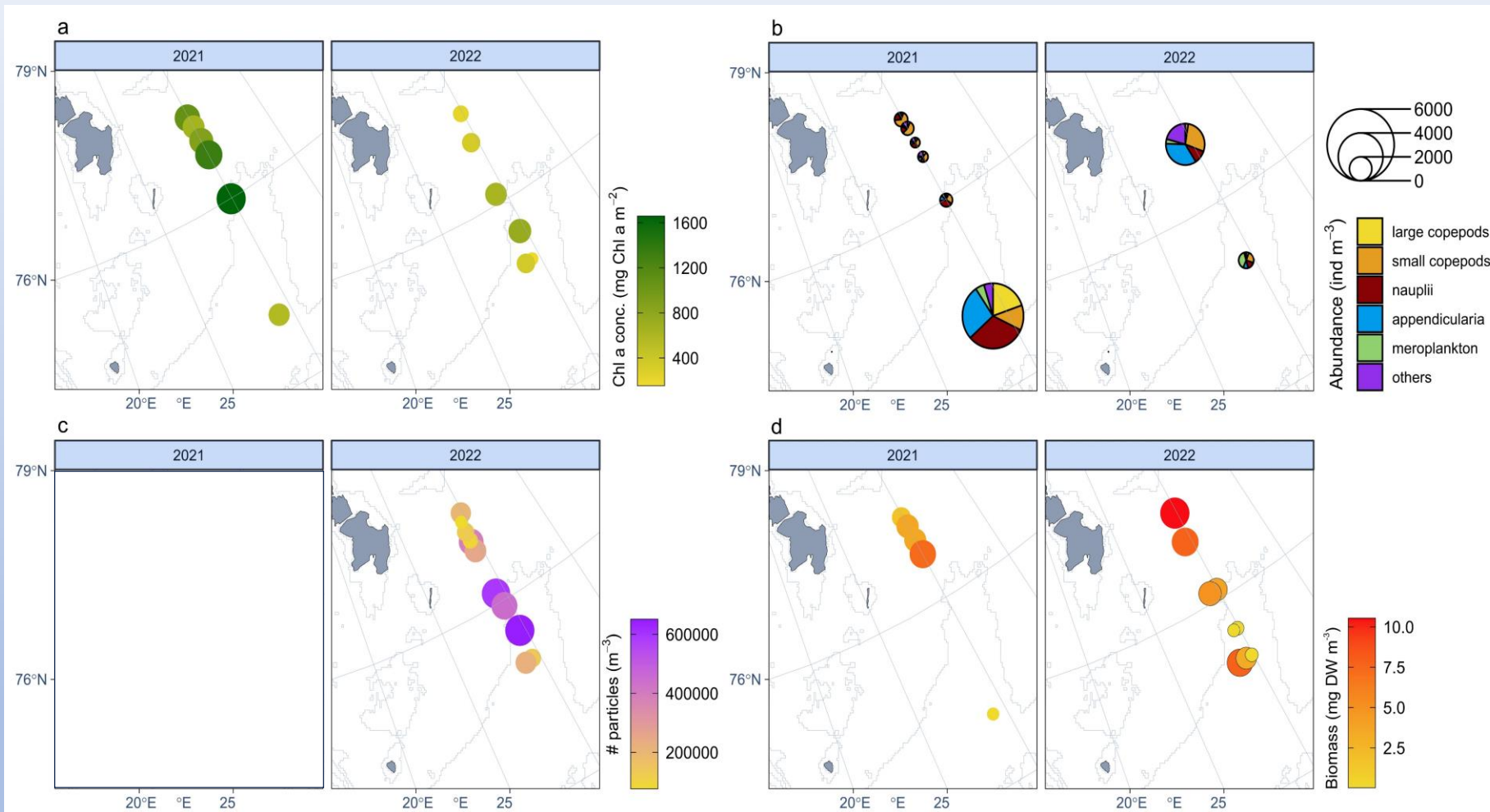
- Slowly finishing data compilation
- Most sections mostly written except discussion
- Plan to submit to special issue '*Food web structure, functions, drivers and dynamics in the Barents Sea and adjacent seas*' in *Progress in Oceanography* (deadline December 2023...extended?)

2022

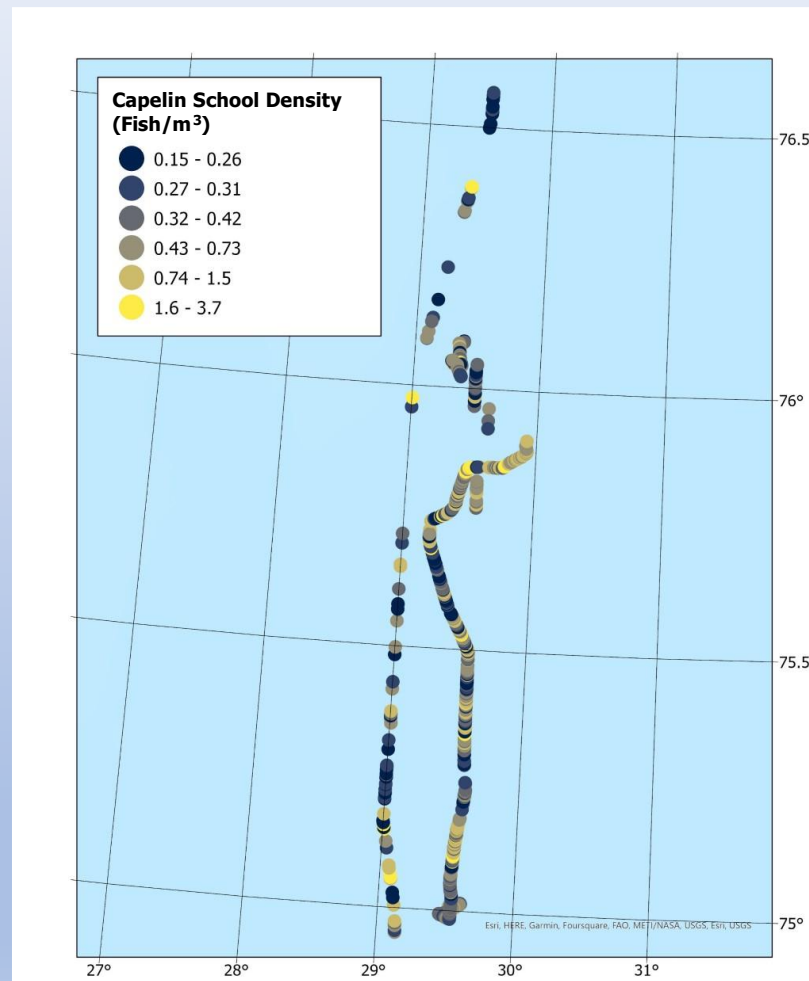
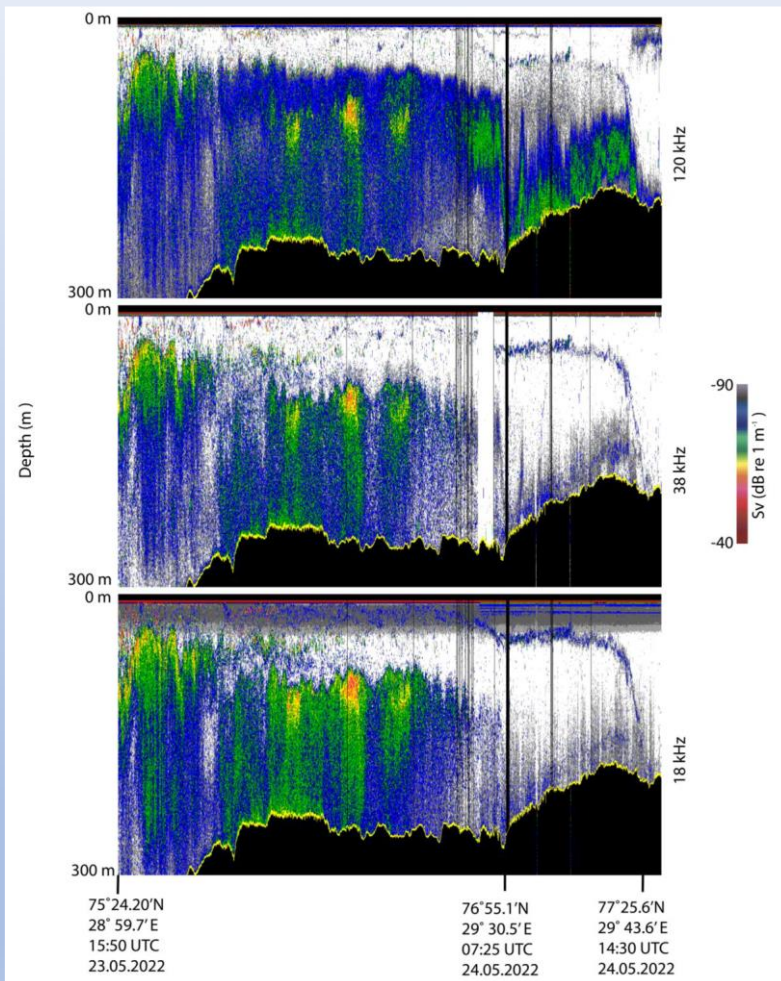


- MVP transects indicate clear stratification from melt water, even south of PF
- Water-mass identification indicates Front position just south of 76.1 N





- Very high integrated Chl a, perhaps highest near Front
- Very low mesozooplankton abundance and biomass
- Highest particle abundance (LISST) near Front
- Weak? spatial trend in macrozooplankton biomass (higher further north?)



- Capelin schools patchy but abundant south of Front (clear boundary). Some polar cod schools captured by nets north and south of Front
- Little zooplankton in surface waters except just north of Front

2022

- Feeding by capelin very low except just south of the Front
- Polar cod feeding much more readily wherever they occur
- Enhanced feeding near Polar Front?

