

SAS workshop  
March 2022

# Ecosystem mapping in the Central Arctic Ocean during the Swedish SAS-Oden 2021 expedition

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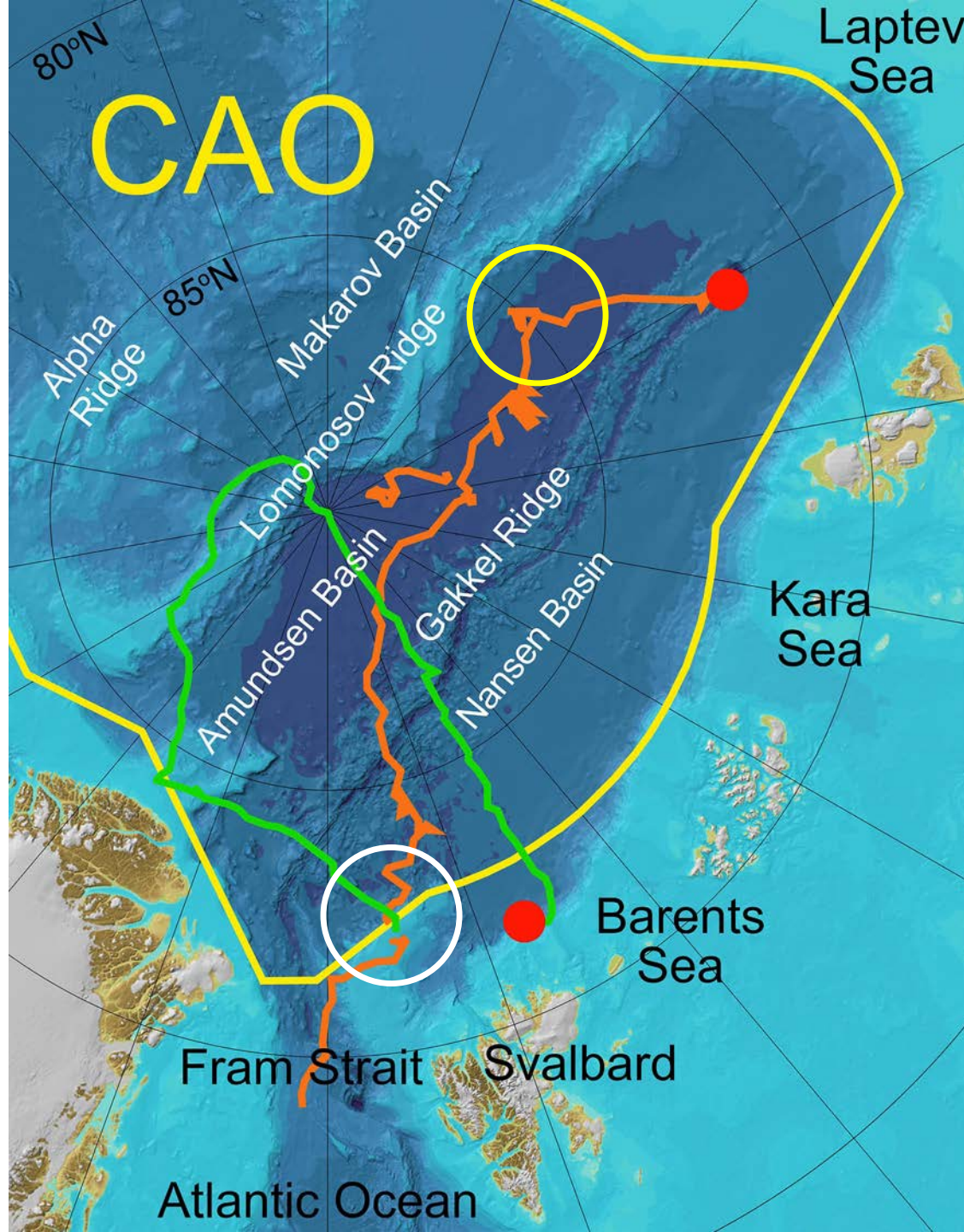




SAS-Oden

Western Eurasian Basin  
Lomonosov Ridge  
Atlantic inflow

White circle =  
High biomass in May 2020  
Low biomass in Sept 2021



MOSAiC

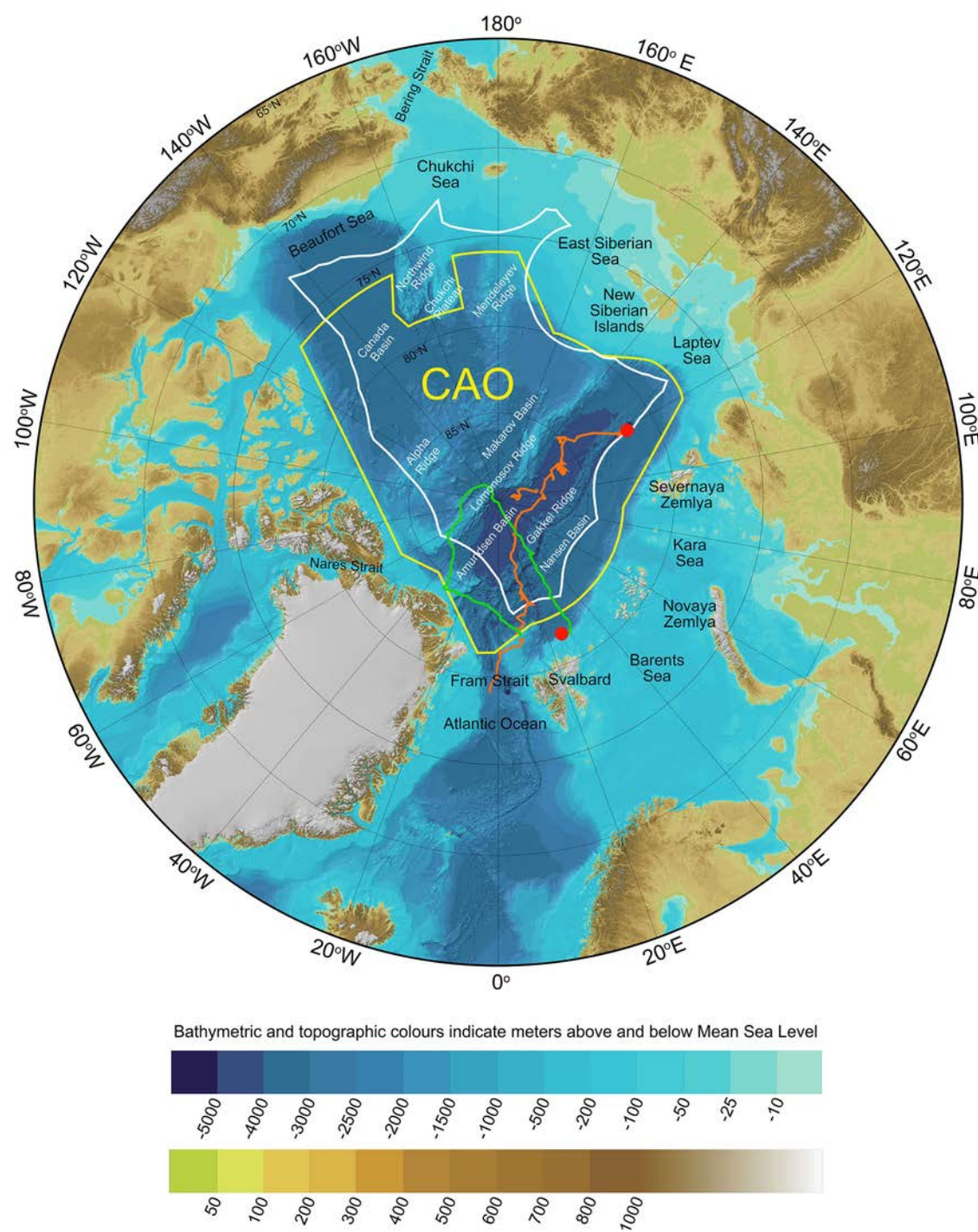
Eastern Eurasian Basin  
Western Eurasian Basin  
Atlantic inflow'

Yellow circle =  
Large Atlantic species



SAS-Oden 2021

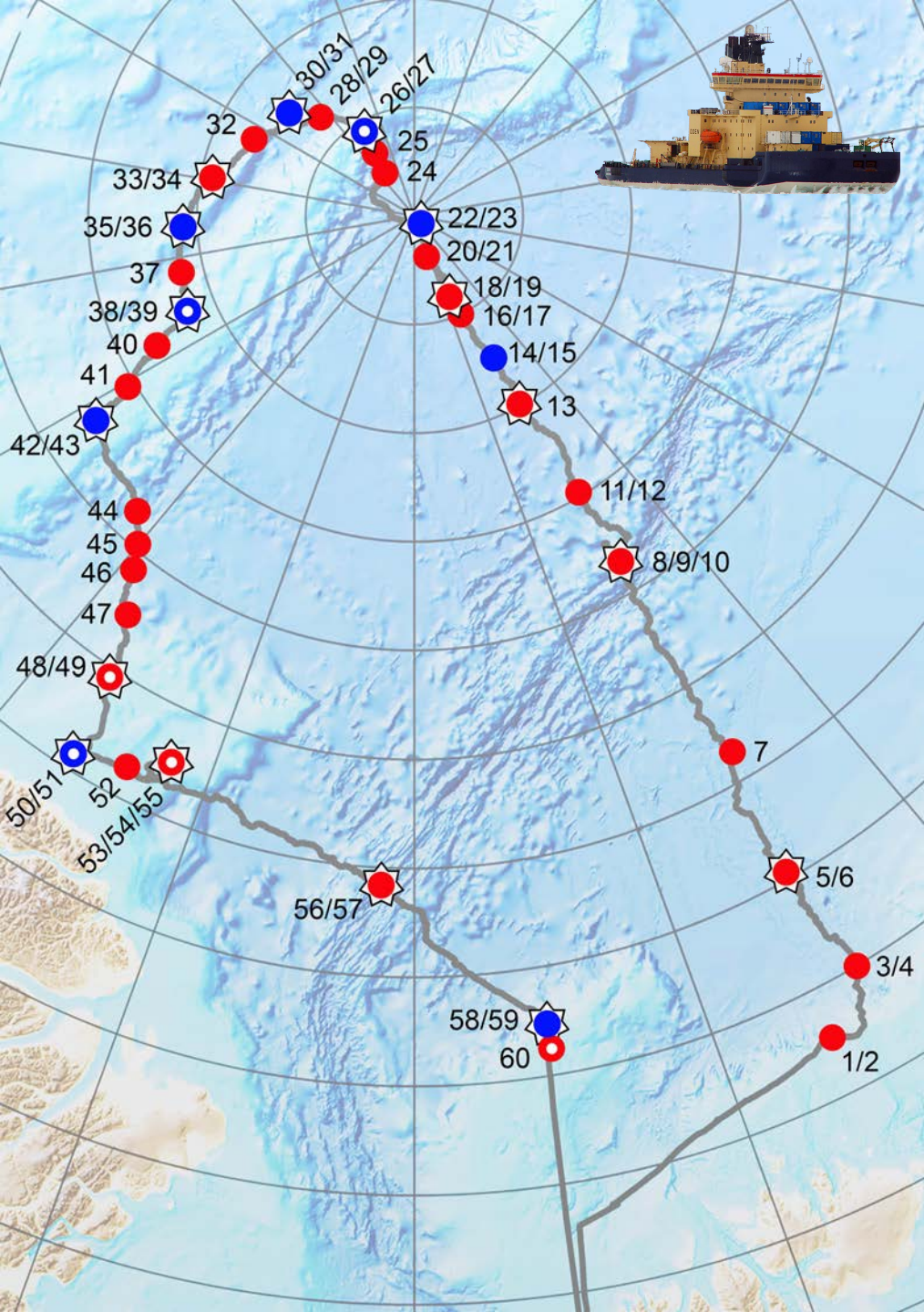
Western Eurasian Basin  
Lomonosov Ridge  
Atlantic inflow



MOSAiC 2019-2020

Eastern Eurasian Basin  
Western Eurasian Basin  
Atlantic inflow'

Together the two expeditions cover a large part of the Eurasian side of the CAO



# The SAS-Oden expedition

60 sampling stations (36 ship, 24 helicopter)  
260 successful device operations

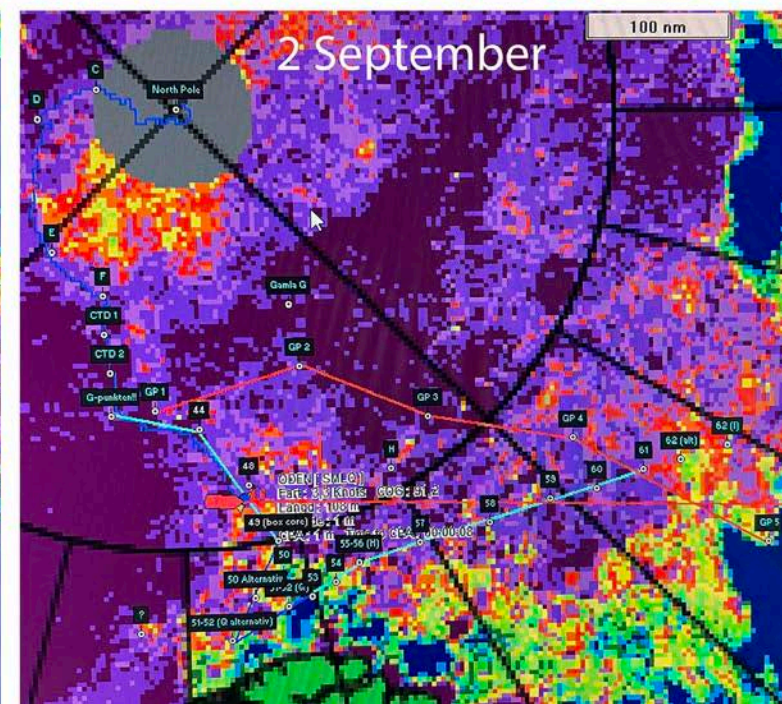
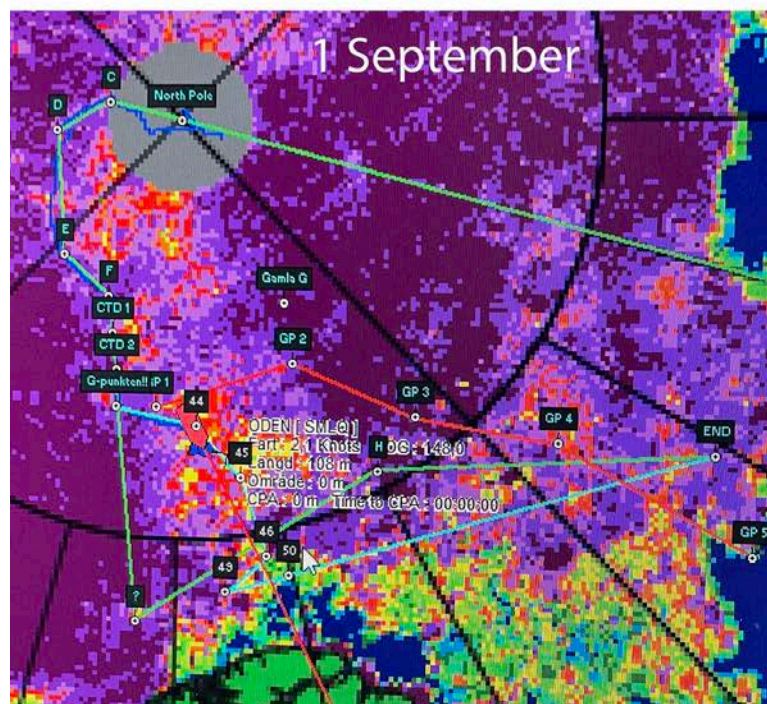
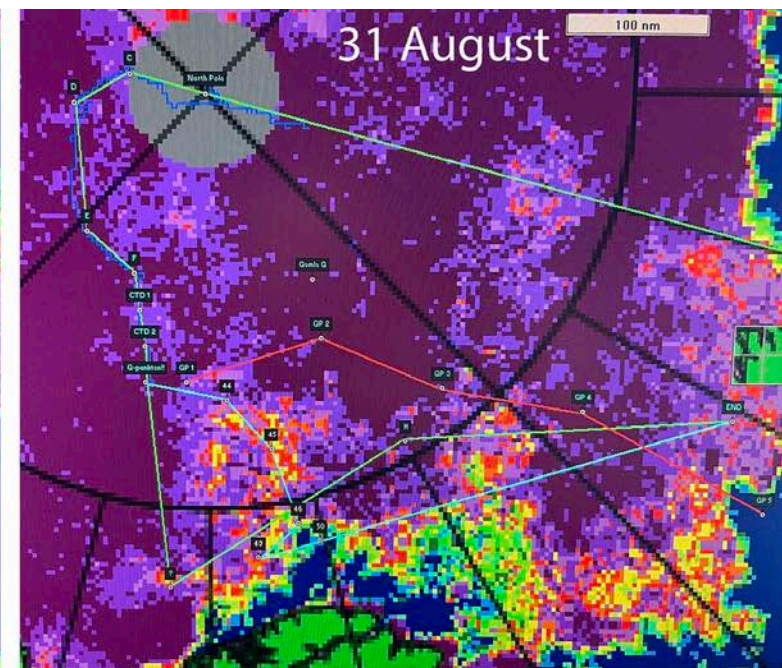
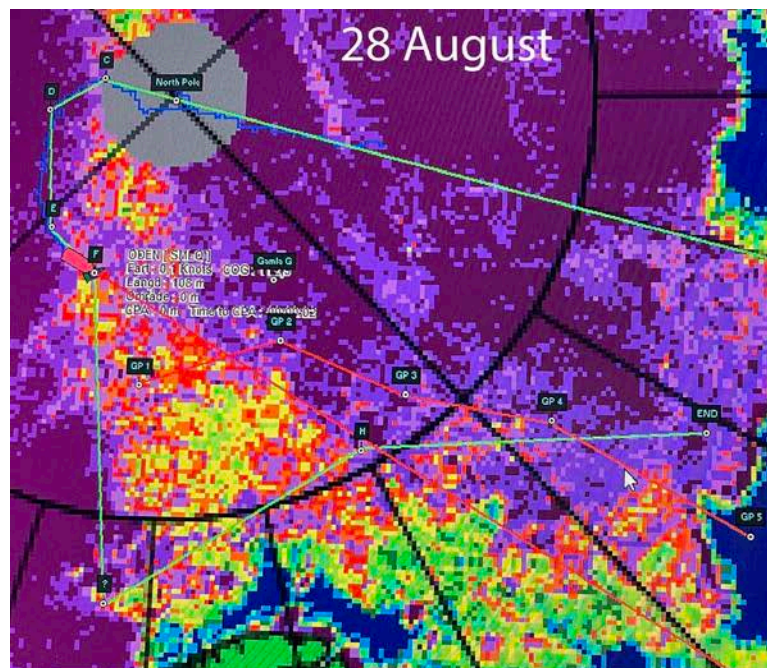
Device operation	Number	Fail	Test	Successful	Total	Type
CTD 1000m	50			50		
CTD deep	40	2		38		
CTD shallow	27		2	25	113	CTD
Multinet	26	1		25		
Bongonet	16			16		
Beam net	46	1		45		
MIK net	6	1		5	91	Nets
LOKI (optics)	12	2		10	10	LOKI
Box corer	11	3		8	8	Box corer
ICE station ship	14			14		
ICE station heli	24			24	38	ICE stations
11	272	10	2	260		



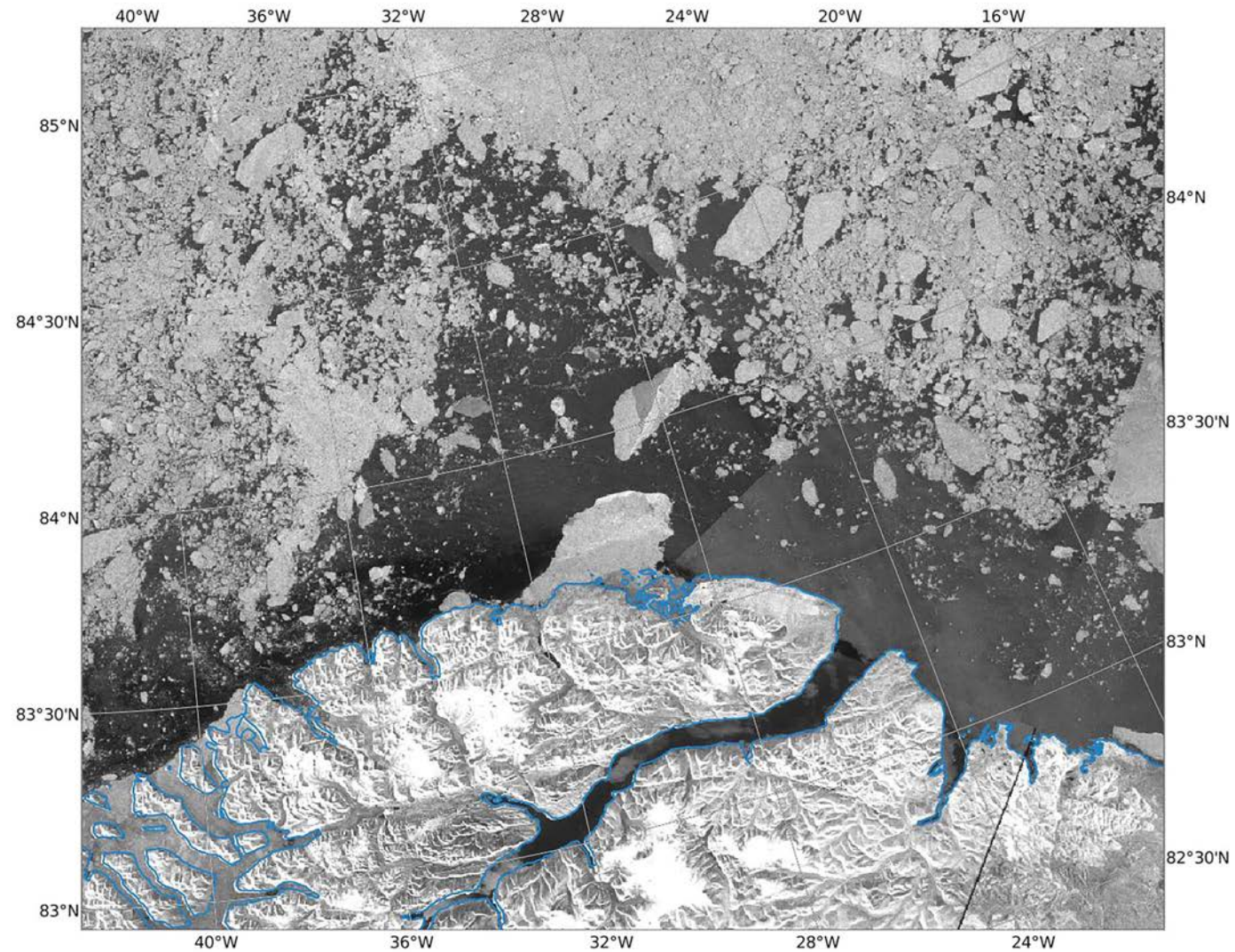
## The SAS-Oden expedition

The ice was very dynamic, which is an effect of climate change:  
thinner ice is more susceptible to winds

(60 % of the summer ice volume has disappeared during the last 20-30 years)



## The SAS-Oden expedition: open water north of Greenland



Morris Jesup

Sentinel-1B:  
2021-09-06

## SAS data collected during the SAS-Oden 2021 expedition

SAS physical and biogeochemical data	SAS biological data
- Seafloor depth	- Chlorophyll fluorescence
- Temperature	- Chlorophyll-a
- Salinity	- HPLC pigment composition
- Insolation (PAR)	- Virus density
- Dissolved oxygen	- Bacterial density
- Inorganic nutrients (NO <sub>3</sub> /NO <sub>2</sub> , PO <sub>4</sub> , SiO <sub>3</sub> )	- Microalgal density
- Dissolved Inorganic Carbon (DIC)	- Bacterial production and respiration
- CDOM fluorescence	- Primary production
- Dissolved Organic Carbon (DOC)	- Plankton respiration
- Particulate Organic Carbon (POC)	- Microbial <sup>13</sup> C/ <sup>15</sup> N
- Particulate Organic N and P (PON, POP)	- Phytoplankton
	- Micro- meso- macrozooplankton
	- Acoustics of fish and zooplankton



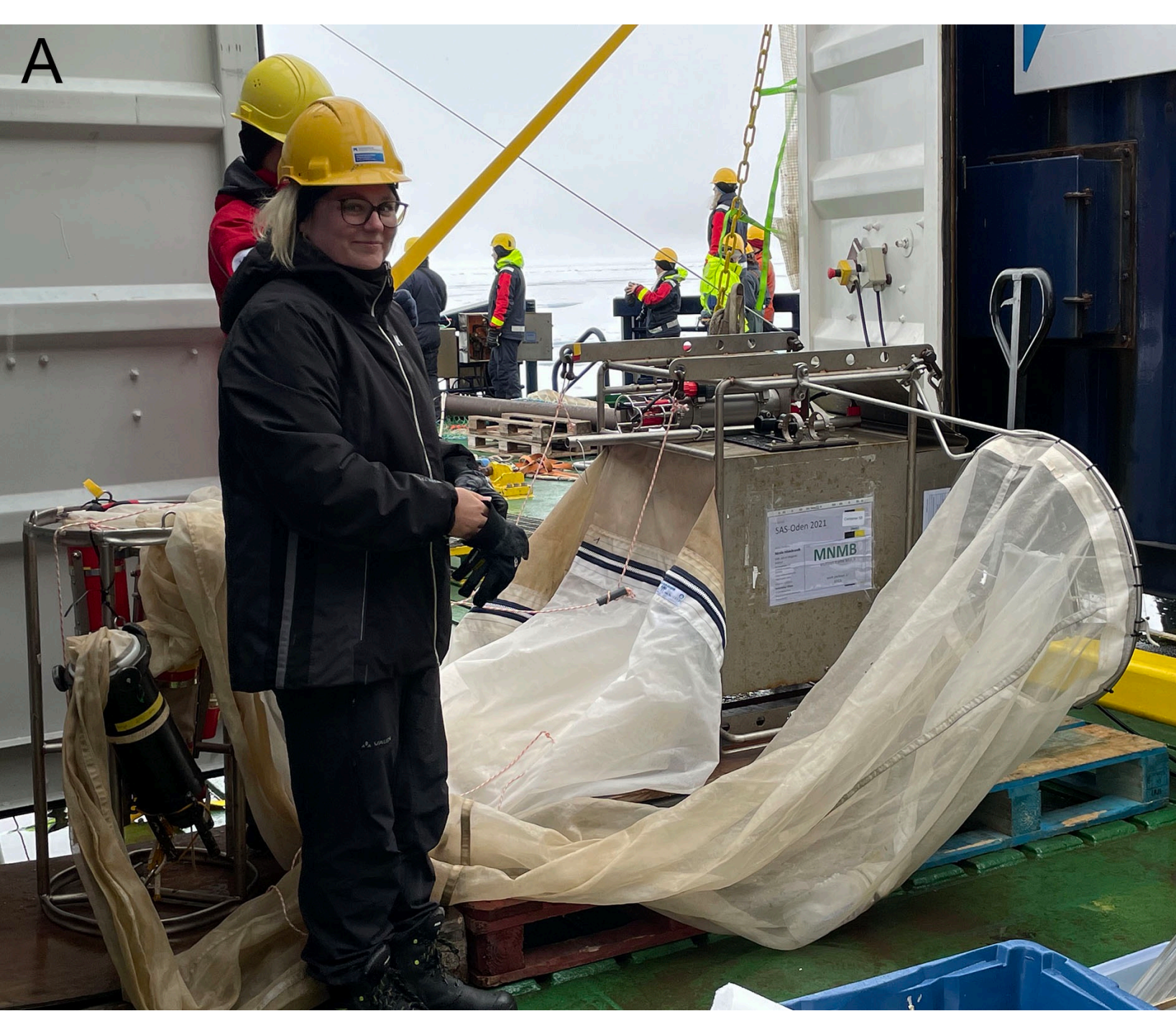
CTD

Oceanography

Chemistry

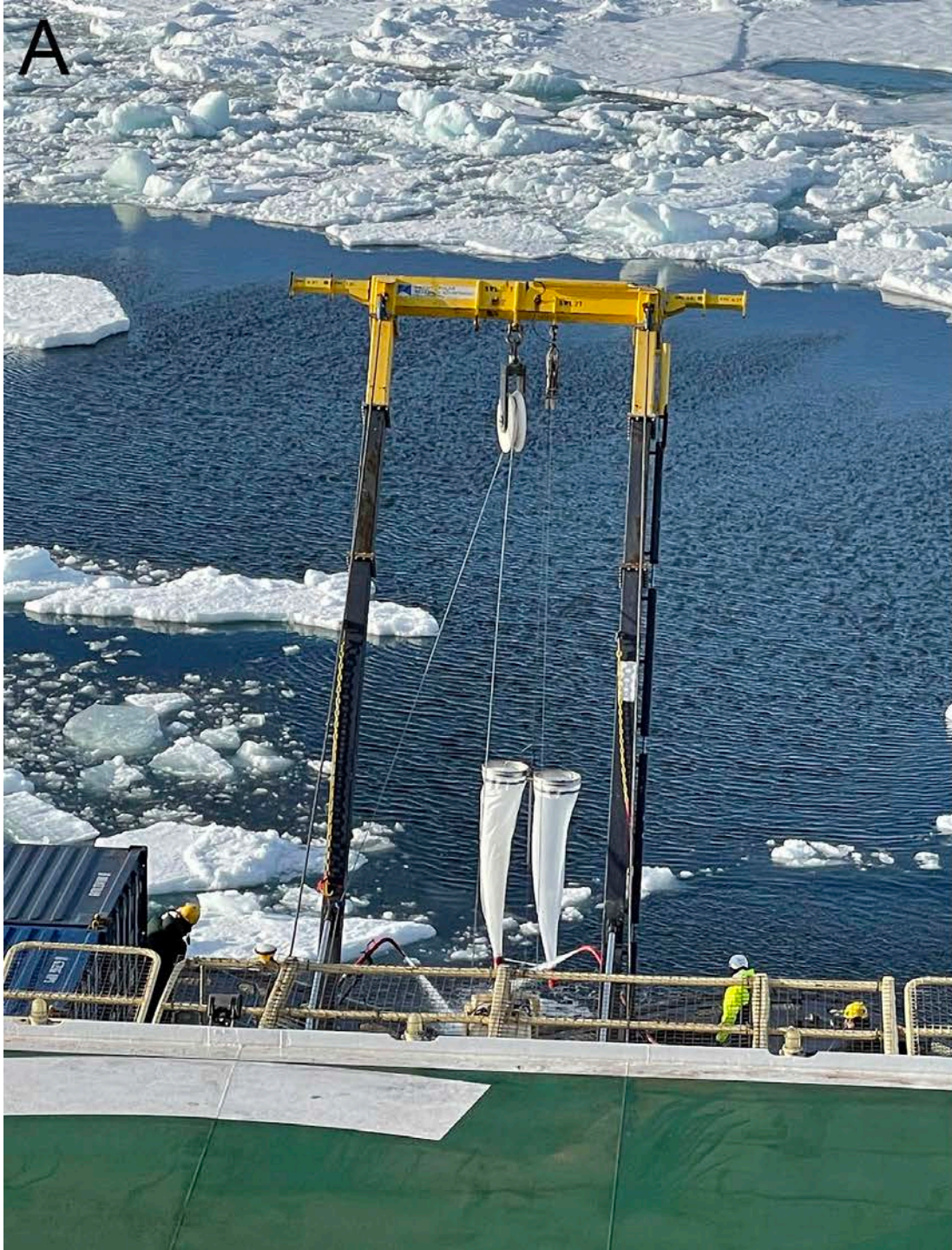
Biology

A



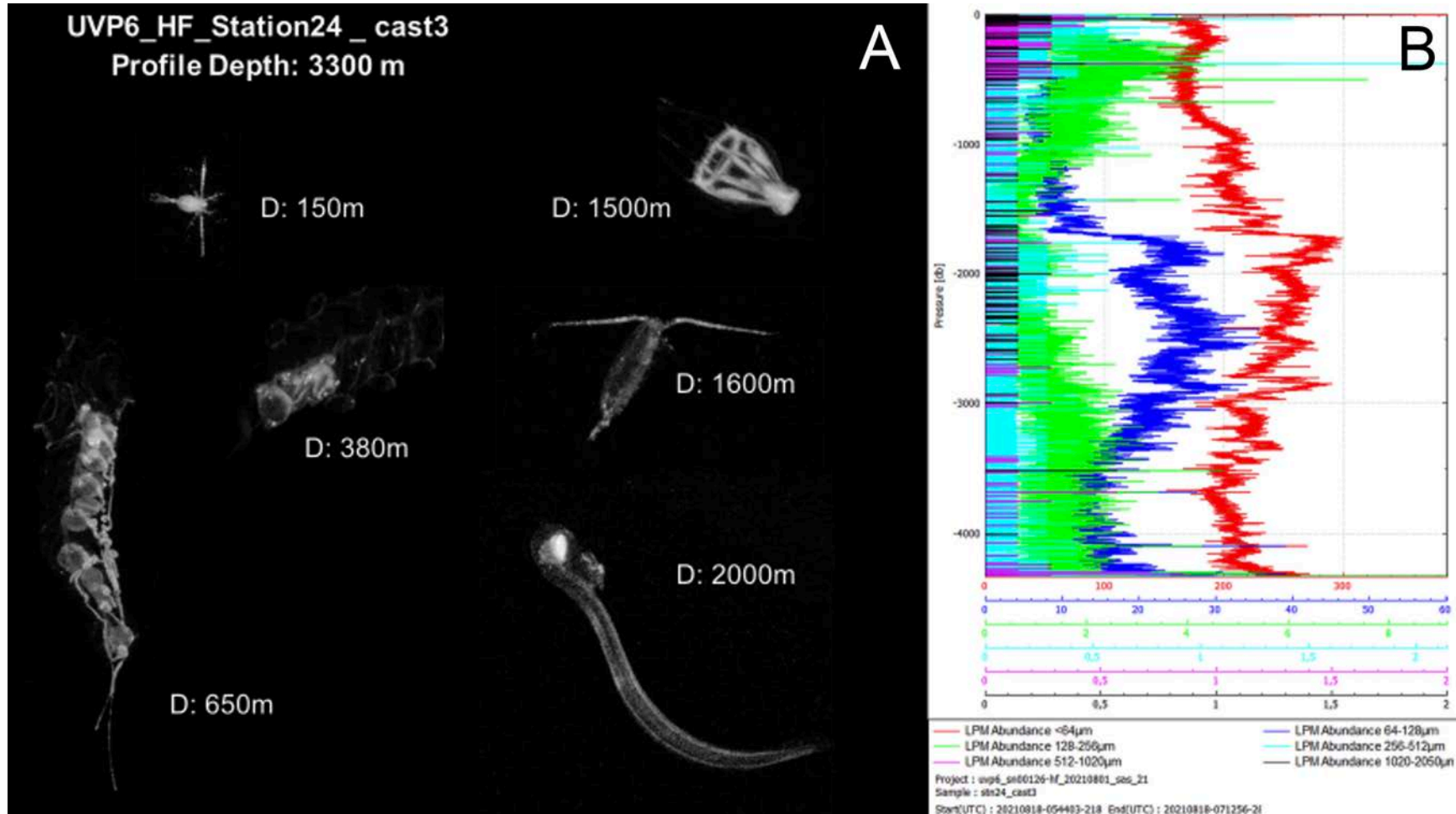
B





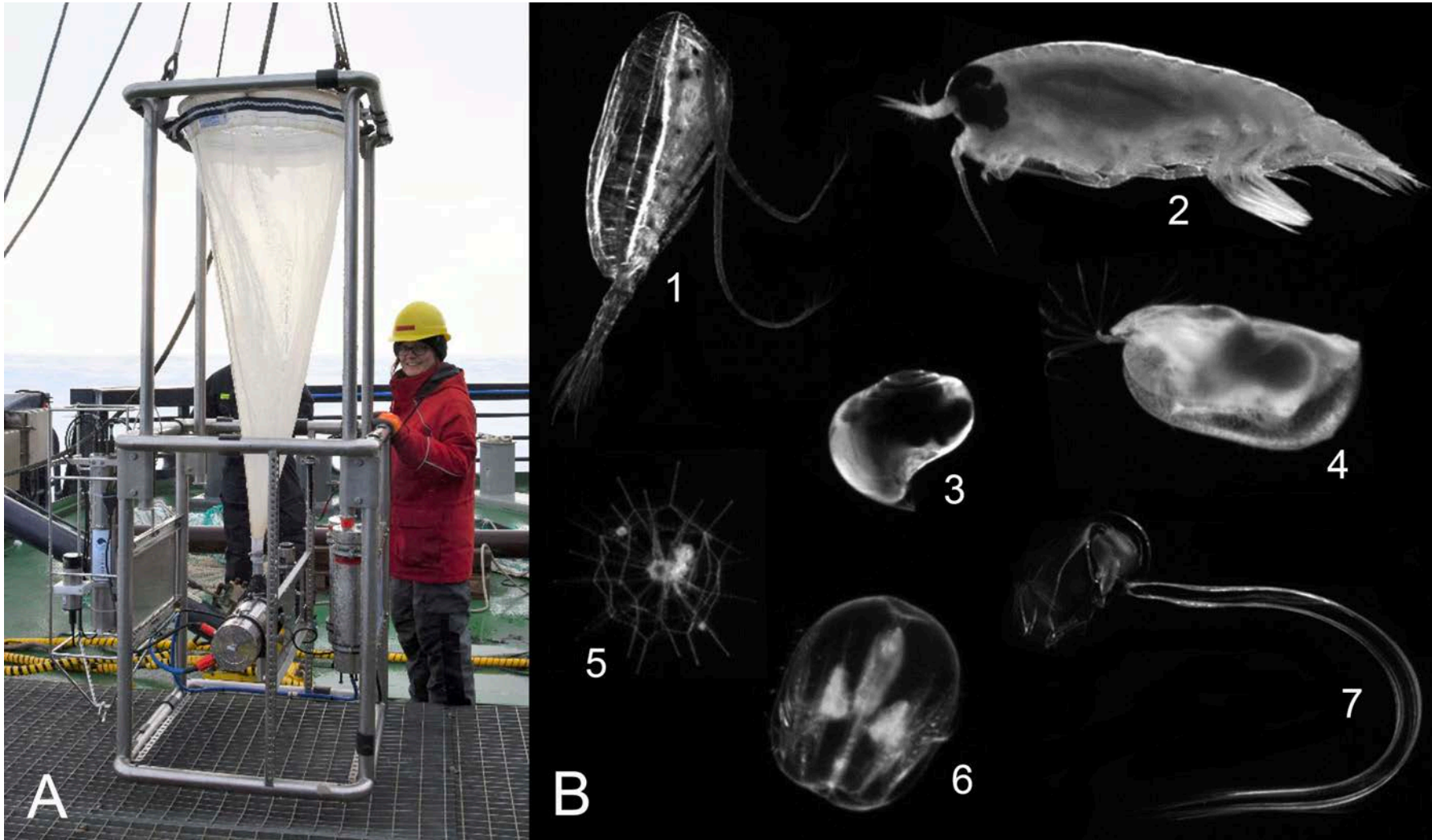
## Optical observations zooplankton:

Underwater Vision Profiler (UVP): 48 good profiles (already uploaded in the EcoPart database)  
Particle counts down to 4300 m depth + zooplankton images (ca. 1 %)



## Optical observations zooplankton:

Lightframe On-sight Key species Investigation system (LOKI) : 10 good profiles (will be uploaded in the EcoPart database as well), focuses on zooplankton images (not dead particles)



Under-ice traps:

17 tube traps

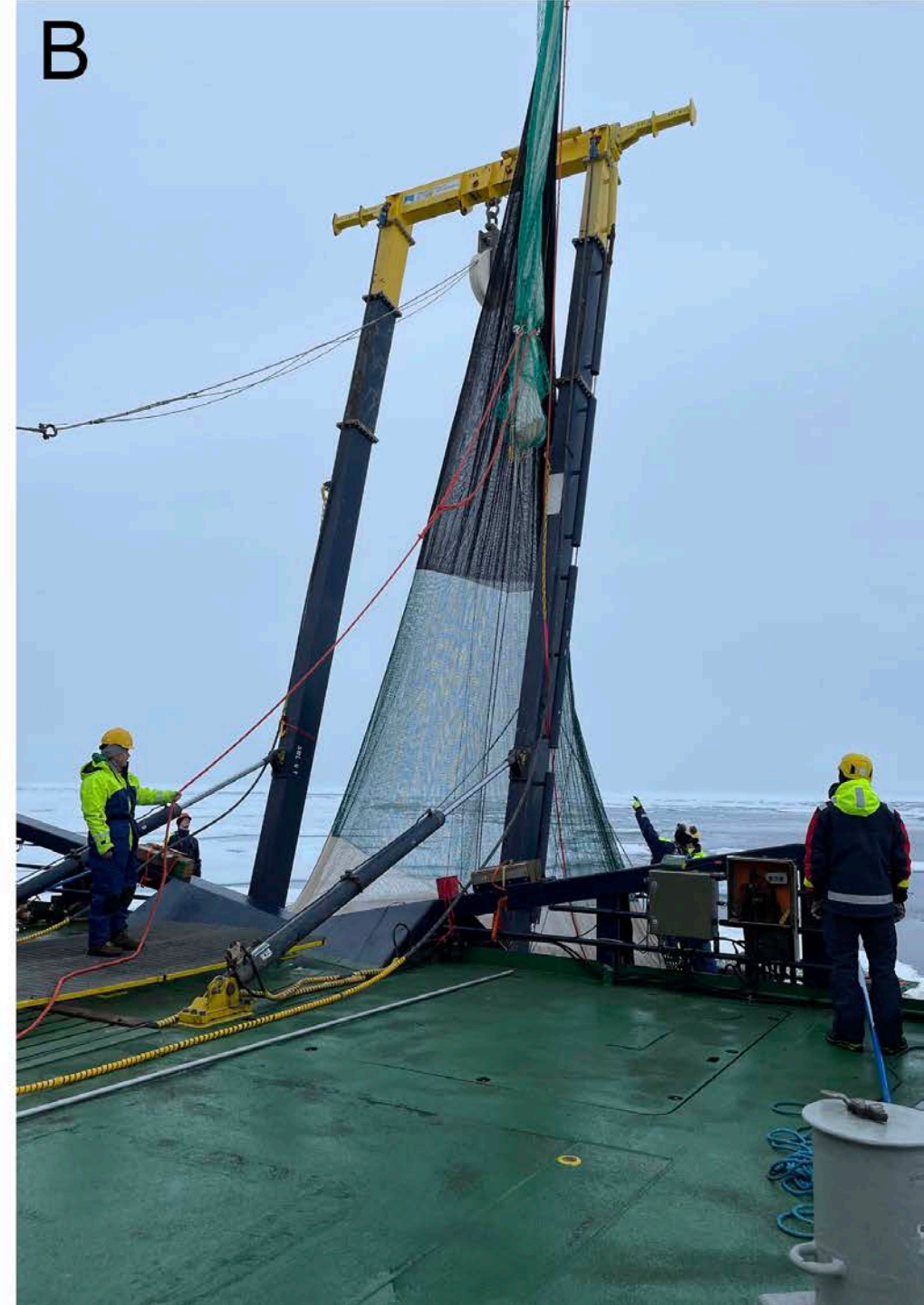
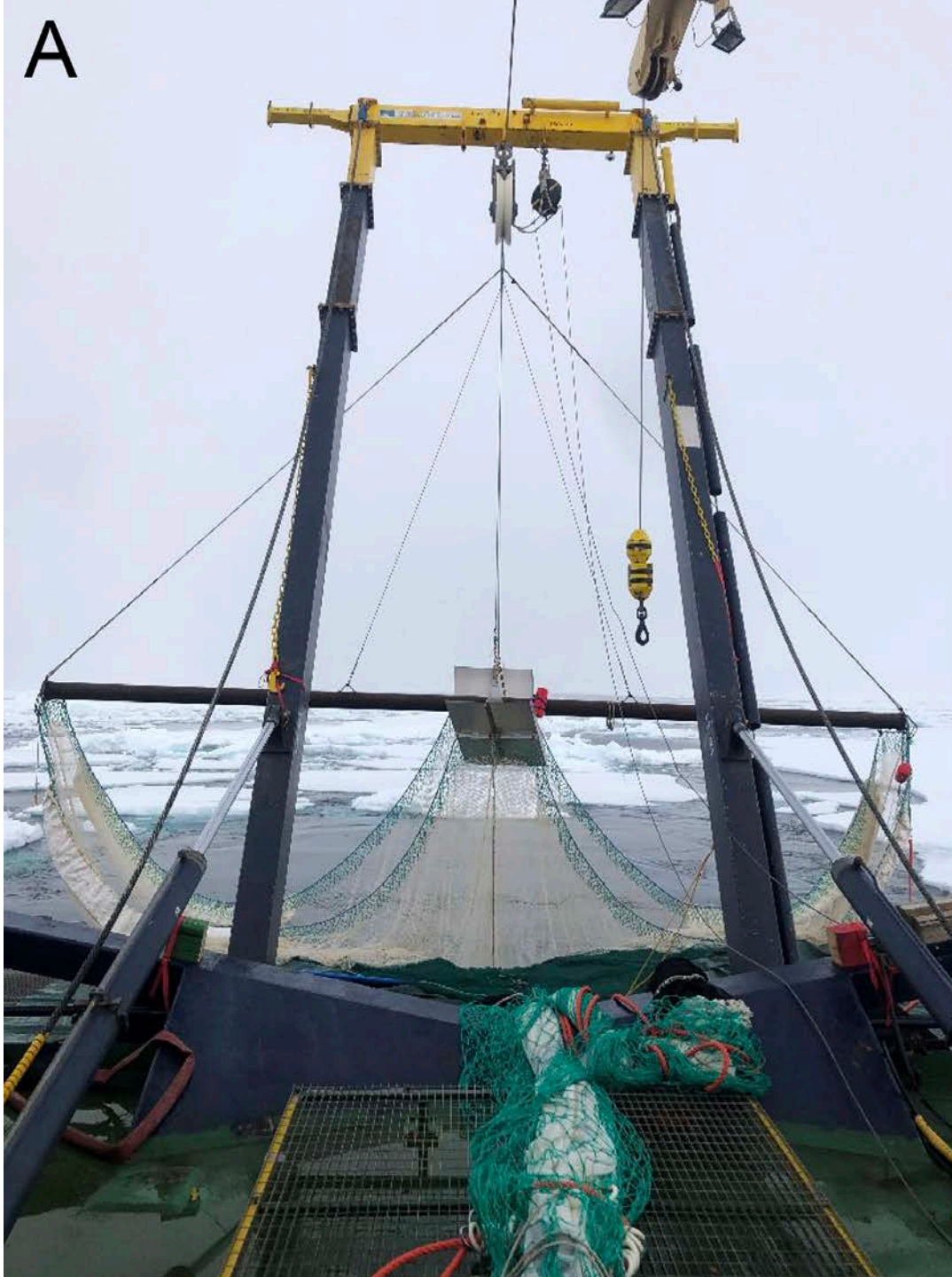
6 umbrella net traps

Three fish

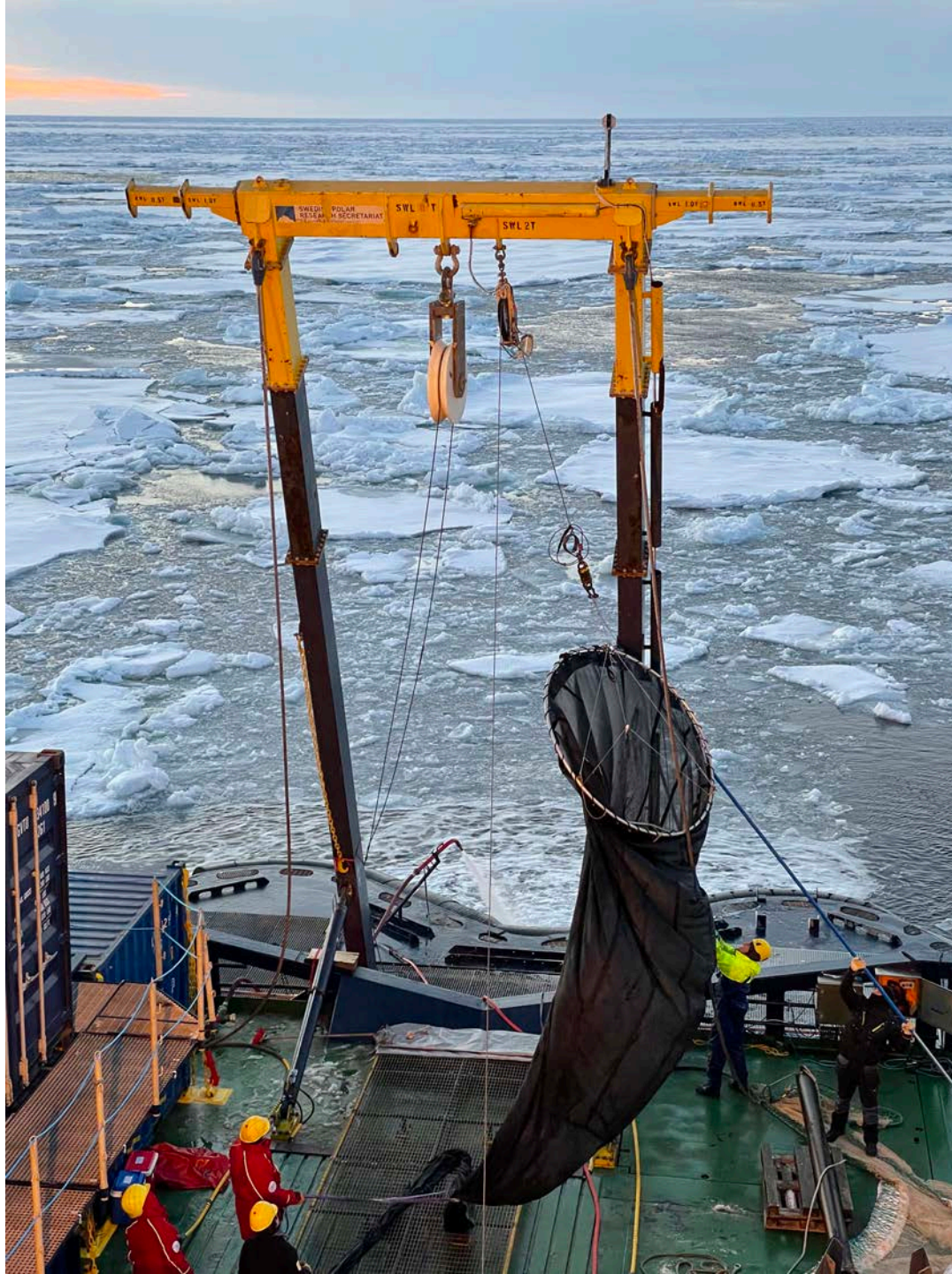


Beam net:  
0 – 800 m depth

Macrozooplankton  
Fish (one)



MIK net:  
0 – 800 m depth  
Macrozooplankton

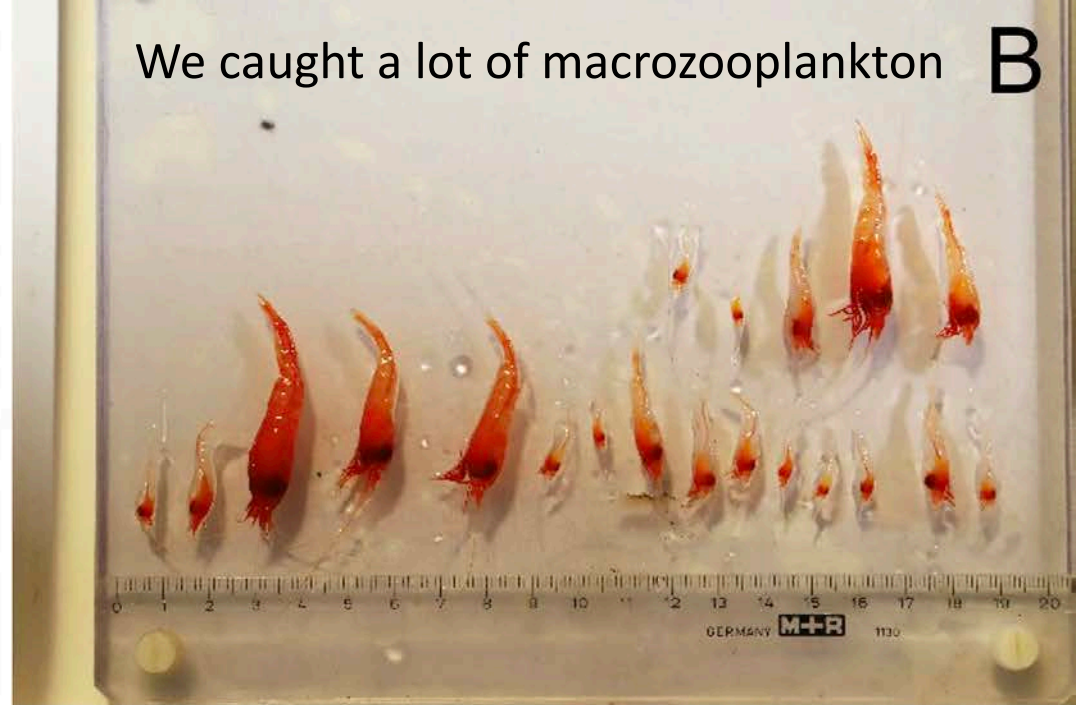


A

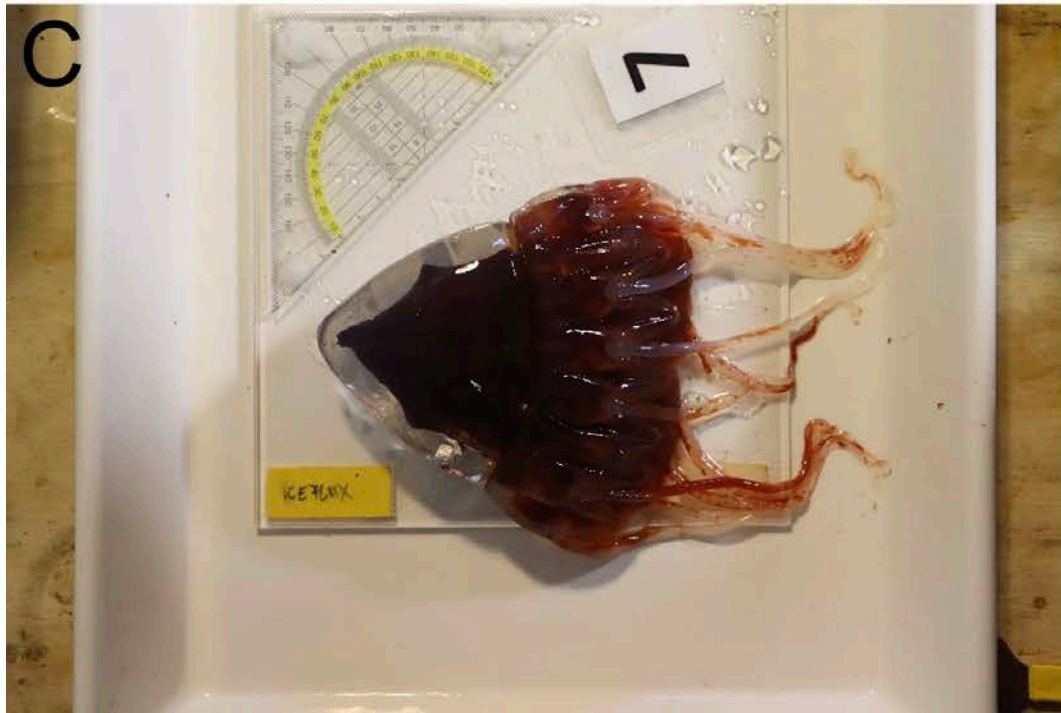


We caught a lot of macrozooplankton

B



C



D



Where is  
the fish?





Box core sample

Otoliths were  
discovered  
immediately



A



Polar cod (*Boreogadus saida*)

B



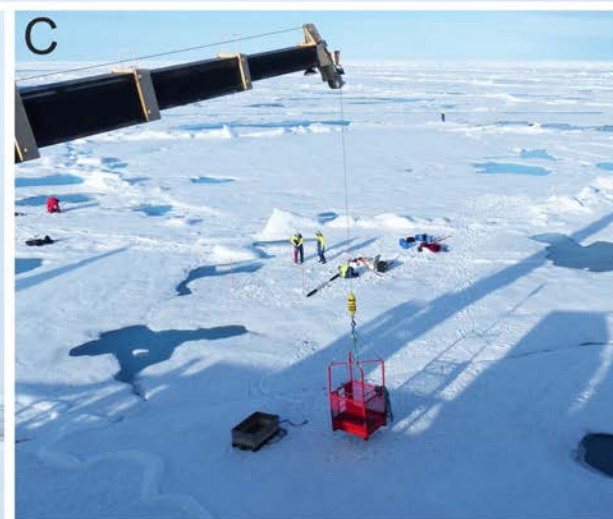
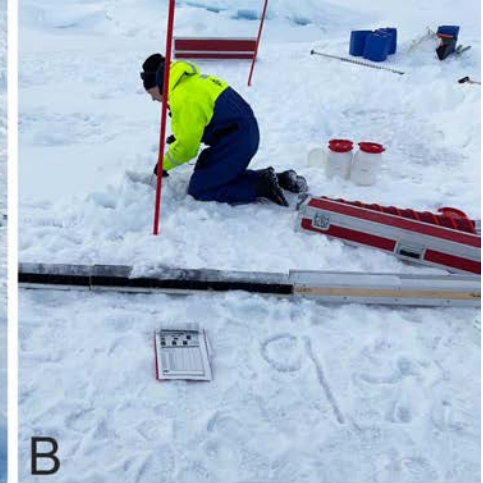
Ice cod (*Arctogadus glacialis*)

(we think)

# Collection of eDNA data



A



A

B

D



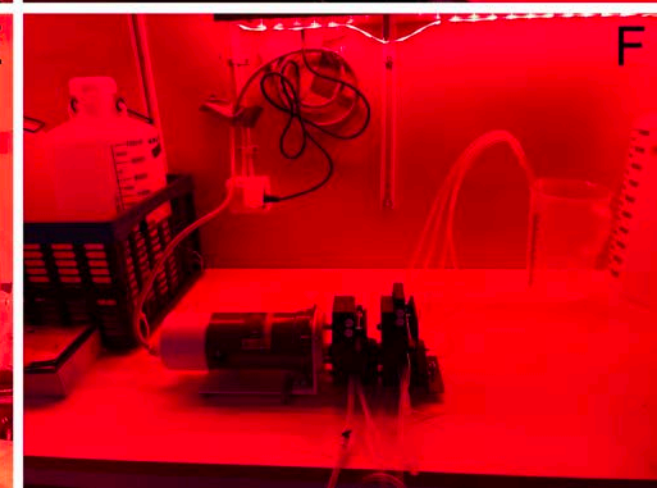
C

D



E

F



## Summary of eDNA samples

Expedition	Sample type	Including replicates	Unique samples	Sequenced in SC07
SAS-Oden	Water and ice DNA treatment	896	245	245
SAS-Oden	Water and ice RNA treatment	600	150	150
SAS-Oden	Water column virus treatment	49	49	49
SAS-Oden	Sediment DNA treatment		120	120
MOSAiC	Water and ice DNA treatment	102	34	34
MOSAiC	Water and ice RNA treatment	102	34	34
		1749	512	692

A blue tang fish is swimming in clear blue water, looking directly at the camera. The fish has a yellow stripe along its side and a small yellow spot on its head. The water is a deep blue, and there are some bubbles and ripples visible. The fish is positioned in the lower left quadrant of the frame.

The End