

Cruise report

Sanna Cruise 25/9 – 1/10 2013



Funded by ASP, ARC & GINR

Participants

Lorenz Meire (WP8, GINR)

Lee Reeve (WP2, AU)

Thomas Juul-Pedersen (WP4, GINR)

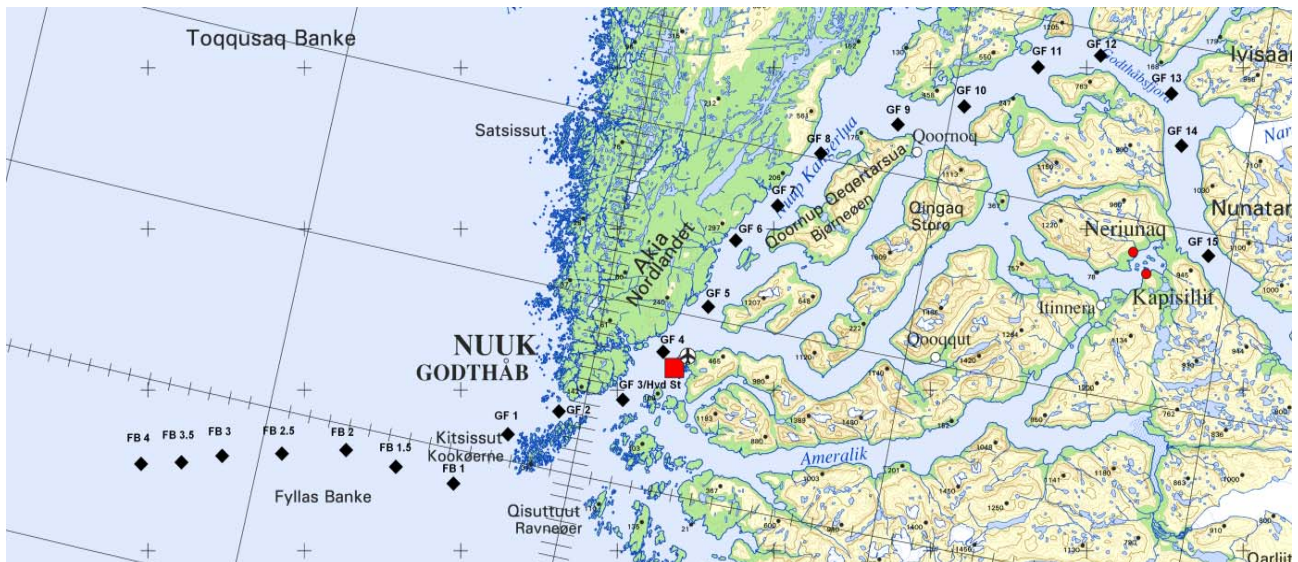
Weiter Boone (WP8, UoM)

Guillaume Meisterhans (WP8, UoM)

Kristine Arendt (WP4, GINR)

Peter Grønkjær (WP2, Cruise leader, AU)

Stations



Cruise summary

Sanna left Nuuk harbor at 9:30 on Wednesday 25 September, and returned to Nuuk on Thursday 26 August in the evening take onboard Kristine Arendt before going to the Fylla Bank transect. Kristine was brought back on land on Friday evening 28 August. The cruise ended on Tuesday 1 October at 10.00.

Sampling and preliminary sample processing was successful for all participants. The crew was extremely capable and efficient in handling the ship and all sampling gear.

Specific projects and outcome

WP2: Linking primary producers to top-predators: The role of capelin and sandeel in the Godthåbsfjord area.

This project intended to investigate the distribution, abundance, feeding and condition of capelin and sandeel in the Godthåbsfjord area. However, due to lack of hydroacoustic equipment the focus has been on feeding, nutritional condition and growth. Capelin and sandeel are zooplanktonic fishes that in other areas are important for the transfer of energy to the highest trophic levels. Due to their life-history, - short lived and highly fecund, their population dynamics are heavily impacted by changes in the oceanographic conditions. Spatial and interannual changes in their growth and condition (e.g. lipid content) are likewise dictated by prey availability and oceanographic conditions, especially temperature. Consequently, their value as prey for top predators varies spatially and temporally.

The aim of the cruise was to collect sandeel on Fyllas Bank and capelin in Godthaabsfjord in order to describe their growth and energy content over a growing season (May-October). A total of 9 0.5 hr hauls were made (6 capelin & 3 sandeel). Onboard the fish (or a sub-sample) were length measured to create a size distribution. For each two cm length class approximately 15 fish were dissected and their stomachs were preserved in 6% formaldehyde. In addition, 1-40 fish per two cm length class were frozen for later analysis of lipid content, energy density, age and growth.

WP4: Seasonal dynamics of phytoplankton production in a glacier influenced fjord

This work package focuses on the seasonal dynamics of pelagic primary production, phytoplankton community structure and carbon cycling during an annual cycle in the Godthåbsfjord system. While these seasonal dynamics are known at the entrance of the fjord, they remain understudied during much of the year within and outside the fjord. The seasonal influence of terrestrial and glacial freshwater, nutrient dynamics and light conditions on phytoplankton community and production will be studied in 3-4 key areas along a land/glacier-fjord-ocean transect. Focus will be on identifying the relative influence of physical (nutrient limitation, stratification, vertical mixing) and biological (zooplankton grazing) drivers on primary production and carbon cycling. Work will include ship-based measurements of primary production and nutrient addition studies

This study will collaborate closely with the water chemistry work package on nutrients, pigments and C/N/Si concentrations, as well with the zooplankton work package on grazing impact. The present work package will also take active part in collection of hydrographical parameters (CTD).

On this cruise work also aims at understanding the dynamics of bacterial communities along biochemical gradients (i.e. salinity, particulate and dissolved organic matter) in western Greenland (Godthåbsfjord). Samples were collected at several depths ranging from surface to 400 m for bacterial production (Leucine incorporation), bacterial community structure (molecular fingerprinting), dissolved organic carbon and nitrogen (high-temperature catalytic combustion), total suspended material, and particle size spectra (LISST-100, determined on-board). In addition, samples were collected for the characterization of dissolved organic matter by fluorescence spectroscopy, in collaboration with Dr. Colin Stedmon (Technical University of Denmark). Together with hydrographic and biochemical parameters measured by other team members, our measurements will contribute invaluable insights into processes that influence microbial dynamics along oceanic-fjord gradients.

WP8: Quantifying the influences of biogeochemical processes on carbon dynamics in the Godthåbsfjord

This work package aims to understand how the strong chemical and physical gradient in the Godthåbsfjord, due to glacier melt and fjord circulation processes, affect the carbon dynamics. By studying the spatial and temporal variation in chemical variables in combination with primary production (primary production group, the role of the different drivers for carbon dynamics in the fjord ecosystem can be quantified. During the cruise, water chemistry was studied from glacier to open ocean. From the collected water, DIC, pH, alkalinity and $p\text{CO}_2$ are quantified to study the inorganic carbon dynamics. Samples for nutrients (NH_4 , NO_x , PO_4 , DSi, biogenic Si), chlorophyll, oxygen, suspended matter, particulate and dissolved organic carbon and the oxygen isotope ratio (indication on fraction glacial melt) were collected.

Sampling

General sampling overview

Date	Start (local time)	Station ID number	Depth (m)	Latitude	Longitude	CTD	Niskin Bottles	Water pCO2	Lugol preserved water	Trawl	Primary production (14C)	Plankton samples (20µ)	WP2
27-09-13	11:00	FB 4	956	63°53	53°22	√	√	√				√	
27-09-13	08:30	FB 3.5 Focus area	220	63°53.9	53°14.7	√	√	√	√		√	√	
27-09-13	14:30	FB 3	72	63°55	53°07	√	√	√		√		√	
27-09-13	15:20	FB 2.5	63	63°56.4	52°55.9	√	√	√		√		√	√
27-09-13	16:30	FB 2	47	63°58	52°44	√	√	√		√		√	√
28-09-13	10:15	FB 1.5 Focus area	102	63°56.6	52°26.9	√	√	√	√		√	√	
27-09-13	18:30	FB 1	273	63°57	52°22	√	√	√				√	
27-09-13	19:45	GF 1	330	64°03.2	52°10.9	√	√	√				√	
27-09-13	20:45	GF 2	391	64°04.8	52°04.2	√	√	√				√	
25-09-13	10:20	GF 3 Focus area	350	64°07	51°53	√	√	√	√		√	√	
25-09-13	14:15	GF 4	400	64°11.5	51°46.8	√	√	√				√	
25-09-13	15:45	GF 5	357	64°16	51°40	√	√	√				√	
25-09-13	17:00	GF 6	630	64°22	51°37.4	√	√	√				√	
26-09-13	08:00	GF 7 Focus area	626	64°25.5	51°30.6	√	√	√	√	√	√	√	√
26-09-13	14:45	GF 8	624	64°30.5	51°24.0	√	√	√				√	
26-09-13	16:15	GF 9	602	64°34.0	51°10.0	√	√	√				√	
29-09-13	09:30	GF 10 Focus area	579	64°36.6	50°57.5	√	√	√	√	√	√	√	√
29-09-13	08:00	GF 11	552	64°41.0	50°44.4	√	√	√				√	
		GF 12	531	64°42.9	50°32.8								
		GF 13 Focus area	476	64°40.8	50°17.3								
		GF 14	453	64°36.8	50°13.5								
30-09-13	13:00	Extra station near GF7				√	√						

Note: CTD transects across the fjord was made on GF10 and GF11 on the 29th.

Note: Fishing on GF7 was also performed on 30/9-13 (2 hauls)

Note: Fishing on GF3 was performed during the next cruise (1-7/10)

WP4 Sampling (Guillaume Meisterhans)

Date	Starting time	Station ID number	Depth (m)	Latitude	Longitude	Bact abundance	Bacterial prod	Bacterial diversity	DOC	FcDOM	Particle size	TSM
27-09-2013	11:00	FB 4	956	63°53	53°22							
27-09-2013	08:30	FB 3.5 Focus area	220	63°53.9	53°14.7	√	√	√	√	√	√	√
27-09-2013	14:30	FB 3	72	63°55	53°07							
27-09-2013	15:20	FB 2.5	63	63°56.4	52°55.9							
27-09-2013	16:30	FB 2	47	63°58	52°44							
28-09-2013	10:15	FB 1.5 Focus area	102	63°56.6	52°26.9	√	√	√	√	√	√	√
27-09-2013	18:30	FB 1	273	63°57	52°22							
27-09-2013	19:45	GF 1	330	64°03.2	52°10.9							
27-09-2013	20:45	GF 2	391	64°04.8	52°04.2							
25-09-2013	10:20	GF 3 Focus area	350	64°07	51°53	√	√	√	√	√	√	√
25-09-2013	14:15	GF 4	400	64°11.5	51°46.8							
25-09-2013	15:45	GF 5	357	64°16	51°40							
25-09-2013	17:00	GF 6	630	64°22	51°37.4							
26-09-2013	08:00	GF 7 Focus area	626	64°25.5	51°30.6	√	√	√	√	√	√	√
26-09-2013	14:45	GF 8	624	64°30.5	51°24.0							
26-09-2013	16:15	GF 9	602	64°34.0	51°10.0							
29-09-2013	09:30	GF 10 Focus area	579	64°36.6	50°57.5	√	√	√	√	√	√	√
29-09-2013	08:00	GF 11	552	64°41.0	50°44.4							
		GF 12	531	64°42.9	50°32.8							
		GF 13 Focus area	476	64°40.8	50°17.3							
		GF 14	453	64°36.8	50°13.5							
30-09-2013	13:00	Extra station near gf7				√	√	√	√	√	√	√
Depths sampled: 5, 10, 20, 30, 50, 100, 200 & 400. Depths below 100 m only when possible												

WP2 Sampling (Peter Grønkjær & Lee Reeve)

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Capelin	GF7	26-09-13	18:40	1	
Only ca 30 capelin - all frozen					
Size group	# Length freq	Size group	Number lipid	Number stomach	
6		4-6			
7		6-8			
8		8-10			
9		10-12			
10		12-14			
11		14-16			
12		16-18			
13		18-20			

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Capelin	GF7	30-09-13	7:50	1	
Size group	# Length freq	Size group	Number lipid	Number stomach	
6		4-6			
7		6-8			
8		8-10			2
9		10-12	22		10
10		12-14	3		10
11		14-16			
12		16-18			
13		18-20			

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Capelin	GF7				
CA 20 capelin - all bulk frozn					
Size group	# Length freq	Size group	Number lipid	Number stomach	
6		4-6			
7		6-8			
8		8-10			
9		10-12			
10		12-14			
11		14-16			
12		16-18			
13		18-20			

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Capelin	GF10	29-09-13	13:00	1	3 kg / 1 kg
Size group	# Length freq	Size group	Number lipid	Number stomach	
6	2	4-6			
7	7	6-8			
8	4	8-10	10		
9	14	10-12	11		
10	69	12-14	12		
11	94	14-16	4		
12	32	16-18			
13	7	18-20			
14	1	20-22			
15		22-24			
16		24-26			
17					
18					
19					
20					

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Capelin	GF10	29-09-13	22:45	2	
Size group	# Length freq	Size group	Number lipid	Number stomach	
6		4-6			
7		6-8		15	
8		8-10	18	10	
9		10-12	50	10	
10		12-14	46	10	
11		14-16		8	
12		16-18			
13		18-20			
14		20-22			
15		22-24			
16		24-26			
17					

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Sandeel	FB2.5-3	28-09-13	8:05		40 kg / 1.5kg
Size group	# Length freq	Size group	Number lipid	Number stomach	
6		10-12			
7		12-14			11
8	5	14-16			14
9		16-18			10
10		18-20			15
11	2	20-22			4
12	11				
13	30				
14	64				
15	56				
16	61				
17	42				
18	19				
19	3				
20	1				

Species	Station:	Date:	Time:	Haul/event:	Total weight/sub-sample:
Sandeel	FB2.5-2	28-09-13	14:30	2	
Size group	# Length freq	Size group	Number lipid	Number stomach	
6		10-12			
7	1	12-14			
8	1	14-16			
9		16-18			
10		18-20			
11	1				
12	3				
13	6				
14	18				
15	27				
16	29				
17	25				
18	7				
19	1				