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The Expedition of the Research Vessel "Polarstern" to the Arctic in 2010 (ARK-XXV/2)

Edited by
Thomas Soltwedel
with contributions of the participants

HELMHOLTZ GEMEINSCHAFT

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ARK-XXV/2

30 June - 29 July 2010

Longyearbyen - Reykjavik

Fahrtleiter / Chief scientist

Thomas Soltwedel

Koordinator / Coordinator

Eberhard Fahrbach

Contents

1. ZUSAMMENFASSUNG UND FAHRTVERLAUF

Thomas Soltwedel
Alfred-Wegener-Institut

Der zweite Fahrtabschnitt der 25. Expedition des Forschungsschiffes *Polarstern* begann am 30. Juni 2010 in Longyearbyen auf Spitzbergen, führte über das Tiefsee-Observatorium HAUSGARTEN in der östlichen Framstraße und den ozeanographischen Transekt bei 78°50'N bis etwa 12°30'W und endete am 29. Juli 2010 in Reykjavik, Island (Abb. 1.1). Die Reise dauerte insgesamt 28,5 Tage. Etwa 300 Stunden bzw. 12,5 Tage wurden für Stationsarbeiten genutzt, die restliche Zeit wurde für die Anreise in das Untersuchungsgebiet, Transitstrecken zwischen den Stationen und die Abreise von 79°N nach Reykjavik benötigt. Die Expedition umfasste über 160 ozeanographische und biologische Stationen, an denen in der Regel jeweils eine Vielzahl von Geräten eingesetzt wurde. Während der Expedition wurden ca. 3000 Seemeilen zurückgelegt.

Die im Bereich des Tiefsee-Observatoriums HAUSGARTEN durchgeführten Arbeiten tragen zum Forschungsprogramm PACES (Polar regions and coasts in the changing earth system) des AWI bei und leisten darüber hinaus Beiträge zu den EU-Projekten ESONET, HERMIONE und HYPOX. Im Rahmen der HAUSGARTEN-Arbeiten wird seit nunmehr über 10 Jahren der Einfluss klimatisch induzierter Veränderungen auf das marine, arktische Ökosystem dokumentiert.

Klimabedingte Veränderungen der Plankton-Zusammensetzung und des Kohlenstoffkreislaufs in der Framstraße wurden durch die am AWI etablierte Arbeitsgruppe PEBCAO (Phytoplankton ecology and biogeochemistry in the changing Arctic Ocean) untersucht.

Für das KONGHAU-Projekt (Impact of climate change on Arctic marine community structures and food webs) wurden Probennahmen auf dem Svalbard-Schelf und im Bereich des Kongsfjords durchgeführt. Das Projekt vereinigt Flachwasser- und Tiefsee-Daten, die in den letzten 12 Jahren in der östlichen Framstraße gewonnen wurden.

Die in das EU-Projekt ACOBAR (Acoustic technology for observing the interior of the Arctic Ocean) eingebetteten ozeanographischen Arbeiten hatten zum Ziel, Änderungen des Wassermassen- und Wärmeaustauschs zwischen dem Nordpolarmeer und dem nördlichen Atlantik und die Zirkulation in der Framstraße zu quantifizieren. Dafür wurden Temperaturen und Salzgehalte entlang eines Schnitts bei 78°50'N gemessen sowie Wasserproben genommen, um Spurenstoffe zu quantifizieren. Alle ozeanographischen Verankerungen, die vor zwei Jahren auf diesem Schnitt ausgelegt wurden, konnten erfolgreich ausgetauscht werden, so dass die Zeitserie fortgesetzt werden konnte.

Während des gesamten Fahrtabschnitts wurden die Beobachtungen von Seevögeln und marinen Säugetieren aus dem vorhergehenden Fahrtabschnitt fortgesetzt.

Ein Höhepunkt der Reise war der erste Untereis-Einsatz des autonomen Unterwasserfahrzeugs der AWI-Tiefseegruppe. Das mit unterschiedlicher Sensorik und verschiedenen Probennahmegeräten ausgestattete Tauchboot lieferte wertvolle Informationen über physikalisch-chemische und biologische Parameter im ökologisch wichtigen Übergangsbereich zwischen dem eisdeckten Ozean und seinen eisfreien Randbereichen.

Durch die effektive Zusammenarbeit zwischen den wissenschaftlichen Arbeitsgruppen und der Schiffsbesatzung, und begünstigt durch das überwiegend gute Wetter, verlief die Expedition ARK-XXV/2 außerordentlich erfolgreich.

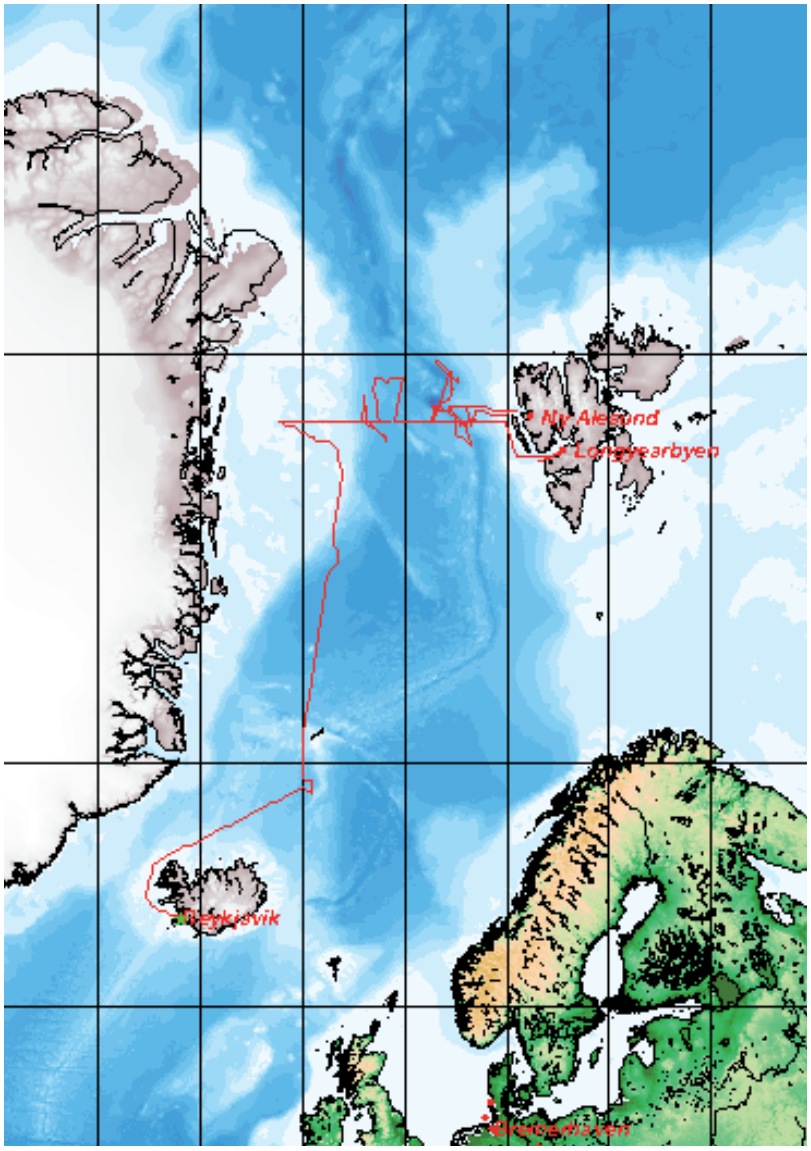


Abb. 1.1: Kurskarte der FS Polarstern Reise ARK-XXV/2
Fig. 1.1: Cruise track of RV Polarstern during the expedition ARK-XXV/2

ITINERARY AND SUMMARY

The second leg of the 25th *Polarstern* expedition to the Arctic started on June 30, 2010 in Longyearbyen (Spitsbergen) and came to an end on July 29, 2010 in Reykjavik (Iceland). The cruise had two main working areas: the deep-sea long-term observatory HAUSGARTEN in the eastern Fram Strait off Svalbard, and an oceanographic transect of stations crossing the entire Fram Strait at about 79°N (Fig. 1.1). The total duration of the expedition was 28.5 days. Approximately 300 hours (12.5 days) were spent for station work, the remaining time was needed to reach the study area, for steaming between individual stations, and for transit from 79°N to Reykjavik. More than 160 stations were sampled, thereby usually deploying several instruments per sampling site. The total length of the expedition was approximately 3,000 nautical miles.

The work at HAUSGARTEN observatory contributes to the new AWI research programme PACES (Polar regions and coasts in the changing Earth system) as well as to the EU projects ESONET, HERMIONE, and HYPOX. The research added to time-series studies at HAUSGARTEN, where impacts of Climate Change on an Arctic marine ecosystem were investigated through field studies, observations and models since more than a decade.

Climate-induced variations in plankton communities of Fram Strait as well as shifts in the marine carbon cycle within the study area were investigated by the AWI research group PEBCAO (Phytoplankton ecology and biogeochemistry in the changing Arctic Ocean).

Within the framework of the KONGHAU project (Impact of climate change on Arctic marine community structures and food webs) we retrieved sediment samples on the continental shelf off Kongsfjorden. KONGHAU combines shallow- and deep-water data collected over the past 12 years from time-series work at Kongsfjorden and HAUSGARTEN.

The oceanographic work during this cruise was dedicated to the EU project ACOBAR (Acoustic technology for observing the interior of the Arctic Ocean), investigating water mass and heat exchanges between the Arctic and the northern North Atlantic, with special emphasis on inter-annual and decadal variations of circulation patterns in Fram Strait. Hydrographic measurements were conducted with various instruments, additional water samples were collected for tracer determinations.

Oceanographic moorings with current meters, temperature sensors and salinity meters, deployed two years ago, were recovered and re-deployed with new instruments to extend the existing time-series.

Observations and counts of sea birds and marine mammals, which were already started during the previous leg, were continued.

The first under-ice mission of the Autonomous Underwater Vehicle (AUV) of the AWI Deep-Sea Research Group was a highlight of this expedition. The vehicle was equipped with various physical and chemical instruments as well as a new designed water sampling system. Data from this dive will help to understand chemical and biological processes in the transition zone between permanent ice-covered areas and marginal, ice-free zones of the Arctic Ocean.

The effective cooperation between the scientific party and the ship's crew, in combination with perfect weather conditions during the cruise, made the entire expedition a great success.

2. WEATHER CONDITIONS

Max Miller, Hartmut Sonnabend
Deutscher Wetterdienst

In the afternoon of June 30, RV *Polarstern* left Longyearbyen (Svalbard) to start for the expedition ARK-XXV/2.

First we operated west of Svalbard between 5°E and 10°E. Most of the time we had only weak pressure gradients with light and variable winds and therefore no significant swell. There was the plan to return to Svalbard on July 7 to fly out a scientist to Ny-Ålesund and to take over scientific material from “Koldewey” station. Light easterly winds induced a lee effect along the west coast of Svalbard and an upcoming low was forecasted to arrive not before afternoon (Fig. 2.1). Although there were some fog patches on Wednesday morning, flight conditions at the entrance of the fjord of Ny-Ålesund were good with sunny skies.

The next part of the cruise was quite smoothly too. Low pressure areas moving to the north passed or weakened before they reached us. Only for some moments the wind increased up to Bft 5, most of the time it was light and variable. However, these calm conditions often caused fog and poor visibility and therefore, planned flights for ice reconnaissance had to be cancelled again and again.

Mid-July, while RV *Polarstern* operated near the meridian of Greenwich, movement came into the atmosphere. First we were located at the east side of a trough stretching along the Greenland coast. The southerly wind increased up to Bft 7, but could not clear the foggy conditions. Further on, however, a low moving towards the Barents Sea caused northerly winds at Bft 7, which significantly improvement the visibility at least for 2 days. A wind sea could not develop, because of the nearby sea ice.

Until the end of the scientific measurements at 78°50’N/12°30’W during the night to Saturday, July 24, the wind decreased significantly. Also, the transit to Iceland was favoured by quite calm weather conditions and the maximum wind force measured was Bft 6. Accordingly, the visibility was temporarily rather poor. In the morning of Thursday, July 29, RV *Polarstern* reached Reykjavik, where ARK-XXV/2 ended.

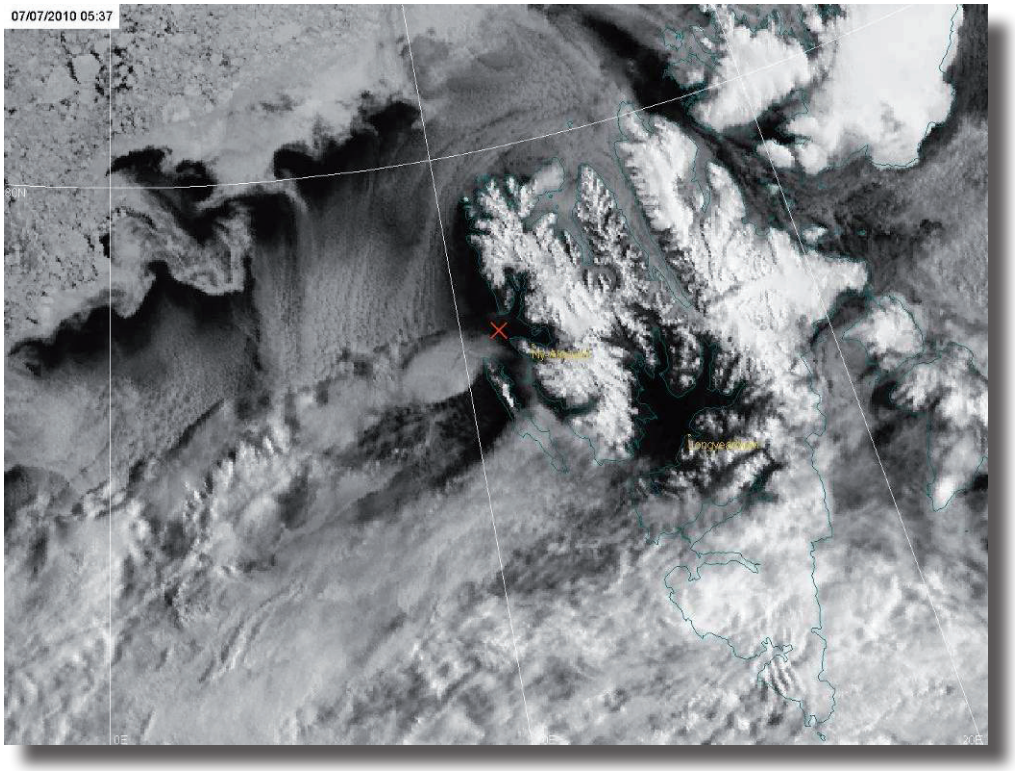
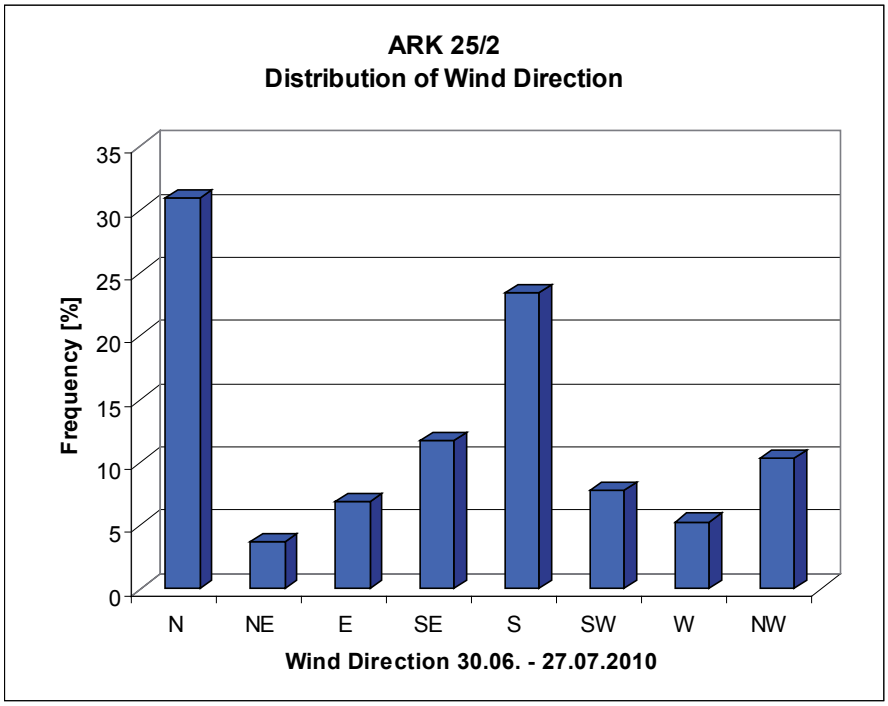
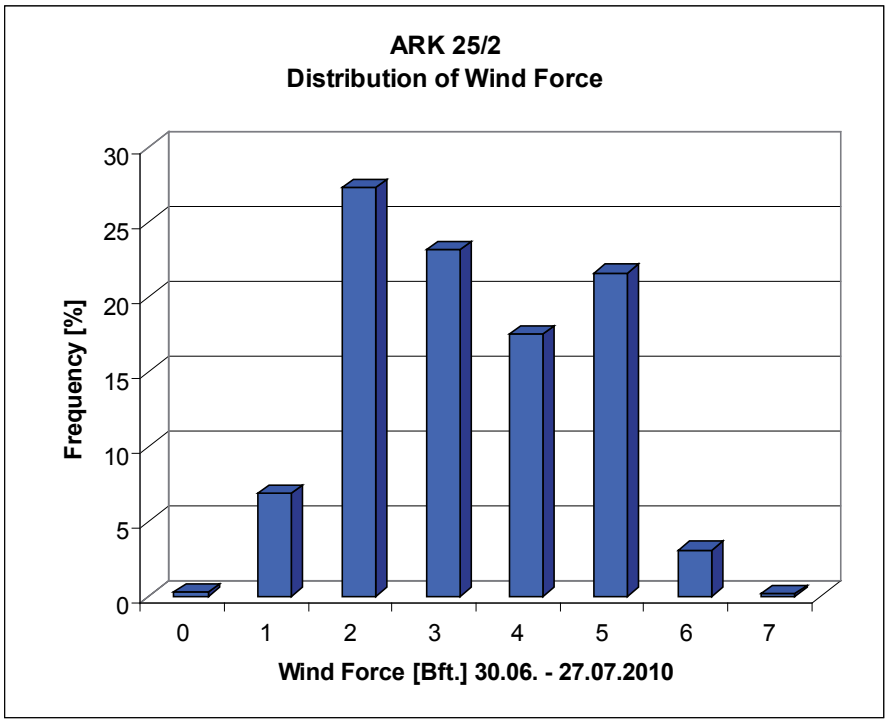
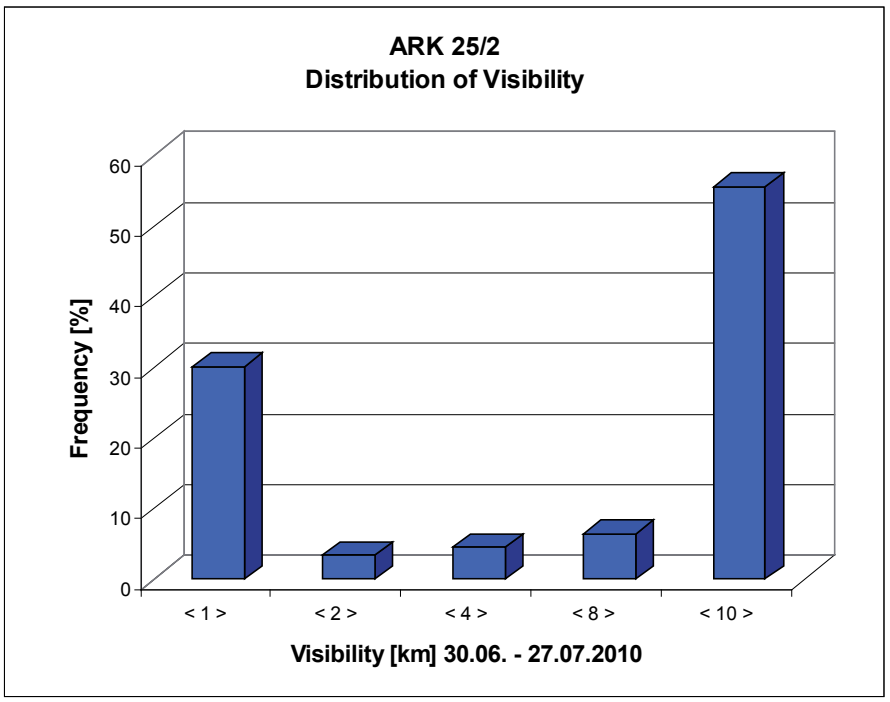


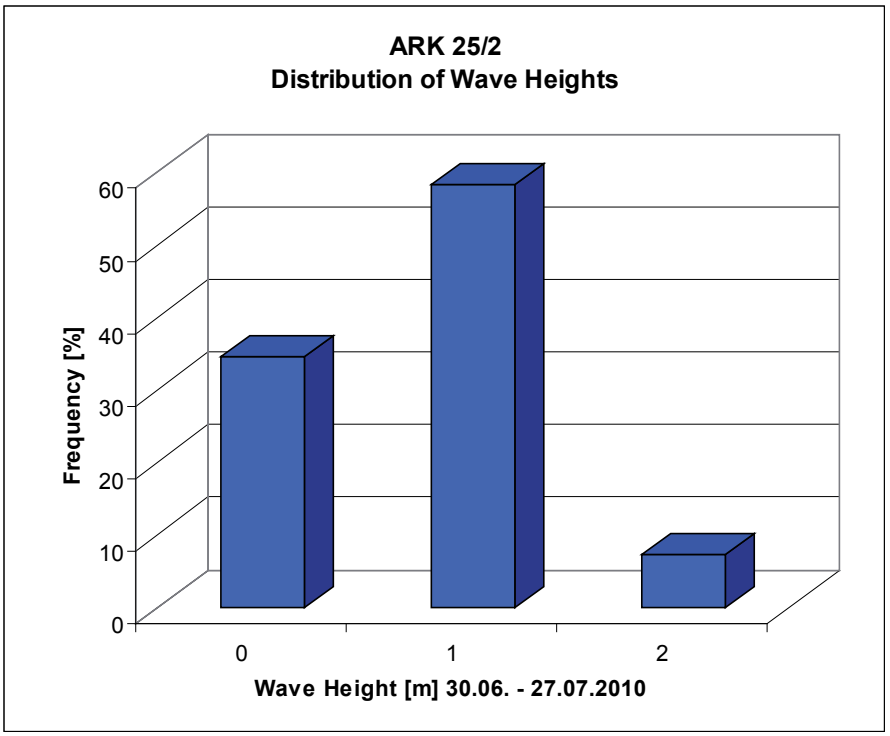
Fig. 2.1: Less cloud in the lee west of Svalbard on July 7, 2010 (red cross: position of RV Polarstern)

Various statistics of weather parameters are displayed on the following pages:


ARK 25/2
Distribution of Wind Direction
Frequency [%]
35
30
25
20
15
10
5
0
N
NE
E
SE
S
SW
W
NW
Wind Direction 30.06. - 27.07.2010


ARK 25/2
Distribution of Wind Force
Frequency [%]
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
Wind Force [Bft.] 30.06. - 27.07.2010


ARK 25/2
Distribution of Visibility
Frequency [%]
60
50
40
30
20
10
0
< 1 >
< 2 >
< 4 >
< 8 >
< 10 >
Visibility [km] 30.06. - 27.07.2010


ARK 25/2
Distribution of Wave Heights
Frequency [%]
60
50
40
30
20
10
0
0
1
2
Wave Height [m] 30.06. - 27.07.2010

3. MULTIDISCIPLINARY INVESTIGATIONS AT THE DEEP-SEA LONG-TERM OBSERVATORY HAUSGARTEN

Deep-sea research group
Coordination Ingo Schewe
Alfred-Wegener-Institut

Introduction

Since more than ten years the Deep-Sea Research Group of the Alfred Wegener Institute has monitored this first and - to date - only deep-sea observatory at high latitudes. In an area of almost 8,000 square kilometres with water depths ranging between 1,000 and 5,500 m (Fig. 3.1), we study impacts of Climate Change on an Arctic marine ecosystem in a multidisciplinary approach. The so-called HAUSGARTEN observatory is located west of Spitsbergen in a region which is conspicuously affected by the adjacent marginal ice zone.

Concurrent with the efforts made by AWI at a northern polar deep-sea site, the Arctic Marine Ecosystem Research Network ARCTOS extensively studied the shallow Arctic pelagic and benthic ecosystems inside and off the Kongsfjord. The long-term co-operation of ARCTOS partners already provided good baseline data from the inner part of the fjord. In 1996, a transect of ten stations was established from Kongsfjord to outside the shelf break, covering five discrete depth strata. Stations along this transect have been sampled several times a year, and data have been continuously processed until summer 2006.

To assess how changes at one level impinge on other compartments of the ecosystem, we began to optimise the scientific outcome of the two sampling programmes by combining the Kongsfjord and HAUSGARTEN bathymetric transects. By chance, the shallowest AWI sampling station lies only some 25 nautical miles northwest of the deepest station of the Kongsfjord transect. The collaboration between AWI and ARCTOS yields a more complete data set spanning from shallow to deep water stations and rises in the KONGHAU project. KONGHAU was co-sponsored by the Norwegian oil company StatoilHydro, and was realised as a sub-task of the EU project HERMES (Hotspot ecosystem research on the margins of European seas).

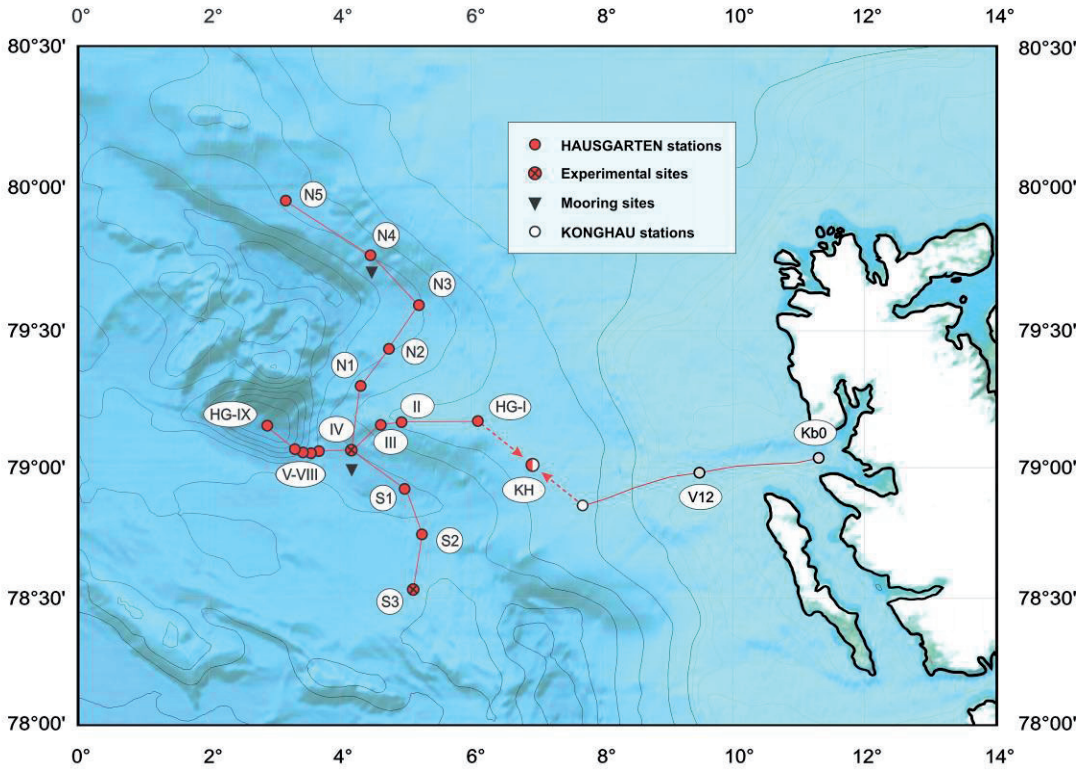


Fig. 3.1: HAUSGARTEN stations and sampling sites for the KONGHAU project

3.1 Sedimentary processes and interactions

Eduard Bauerfeind, Catherine Lalande, Normen Lochthofen, Angelina Kraft, Burkhard Sablotny
Alfred-Wegener-Institut

Particle flux studies

Objectives

Organisms living in the deep sea mainly live on the organic matter that trickles out of the productive layer and finally reaches the deep seafloor. This transfer of organic carbon is governed by a variety of processes within the upper water column, as well as by the composition of the primary producers. In the Arctic, the composition of the phytoplankton, the main primary producers, might change in the near future due to the proposed effects of global warming. At HAUSGARTEN, studies to gain insights into the amount and composition of the settling material have been performed by means of annually moored sediment traps since the year 2000.

Work at Sea

During the expedition ARK-XXV/2, one mooring was successfully recovered. This mooring, equipped with sediment traps and current meters, was deployed at the

central HAUSGARTEN position (HG-IV, Fig. 3.1) during the RV *Polarstern* cruise ARK-XXV/2 in summer 2009. Seasonally resolved trap samples were obtained from ~80 m below sea surface, and 150 m above the seafloor. Due to a technical malfunction, a third trap located at ~1200 m water depth did not obtain any samples. At the same HAUSGARTEN site, we successfully recovered a benthic lander, which was equipped with an additional, smaller sediment trap collecting material at 2.5 m above the seafloor. Two new moorings were brought out at the central HAUSGARTEN site (79°00.41'N, 04°19.83'E) and in the northern HAUSGARTEN region at 79°44.35'N, 04°30.22'E (Fig. 3.1).

Preliminary results

A first impression of the sedimentation regime during 2009/10 can be obtained from the visual inspection of material collected in the sampling bottles. Fig. 3.1.1 shows the sampling jars of the sediment trap located at ~80 m water depth as well as from the trap close to the seafloor. A seasonal pattern in sedimentation can be deduced, with larger amounts of material collected at the end of July and in August 2009. The amount of material collected stayed at an elevated level until the end of September, decreased afterwards and stayed at low level until April/May 2010.

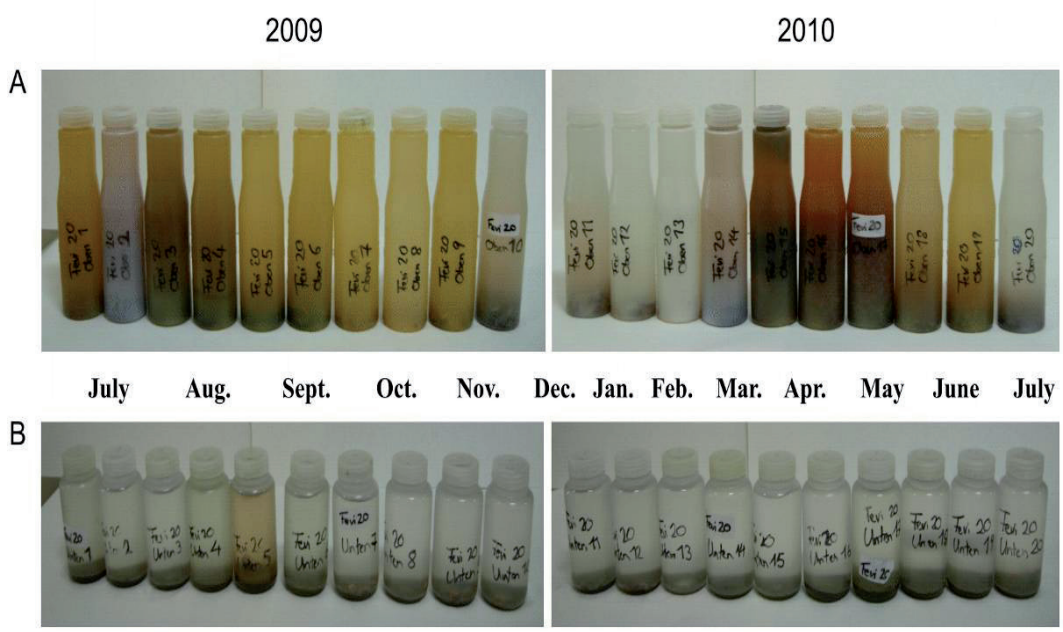


Fig. 3.1.1: Sampling jars of the sediment traps moored at the central HAUSGARTEN during 2009/10; A. upper sediment trap (~80 m below surface). B. deep sediment trap (~150 m above the seafloor).

Starting from this, an increasing flux can be noted till the end of the mooring period in July 2010. In the trap located ~150 m above the seafloor generally less material was collected and the seasonal pattern seems to be shifted for ~1 month (Fig. 3.1.1). More detailed information on sedimentation, the quantity and composition of the settled material will be obtained after biochemical and microscopic analyses of the samples at the home laboratory.

Water sampling and analyses

Objectives

For a better understanding and interpretation of the data obtained by the year round moored sediment traps (see above), information on suspended matter (plankton, detritus), its composition and quantity in the water column above the traps are needed. As these parameters have been measured since the start of the sediment trap studies at HAUSGARTEN in the year 2000, these data can further be used to trace changes in the plankton composition.

Work at Sea

The work in the water column was done in close cooperation with the PEBCAO group (for details see Chapter 5). Samples were taken from the CTD/rosette sampler at each HAUSGARTEN station in six layers between 5 and 100 m water depth; at least one additional sample was taken in the water layer exhibiting the fluorescence maximum. In addition to the parameters that were sampled regularly, further samples were taken for the analyses of the stable isotope ^{15}N and dissolved inorganic nutrients near the sediment trap moorings at HAUSGARTEN stations HG-IV and N-4 as well as at the KONGHAU stations KH, V12, and Kb0 (Fig. 3.1.1). At the letter stations, sampling was performed down to the seafloor. At selected stations, a Bongo net (mesh size: 500 μm) was used to collect the macro-zooplankton from 300 m water depth to the surface. All samples are preserved or stored frozen for further analyses at the home lab.

3.2 Impact of climate change on Arctic benthic ecosystems

Ingo Schewe[1], Christiane Hasemann[1], Barbara Baldyga[2], Michael Czub[2], Michael Ginzburg[1], Marianne Jacob[1], Normen Lochthofen[1], Burkhard Sablotny[1]
[1]Alfred-Wegener-Institut,
[2]IOPAS

Objectives

Multidisciplinary research activities at HAUSGARTEN cover almost all compartments of the marine ecosystem from the pelagic zone to the benthic realm, with some focus on benthic processes. Regular seafloor sampling as well as the deployment of different free-falling systems (benthic lander) which act as local observation platforms, have taken place since the observatory had been established in summer 1999. Frequent visual observations with towed photo/video systems allow the assessment of large-scale epifauna distribution patterns as well as their temporal development. To determine the factors controlling deep-sea biodiversity, we carry out various biological long-term experiments.

Work at sea

Virtually undisturbed sediment samples were taken using a video-guided multiple corer (MUC) at 17 HAUSGARTEN stations along a bathymetric gradient between 1,000 and 5,500 m water depth and along a latitudinal transect following the 2,500

m isobaths (Fig. 3.1). Three additional stations at 230, 280 and 1,200 m depth were sampled for the KONGHAU project. The top sediment centimetres of the push-corers were sub-sampled to analyse a large number of parameters such as bacterial activity, chloroplastic pigments, organic carbon content, phospholipids, isotopic signatures ($\delta^{15}N$, $\delta^{13}C$), particulate proteins, granulometry as well as the small sediment-inhabiting biota. Most of the subsamples were stored for later analyses.

Frozen sediment samples will be used to extract DNA and to conduct ARISA (Automated Intergenic Spacer Analyses), to investigate the bacterial community structure. This data will complete an existing database of bacterial data covering the last eight years. With this data, spatial and temporal changes of the bacterial community structure at the HAUSGARTEN stations will be investigated and correlated with biochemical parameters, like exo-enzymatic activity and phytodetritial matter in the sediments. Additionally, sediment samples were fixed to perform Fluorescence In-Situ Hybridisation (FISH) to quantify bacterial phyla.

Giant Box Corer samples were collected at fifteen stations ranging between 280 and 5,560 m water depth. At each station, samples were divided into two subsamples for macrofauna (except for PS76/178, where only one subsample was taken), three for meiofauna, one for grain size analyses, and one for CHN ratios (Fig. 3.2.1). Subsamples for CHN ratios and granulometry were frozen at -20°C. All other samples were preserved in a 4 % buffered formalin-seawater solution. This material will be used to compare macrofauna densities with those from a similar assessment in the year 2000. The material will also be used to assess benthic biomass size spectra for the HAUSGARTEN area. Taxonomic and laboratory analyses will be performed at the Department of Marine Ecology of IOPAS, Poland.

A benthic lander based biological long-term experiment that has been deployed during last year's RV *Polarstern* cruise, was terminated and sampled. A free-falling device carrying colonisation-cores with artificial sediments was recovered, to study the attraction of azoic but organically enriched sediments to meiofaunal organisms, thereby focussing on nematode communities.

Another benthic lander equipped with baited fish traps was deployed for two days at 2500 m water depth and caught about 20 specimens of the eelpout *Lycodes frigidus* and uncounted scavenging amphipods (*Eurythenes gryllus*). The isotopic signature (δ15N, δ13C) of fish and amphipod tissues will be analysed and compared with previous results.

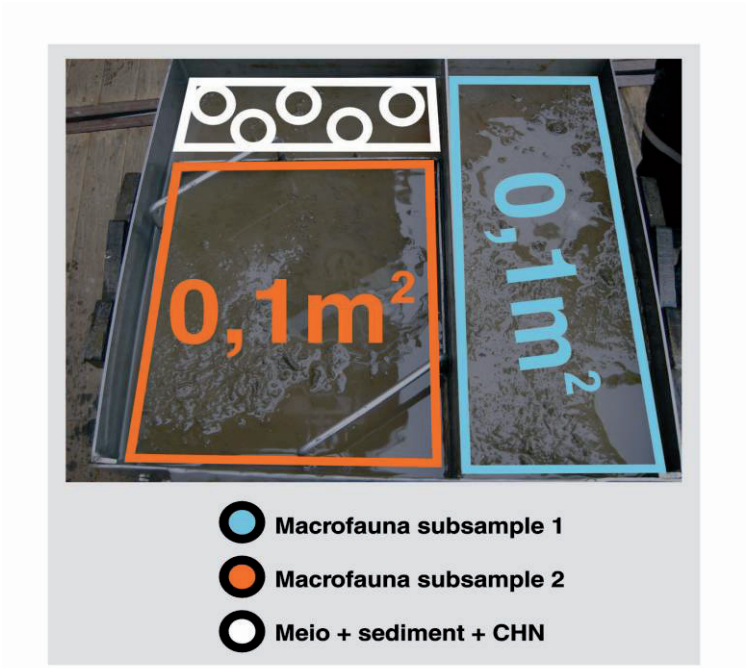


Fig. 3.2.1: Schematic subsampling of the boxcorer surface

A towed photo/video system (Ocean Floor Observation System, OFOS) was deployed at several stations to assess the large-scale distribution of megafaunal organisms. However, because of technical difficulties, we were unable to obtain satisfying results.

Preliminary results

Bacterial activity and chloroplastic pigments were analysed onboard. Both sediment-related parameters showed a clear gradient of decreasing values with increasing water depth (Figs 3.2.2 a,b), with expected exceptional high concentrations at the shallowest shelf station Kb0.

Further analyses at the home lab will show, whether these results could be confirmed by other biochemical parameters. Our studies will help to assess to which extend Climate Change induced processes might be responsible for changes within the Arctic deep-sea ecosystem.

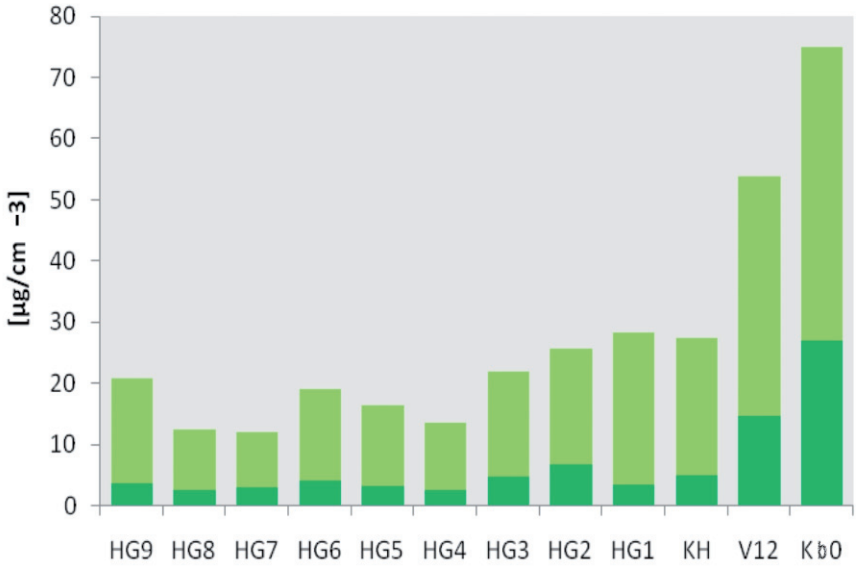


Fig. 3.2.2 a: Chloroplastic pigments within the uppermost sediment layer (light green: pheopigments; dark green: chlorophyll a)

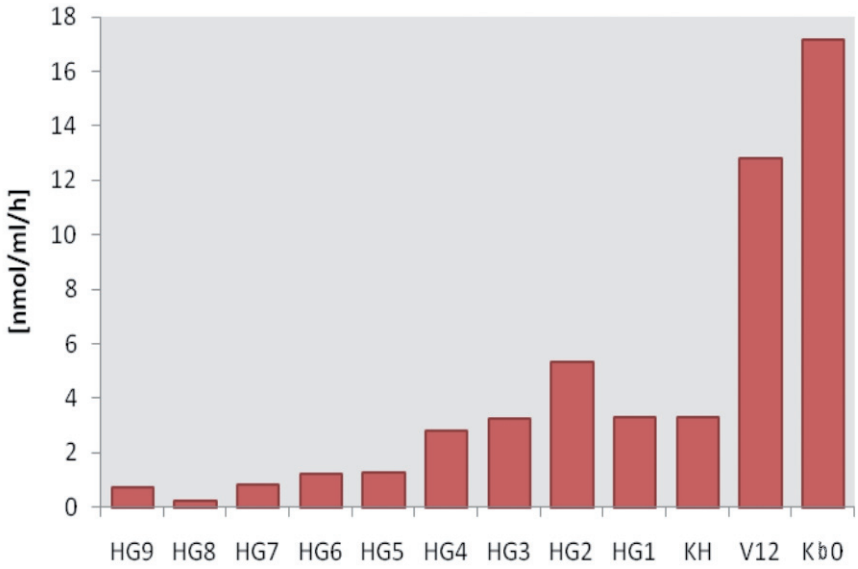


Fig. 3.2.2 b: Hydrolytic activity of bacteria within the uppermost sediment layer

3.3 Oxygen dynamic and carbon mineralisation rates

Janine Felden[1], Normen Lochthofen[2], Frank Wenzhöfer[2]
[1]MPI-MM,
[2]Alfred-Wegener-Institut

Objectives

Deep sea benthic communities strictly depend on carbon supply through the water column, which is determined by temporal and spatial variations in the vertical export flux from the euphotic zone, but also lateral supply from shelf areas. Most organic carbon is recycled in the pelagic, but a significant fraction of the organic material ultimately reaches the seafloor, where it is either re-mineralized or retained in the sediment record. The benthic oxygen distribution provides detailed information on the turn-over of settled organic material, fauna activity and the biogeochemical reactions of the sediment. Only a minor part of the oxygen is used for animal respiration, while microbial heterotrophic and autotrophic activity is responsible for the major part of the benthic oxygen requirement. Benthic oxygen fluxes provide the best and integrated measurement of the metabolic activity of surface sediments. They quantify benthic carbon mineralization rates and thus, can be used to evaluate the efficiency of the biological pump (export of organic carbon from the photic zone). It is therefore crucial to obtain high-quality *in-situ* measurements of the benthic oxygen distribution in order to access both quantitatively and qualitatively the benthic mineralization activity, a key element in local, regional and global carbon cycling.

Work at sea

Two free-falling systems (benthic lander) were used to study the benthic oxygen consumption at different spatial scales. The benthic landers were equipped with different instruments to investigate the oxygen penetration and distribution as well as the oxygen uptake of the arctic sediments:

(1) Micro-profiler: The micro-profiler was equipped with 5 O_2, 3 pH, a temperature, and a resistivity sensor covering an area of 180 cm^2. Micro-profiles across the sediment-water interface were performed with a vertical resolution of 150 μm on a total length of 19 cm. During the deployment the micro-sensor array performed up to nine vertical profiles on an area of 625 cm^2.

(2) Benthic chamber: Incubations were conducted to measure the total oxygen consumption and nutrient exchange of the sediment. This measurement integrates all relevant solute transport processes (diffusion, advection and fauna-mediated transport) over an area of 400 cm^2.

Additionally, multicorer samples were used to conduct onboard measurements of oxygen gradients and fluxes. Phytoplankton extracts were added to simulate food pulses. Subsequent oxygen measurements revealed stimulated benthic consumption rates due to the organic matter addition.

Preliminary Results

A total of eight benthic lander deployments with approximately 220 *in-situ* micro-profiles and eight benthic chamber incubations were obtained at about 2,500 m water depth along the latitudinal HAUSGARTEN transect (stations S-3, HG-4, N-3) and at 5,500 m water depth in the Molloy Hole (HG-IX). Additionally *ex-situ* oxygen profiles and total incubations were performed at 15 stations (Tab. 3.3.1). Very few data have been evaluated so far. Preliminary results reveal generally low oxygen consumptions rates and deep oxygen penetrations at the investigated sites (Fig. 3.3.1). The present data provide the most detailed insight in the benthic micro-scale oxygen distribution of any investigated Arctic deep-sea sediment.

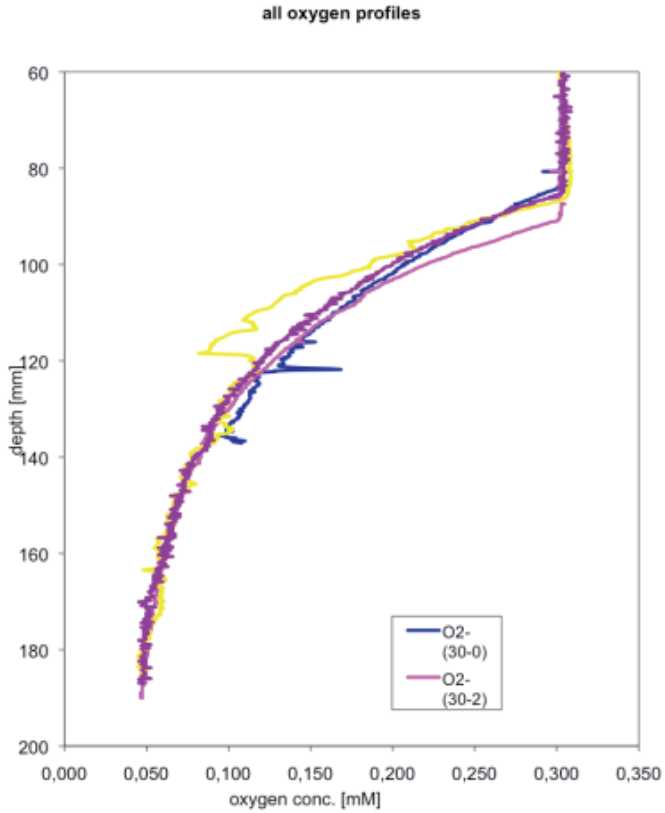


Fig. 3.3.1: Example of in-situ oxygen micro-profiles from HAUSGARTEN station HG-IV

Tab. 3.3.1: Station list for *in-situ* (3D-profiler and benthic chamber lander) and *ex-situ* (micro-profiles and total incubation) benthic flux studies

Ship Station	Gear	Date (UTC)	Station (location)	N	E	Depth (m)	in-situ	ex-situ
PS 76/124-1	3D-Profiler	07.04.10	S-3	78° 36.75’	5° 03.78’	2334	X	
PS 76/124-2	Benthic Chamber	07.04.10	S-3	78° 36.60’	5° 03.19’	2334	X	
PS 76/124-4	MUC	07.04.10	S-3	78° 36.38’	5° 03.92’	2282		X
PS 76/129-4	MUC	05.07.10	S-1	78° 54.99’	5° 00.11’	2635		X
PS 76/131-1	MUC	06.07.10	HG-II	79° 07.84’	4° 54.17	1547		X
PS 76/132-2	MUC	06.07.10	HG-I	79° 08.10’	6° 06.36’	1281		X
PS 76/141-1	MUC	07.07.10	HG-III	79° 06.54’	4° 36.33’	1896		
PS 76/142-1	3D-Profiler	07.07.10	HG-IV	79° 03.79’	4° 10.59’	2475	X	
PS 76/142-2	Benthic Chamber	07.07.10	HG-IV	79° 03.89’	4° 10.69’	2463	X	
PS 76/142-3	MUC	07.08.10	HG-IV	79° 03.87’	4° 10.36’	2471		X
PS 76/170-4	3D-Profiler	07.12.10	HG-IX	79° 08.58	2° 45.68’	5596	X	
PS 76/170-5	Benthic Chamber	07.12.10	HG-IX	79° 08.58	2° 45.61’	5595	X	
PS 76/172-1	MUC	12.07.07	HG-IX	79° 08.55’	2° 45.61’	5596		X
PS 76/174-3	MUC	12.07.10	HG-V	79° 03.18’	3° 44.68’	2860		X
PS 76/175-3	MUC	13.07.10	HG-VI	79° 02.79’	3° 36.05’	3442		X
PS 76/176-3	MUC	13.07.10	HG-VII	79° 03.51’	3° 28.81’	4085		X
PS 76/179-1	3D-Profiler	07.14.10	N-4	79° 43.90’	4° 29.06’	2731	X	
PS 76/179-2	Benthic Chamber	07.14.10	N-4	79° 44.08’	4° 28.83’	2703	X	
PS 76/180-4	MUC	14.07.10	N-4	79° 44.10’	4° 29.25’	2691		X
PS 76/181-2	MUC	15.07.10	N-3	79° 35.69’	5° 13.24’	2768		X
PS 76/182-2	MUC	15.07.10	N-5	79° 56.35’	3° 06.02	2525		X
PS 76/184-3	MUC	16.07.10	N-2	79° 25.61’	4° 44.85’	2601		X
PS 76/187-1	MUC	16.07.10	N-1	79° 16.81’	4° 19.77’	2393		X

3.4 Water column studies using an Autonomous Underwater Vehicle (AUV)

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Objectives

In the past two years the AUV program of the Alfred Wegener Institute was re-focused on research operations in the free-water zone. With regard to this re-orientation, the AUV was equipped with special sensors and scientific devices. The payload and the vehicles' control unit were particularly affected by this. By now, the scientific payload consists of a CTD probe, sensors for PAR and fluorescence, and a water sampler, which is able to collect up to 22 discrete samples.

Additionally, the vehicle control system was improved by implementing a software upgrade that enables the operator to feed positioning data from external sources into the vehicles' main computer. After the AUV has been located by an external source (e.g. Posidonia on RV *Polarstern*), the detected position can be transmitted to the vehicle via acoustic modem and, with the aid of the software upgrade, fed into the control computer. Especially during dives in free-water zones, when the vehicle exclusively depends on its Inertia Navigation System (INS), deviations from the dive path can further on be avoided.

Concerning the AUV, this year's expedition had two major goals:

- To establish communication with the vehicle and test the software upgrade in a mission.
- To accomplish missions with scientific focus, including at least one under-ice mission, collecting sensor data and water samples.

Work at sea

The first AUV dives during ARK-XXV/2 had a rather technical focus, including tests of the acoustic underwater communication and the software upgrade. For some of the tests the AUV was lowered on a cable down to 50-100 m water depth. Since the AUV is unable to dive statically, lowering it by winch was the only way to keep a stable position below the ship. During these deployments, the acoustic communication was tested in different depths. For other tests, the AUV was sent on real dive missions and, for example, circled close to the ship at certain depths.

In addition to study the technical aspects, these dives were used to practice details for the following scientific dives. Special intention was paid on the precise calibration of the payload control and the training of the launch and recovery routine.

In a later phase of the expedition, the focus of the dives shifted towards scientific topics. Among the scientific missions the last deployment (Dive #12, 21.07.2010; Tab. 3.4.1) has an outstanding position, because the AUV accomplished its very first under-ice mission. The dive led the AUV to a turning point that was roughly 2 km beyond

the ice edge. While diving, data were collected continuously and water samples were taken in discrete time intervals.

Tab. 3.4.1: List of AUV deployments achieved during ARK-XXV/2 (total distance travelled: 57.6 km; overall dive time: 08:23:22)

No.	Date	Time	Station	Latitude	Longitude	Comment
1	02.07.2010	11:08:00 12:20:59	PS76/0101-2	78° 50,12' N 78° 49,83' N	04° 56,37' E 04° 56,19' E	Winch
2	03.07.2010	12:01:00 13:16:59	PS76/0112-1	78° 50,42' N 78° 50,86' N	08° 21,44' E 08° 21,48' E	Winch
3	05.07.2010	06:10:00 07:40:00	PS76/0126-1	78° 36,88' N 78° 36,80' N	05° 05,29' E 05° 05,44' E	
4	05.07.2010	07:57:00 09:04:59	PS76/0126-1	78° 36,86' N 78° 36,99' N	05° 05,01' E 05° 04,32' E	
5	06.07.2010	12:16:00 14:27:00	PS76/0133-1	78° 45,01' N 78° 45,39' N	06° 29,84' E 06° 27,33' E	Mission aborted and re-started
6	08.07.2010	04:50:00 05:34:59	PS76/0144-1	79° 00,03' N 79° 00,02' N	04° 21,20' E 04° 20,61' E	Winch
7	08.07.2010	09:01:00 12:18:59	PS76/0145-2	79° 00,45' N 79° 00,33' N	04° 19,86' E 04° 18,94' E	Water samples
8	14.07.2010	11:19:00 11:51:59	PS76/0179-5	79° 43,99' N 79° 44,02' N	04° 27,85' E 04° 27,31' E	
9	14.07.2010	15:47:00 17:00:00	PS76/0179-7	79° 44,44' N 79° 44,57' N	04° 23,37' E 04° 23,90' E	
10	20.07.2010	17:36:00 19:07:00	PS76/0213-1	78° 50,43' N 78° 50,32' N	02° 00,88' W 02° 01,09' W	
11	20.07.2010	20:00:00 21:34:59	PS76/0214-1	78° 51,46' N 78° 51,19' N	02° 15,36' W 02° 16,89' W	Mission aborted and re-started
12	21.07.2010	20:08:00 22:59:00	PS76/0220-2	78° 49,74' N 78° 49,70' N	03° 49,89' W 03° 48,51' W	Under-ice mission Water samples

The dive path of the AUV is given in Fig. 3.4.1. For better visibility, the depth is exaggerated. The broken white line represents the position of the ice edge at the beginning of the dive. The yellow spots along the dive path show positions where water samples were taken. After descending, the AUV moved along an 800 m transit route towards the ice edge. The depth of the transit was 20 m. Approximately 200 m in front of the ice edge, the AUV descends to its actual mission depth of 27 m, where it stayed for the rest of the dive.

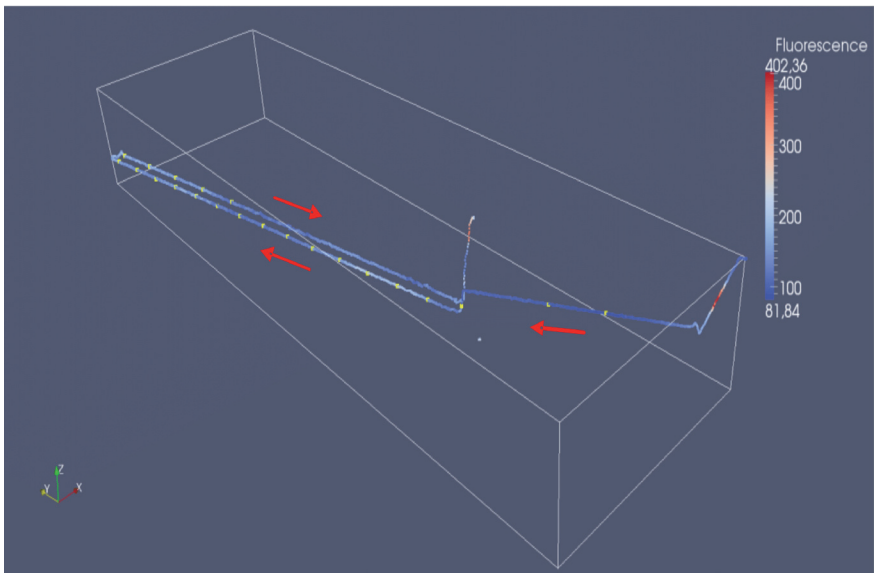

Fig. 3.4.1: Dive path of the AUV during under ice mission

Subsamples of the water samples retrieved during dives #7 and #12 were taken for the analysis of pigments, particulate organic carbon, dissolved organic carbon, dissolved inorganic nutrients as well as the quantification of bacteria, and the nano- and micro-plankton. This work was done in close co-operation with the PEBCAO group. The samples are preserved or stored deep frozen on board RV *Polarstern* and will be analysed after their arrival in Bremerhaven.

Preliminary results

During the tests of the acoustic underwater communication, the noise emission below RV *Polarstern* proved to be highly problematic. Attempts to establish stable communication with the vehicle failed repeatedly. Since communication has never been established, the proper functioning of the software upgrade could not be confirmed. These tests have to be redone during a later cruise.

In the original mission planning of the under-ice mission, it was intended to dive in a water layer where high chlorophyll concentrations could be expected. The fluorescence maximum, which is a strong hint at high chlorophyll concentrations, was expected in a depth of approximately 27 m water depth and consequently the mission depth was defined as 27 m. However, preliminary analysis of the data retrieved by the fluorescence sensor revealed that the fluorescence maximum in open water was at about 14 m depth. The AUV crossed that layer during its descent and clearly detected the maximum. As the on-board water sampler was programmed to a depth of 27 m, all samples were taken below the layer exhibiting the highest chlorophyll fluorescence.

At the end of the dive, a mishap occurred that might turn out to be a piece of luck. The AUV ascended close to the ice edge and broke through the surface between two ice floes (usually the ascent would have been executed in a much greater distance to the ice). In doing so, the AUV crossed the fluorescence maximum and detected its depth in a region that was largely covered with ice. As the recorded data show, the fluorescence maximum moved from 14 m depth in open water to only 5 m depth under the ice.

4. FLOW THROUGH FRAM STRAIT AND IN THE ENTRANCE TO THE ARCIC OCEAN

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Objectives

Exchanges between the North Atlantic and the Arctic Ocean result in the most dramatic water mass conversions in the World Ocean: warm and saline Atlantic waters, flowing through the Nordic Seas into the Arctic Ocean, are modified by cooling, freezing and melting to become shallow fresh waters, ice and saline deep waters. The outflow from the Nordic Seas to the south provides the initial driving of the global thermohaline circulation cell. Knowledge of these fluxes and understanding of the modification processes is a major prerequisite for the quantification of the rate of overturning within the large circulation cells of the Arctic and the Atlantic Oceans, and is also a basic requirement for understanding the role of these ocean areas in climate variability on inter-annual to decadal time scales.

The Fram Strait represents the only deep connection between the Arctic Ocean and the Nordic Seas. Just as the freshwater transport from the Arctic Ocean is of major influence on convection in the Nordic Seas and further south, the transport of warm and saline Atlantic water affects the water mass characteristics in the Arctic Ocean which has consequences for the internal circulation and possibly influences also ice and atmosphere.

The complicated topographic structure of the Fram Strait leads to a splitting of the West Spitsbergen Current carrying Atlantic Water northward into at least three branches. One current branch follows the shelf edge and enters the Arctic Ocean north of Svalbard. This part has to cross the Yermak Plateau which poses a sill for the flow with a depth of approximately 700 m. A second branch flows northward along the north-western slope of the Yermak Plateau and the third one re-circulates immediately in Fram Strait at about 79°N. Evidently, the size and strength of the different branches largely determine the input of oceanic heat to the inner Arctic Ocean. The East Greenland Current, carrying water from the Arctic Ocean southwards has a concentrated core above the continental slope.

It is our aim to measure the oceanic fluxes through Fram Strait and to determine their variability on seasonal to decadal time scales. Since 1997, year-round velocity, temperature and salinity measurements are carried out in Fram Strait with moored instruments. Hydrographic sections exist since 1980. The estimates of mass and heat fluxes through the strait are provided through a combination of both data sets.

From 1997 to 2000 intensive fieldwork occurred in the framework of the EU project VEINS (Variability of Exchanges in Northern Seas). After the end of VEINS it was maintained under national programmes. From 2003 to 2005, the work was carried out as part of the international Programme ASOF (Arctic-Subarctic Ocean Flux Study) and was partly funded in the European ASOF-N project. In 2006-2009 measurements in Fram Strait were performed under the European DAMOCLES (Developing Arctic Modelling and Observing Capabilities for Long-term Environment Studies) Integrated Project and since 2009 the observational program has been continued in a frame of the European ACOBAR project. The mooring line is maintained in close co-operation with the Norwegian Polar Institute. The results of the measurements will be used in combination with regional models, to investigate the nature and origin of the transport fluctuations on seasonal to decadal time scales.

Work at Sea

The oceanographic work at sea during ARK-XXV/2 included two main activities: the recovery and redeployment of the array of moorings and measurements of CTD (Conductivity, Temperature, Depth) profiles. The standard section in Fram Strait at 78°50'N, which has been occupied regularly since 1997, was measured with the high resolution coverage by 79 CTD stations, extending westward to 12°30'W. In addition, 28 CTD stations were performed in the HAUSGARTEN area (Fig. 4.1).

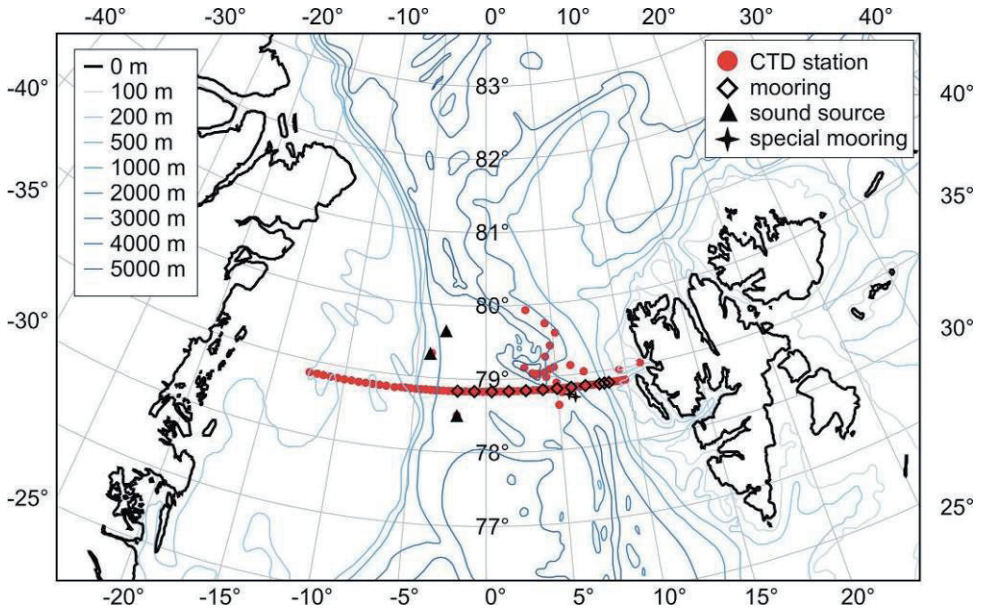


Fig. 4.1: Map with the position of CTD station, moorings and PIES during ARK-XXV/2

The mooring array passes through the deep part of the Fram Strait from the eastern to the western shelf edge and was in 2003 was extended on the East Greenland shelf. In July 2010, RV *Polarstern* recovered 12 moorings east of 3°W, six of which had stayed in water since summer 2008 for two years and the remaining eight were exchanged in summer 2009. Each tall subsurface mooring carried 3 to 7 instruments including rotor and acoustic current meters from Aanderaa Instruments (RCM7, RCM8 and RCM11), acoustic current profilers from RD Instruments (WH and QM ADCP), temperature and salinity sensors from Sea-Bird Electronics Inc. (SBE37 and SBE16), and bottom

pressure recorders from Sea-Bird (SBE26). The accoustic recorder (AURAL M2) was also included in the mooring located in the eastern part of Fram Strait. The recovery of western moorings (west of 3°W) operated by NPI is planned for September 2010 from board of RV *Lance*. The important task during ARK-XXV/2 was to recover six moorings, deployed in 2008, which due to limited ship time could not be recovered in 2009. Recovery of these rigs was successful and all instruments were regained in a good shape and with the recorded data.

In addition to the long-term array, two new moorings were deployed during ARK-XXV/2. The mooring F20-2, located in the eastern part of Fram Strait, has been equipped in the underwater profiling winch and the CTD profiler capable of the satellite data transfer. The mooring F21-1 (FFGR-1), deployed in the vicinity of F20 was a prototype equipped with the NEMO float, tethered with the rope of neutral buoyancy to steel floatation at the depth of ~300 m. Both profiling moorings were deployed for the test period of 2 months and will be recovered in September 2010 from KV *Svalbard*.

Four Pressure Inverted Echo Sounders (PIES Model 6.1E and 6.2E), manufactured by the University of Rhode Island, were recovered during ARK-XXV/2. They were located next to moorings in the eastern and central Fram Strait and have been measuring since summer 2008. By combining historical hydrography with the acoustic travel time measured by PIES, time-series of the temperature and specific volume anomaly profiles can be obtained and subsequently estimates of the baroclinic flow and heat transport. PIES are also equipped with the pressure gauge, which provides the sea surface slope and resulting barotropic current. Three of recovered PIES (C-PIES) were additionally instrumented with Doppler Current Sensors from Aanderaa, located 50 m above the PIES frame. All recovered instruments provided full data sets. PIES bottom moorings were equipped with the POSIDONIA transponders ET861G for 3D positioning. During ARK-XXV/2, one PIES had to be recovered in the ice covered area and only due to POSIDONIA transponders and radio beacons these recovery was feasible.

The mooring recovery rate was 92 % (12 out of 13 moorings). 79 out of 82 prior deployed instruments including PIES delivered the data what makes obtained data rate of 96 %. Two Seabird TS sensors SBE16 were not initialised during deployment and did not record any data. One RCM8 was flooded and data were lost. Most of instruments which remained deployed for two years, provided the full time data, which an exception of two TS sensors which stopped two months earlier. The recovered and deployed instruments and the obtained data are summarized in Tables 4.1 and 4.2. The distribution of the instruments at the moorings is displayed in Figures 4.2 a,b.

During ARK-XXV/2 the third operational mission of the Seaglider in Fram Strait was launched. The underwater glider is a buoyancy-driven device, which can alternately reduce and expand displaced volume to dive and climb through the ocean, just as do profiling floats. Unlike floats, a glider additionally carries wings and controls its pitch attitude to effectuate a horizontal speed component through the ocean. The Seaglider SN127 deployed in Fram Strait for two months mission in the West Spitsbergen Current, was developed by APL group at the University of Washington (UW) in Seattle and manufactured by the Seaglider Fabrication Center in Seattle, cooperating with UW. The seaglider project is run in close cooperation with Craig Lee (UV). The vehicle is capable to profile between surface and 1000 m with the horizontal speed 0.1-0.45 m s^{-1}

and minimum vertical speed of 0.06 m s^{-1}. The Seaglider SN127 is equipped with SBE Temperature/Conductivity Sensors, SBE43 dissolved oxygen sensor, Wetlabs BB2SF chlorophyll *a*, fluorescence and optical backscatter sensors. In addition, the RAFOS hardware was installed to test possibility of the underwater acoustic navigation of the glider in the sea-ice covered areas. During its mission, the Seaglider is operated from the Glider operation Center in Bremerhaven. The Seaglider was launched on July 19, after series of tests performed onboard and will profile in the eastern Fram Strait until late September. The Seaglider track until September 5, and the vertically averaged currents during all dives are shown in Fig. 10.

The CTD measurements at the Fram Strait section occurred mostly during the nights, between mooring work and in between activities at HAUSGARTEN, and were also split into two periods (the westernmost part of the section completed after finishing activities in HAUSGARTEN one week later). Therefore the sequence of stations is rather irregular. Altogether 107 CTD profiles were taken at 107 stations and water samples were collected during all casts (Fig. 4.1, Tab. 4.3). One CTD system from Sea-Bird Electronics Inc SBE911+ was used. Mainly CTD probe SN 937 with duplicate T and C sensors (temperature sensors SBE3, SN 5207 (primary) and 5104 (secondary), conductivity sensors SBE4, SN 3290 (primary) and 2470 (secondary) and pressure sensor Digiquartz 410K-105 SN 51197) was in service. The CTD was connected to a SBE32 Carousel Water Sampler SN 55 (24 bottles à 12 litre). In addition, a Benthos Altimeter Model PSA-916 SN 1229 and a Fluorometer Wetlabs FLRTD SN 1365 were mounted on the carousels. Two dissolved oxygen sensors were in use: Rinko-III ARO-CAV (SN 109) and SBE43 (SN 467). The algorithm to compute oxygen concentration requires also measurements of temperature, salinity and pressure. When the oxygen sensor is interfaced with a Sea-Bird CTD, all of these parameters are measured by the system. The oxygen in 511 water samples from 66 stations was also measured onboard with DOA-Analyser Fa.SIS-Kiel (Winkler titration) for a calibration of the oxygen sensors. Additionally, 43 water samples from MUC were analysed for oxygen concentration. Salinity of 137 water samples was measured using the Optimare Precision Salinometer SN 003 with Standard Water IAPSO Batch P149 for calibration of the salinity sensor.

Tab. 4.1: Moorings recovered during ARK-XXV/2

Mooring	Latitude Longitude	Water depth (m)	Date and time of first useful record	Instrument type	Serial nr	Instr. depth (m)	Comments
F1-12	78°50.00'N	241	06.07.09	RCM7 VTP	10003	61	Mooring lost
	008°40.15'E	(plan)	06:00	SBE37	211	77	the end of June 2010
		248		SBE37	241	227	
		(HDS)		RCM11	513	234	
F2-13	78°50.40'N	773	05.07.09	RCM8 VTP	9204	61	P wrong (constant, negative), Tarc instead Tlow => T>5.6°C cut off
			06:00				Data only to 18.06.2010
	08°20.02'E	(plan)		SBE16	2413	80	Instrument has not been started
		796		RCM8 VTP	9785	251	
		(HDS)		SBE37	214	252	
				SBE16 TR	2418	771	Instrument has not been started
				RCM8 VTP	8037	773	
PIES-F2-11	78°50.49' N 08°19.45' E	793	07.07.08 14:00	C-PIES	141	793	
F3-12	78°50.01'N	1005	05.07.09	RCM7 VTP	8367	62	
	08°00.04'E	(plan)	08:00	SBE37P	244	80	
		1033		RCM7 VTP	8400	254	
		(HDS)		SBE37	215	255	
				RCM8 VTP	9212	755	
				RCM11 VT	315	999	
				SBE16Tr	2419	1001	Time shifted, data only until 10.11.09
F4-12	78°50.00'N	1412	04.07.09	SBE37P	245	74	
	07°00.02'E	(plan)	16:00	RCM8 VTP	9207	94	
		1462		RCM11 VT	101	249	
		(HDS)		RCM11 VTP	127	754	T wrong (all RCMs with modem interface)*
				HAM	516	755	
				RCM11 VTP	570	1423	Programmed with Tlow => low resolution T
				SBE16Tr	2421	1424	P wrong (sensor failure?)
PIES-F4-11	78°50.21'N 07°02.94'E	1428	08.07.08 16:00	C-PIES	181	1428	
F5-12	78°50.00'N	2417	05.07.09	RCM8 VTP	10541	63	Tarc instead Tlow => T>5.6°C cut off
			18:00				
	06°00.01'E	(plan)		SBE37P	246	80	
		2465		RCM8 VTP	9997	255	P wrong (sensor failure?), gap in SPD (1.5) in Sep-Oct (rotor blocked?)
		(DWS)		RCM11	458	751	T wrong (all RCMs with modem interface)*
				HAM	515	752	
				RCM11 VT	146	1507	
				RCM11 VT	212	2403	

Mooring	Latitude Longitude	Water depth (m)	Date and time of first useful record	Instrument type	Serial nr	Instr. depth (m)	Comments
F6-13	78°50.02'N	2646	06.07.09 10:00	RCM7 VTP	10926	65	Tarc instead Tlow => T>5.5°C cut off
	05°00.25'E	(plan)		SBE37P	247	70	
		2704		RCM8 VTP	9194	252	P wrong (wrong calib? variability correct)
		(DWS)		RCM11 VTP	472	748	T wrong (all RCMs with modem interface)*
				HAM	514	749	
				RCM11 VT	216	1504	
				RCM11 VT	219	2635	
PIES-F6-12	78°50.046'N	2632	11.07.08 18:00	C-PIES	182	2632	
	04°56.324'E						
F7-9	78°50.00'N	2341	15.07.08 12:00	RCM8 VT	10532	62	
	03°59.80'E	(DWS)		SBE 16P	630	80	
		2295		RCM8 VTP	11887	253	
		(corr. CTD)		RCM8 VTP	9211	759	
				RCM11 VTP	455	1503	
				RCM11 VT	134	2281	
F8-10	78°50.0'N	2483	18.07.08 09:00	RCM8 VTP	9215	60	Data only until 28.12.2008, 1h interval, P wrong
	02°48.30'E	(DWS)		SBE 37	2097	100	
		2445		RCM11 VTP	569	247	
		(corr. CTD)		RCM11 VT	133	753	No P as in plan
				RCM8 VTP	9783	1499	1h interval
				RCM11 VT	102	2435	
				SBE26	228	Boden	
PIES-F8-9	78°49.979'N	2442	18.07.80	PIES	183	2442	
	02°49.902'E		10:00				
F15-7	78°50.06'N	2503	18.07.08 17:00	RCM8 VT	9995	57	Data only until 26.09.2009, 1 h interval, no P
	01°35.97'E	(HSW)		SBE 37P	2719	100	Data only until 29.03.2010
		2497		RCM11 VTP	461	249	1h interval
		(corr. CTD)		RCM11 VT	145	755	No P as in plan
				RCM8 VT	9768	1501	Data only until 26.09.2009, 1 h interval
				RCM11 VT	297	2487	
F16-7	78°49.60'N	2542	20.07.08 12:00	RCM8 VTP	8405	59	
	00°23.41'E	(HSW)		SBE 37P	2720	100	Data only until 26.04.2010
		2530		RCM11 VT	312	251	No P as in plan
		(corr. CTD)		RCM8 VT	9770	757	No P as in plan
				RCM11 VTP	568	1503	
				RCM11 VT	313	2519	

Mooring	Latitude Longitude	Water depth (m)	Date and time of first useful record	Instrument type	Serial nr	Instr. depth (m)	Comments
F9-9	78°50.24'N	2618	21.07.08 10:00	Aural M2		58	
	00°46.93'W	(HSW)		RCM7 VTP	8402	60	
		2611		SBE 37P	2722	100	Data only to 7.04.2010
		(corr. CTD)		RCM7 VTP	8417	250	
				RCM11 VT	311	756	
				RCM8 VT	10531	1502	No P as in plan
				RCM11 VT	294	2598	Time wrong, interval correct (time stamp was rebuilt from first record and interval)
F10-10	78°49.65'N	2663	21.07.08 20:00	RCM8 VTP	11892	63	
	02°06.90'W	(HSW)		SBE 37	227	100	Time shifted by 1 month (start on Aug 20 instead Jul 20)
		2655		RCM8 VTP	9219	255	P wrong (wrong range)
		(corr. CTD)		RCM11 VTP	462	752	
				RCM11 VTP	506	1507	
				RCM11 VTP	509	2654	

Abbreviations

ADCP-UP	RDI Inc. Self-Contained Acoustic Doppler Current Profiler Upper-Looking
VTCP	Aanderaa current meter with temperature, conductivity and pressure sensor
VTP	Aanderaa current meter with temperature and pressure sensor
VT	Aanderaa current meter with temperature sensor
RCM7	Aanderaa current meter type RCM7
RCM8	Aanderaa current meter type RCM8
RCM 11	Aanderaa Doppler current meter with temperature sensor
SBE 16	Seabird Electronics SBE16 recording temperature, conductivity, and pressure
SBE 26	Seabird Electronics SBE26 bottom pressure recorder
SBE 37	Seabird Electronics SBE37 recording temperature and conductivity (optionally pressure SBE 37P)
PIES	Pressure Inverted Echo Sounder
C-PIES	Pressure Inverted Echo Sounder with DCS (Doppler Current Sensor)
Aural M2	Acoustic recorder
HAM	Acoustic modem

Tab. 4.2: Moorings deployed during ARK-XXV/2

Mooring	Latitude Longitude	Water depth (m)	Date and time of first useful record	Instrument type	Serial number	Instr. depth (m)
F1-13	78°50.00'N 008°40.09'E	232 (DWS) 239 (corr. CTD)	03.07.10 11:00 UTC	SBE 37P SBE 37 ADCP QM	3810 7724 14089	100 233 239
F2-14	78°50.01'N 08°20.01'E	789 (DWS) 778 (corr. CTD)	03.07.10 08:00 UTC	SBE 16P ADCP WH SBE 37 RCM8 VTP SBE 16 RCM8	1253 1368 7732 10002 319 7727	76 97 98 252 768 769
F3-13	78°50.00'N 07°59.99'E	1037 (HSW) 1014 (corr. CTD)	03.07.10 06:00 UTC	SBE 16 ADCP QM SBE 37P AR RCM7 VTP RCM8 VT SBE 16	1973 14088 7730 H18 8403 10004 631	74 248 248 499 756 1002 1003
F4-13	78°50.08'N 07°00.35'E	1436 (HSW) 1435 (corr. CTD)	04.07.10 09:00 UTC	SBE 16 ADCP QM SBE37P RCM11 VTCP RCM8 VTP SBE 16	1975 14087 7728 452 9213 2420	86 247 248 753 1419 1420
F5-13	78°49.97'N 06°00.03'E	2437 (HSW) 2440 (corr. CTD)	04.07.10 13:00 UTC	SBE 37P ADCP QM SBE37P RCM8 VTP RCM8 VT RCM8 VTP	1976 14016 7733 10498 9179 9786	83 254 255 750 1501 2407
F6-14	78°50.01'N 05°00.00'E	2706 (DWS) 2651 (corr. CTD)	02.07.10 17:00 UTC	SBE 37P ADCP QM SBE16 AR RCM8 VTP RCM8 VT RCM11 VT	243 14090 1977 H11 11613 9182 475	87 246 247 497 749 1500 2644
F7-10	78°50.00'N 04°00.01'E	2304 (HSW) 2297 (corr. CTD)	11.07.10 06:00 UTC	SBE 16P ADCP QM SBE 37 RCM8 VTP RCM7 VTP RCM8 VT	1167 14086 244 9998 10491 10497	78 243 244 750 1496 2272

Mooring	Latitude Longitude	Water depth (m)	Date and time of first useful record	Instrument type	Serial number	Instr. depth (m)
F8-11	78°49.99'N 02°47.92'E	2459 (HSW) 2457 (corr. CTD)	11.07.10 11:00 UTC	RCM8 VT SBE 37P ADCP WH RCM8 VT RCM11 VTP RCM8 VT	8084 7725 951 9184 491 9185	72 92 246 753 1499 2425
F15-8	78°49.96'N 01°35.90'E	2502 (HSW) 2507 (corr. CTD)	18.07.10 08:00 UTC	RCM8 VT SBE 37P RCM8 VTP RCM11 VT RCM11 VT RCM11 VT	6854 7727 11890 135 25 26	65 80 245 750 1497 2463
F16-8	78°49.99'N 00°24.05'E	2533 (HSW) 2544 (corr. CTD)	17.07.10 14:00 UTC	RCM11 VTP SBE 37P RCM7 VTP RCM11 VT RCM11 VT RCM11 VT	469 7729 10929 100 214 215	68 81 246 752 1498 2515
F9-10	78°50.00'N 00°49.00'W	2617 (HSW) 2620 (corr. CTD)	19.07.10 16:00 UTC	Aural M2 RCM11 VTP SBE 37P RCM8 VT RCM8 VT RCM8 VT RCM8 VT	MML13 512 7731 9763 9187 9391 9767	57 58 70 247 753 1499 2586
F10-11	78°50.01'N 01°59.97'W	2663 (HSW) 2655 (corr. CTD)	20.07.10 11:00 UTC	RCM11 VTP SBE 37P RCM8 VTP RCM8 VT RCM7 VTP RCM11 VT	474 7726 11889 10496 8395 20	79 80 256 753 1499 2636
F20-2	78°48.01'N 06°00.01'E	2415 (HSW) 2424 (corr. CTD)	10.07.10 06:00 UTC	CTD Profiler Profiling winch		0-85 86
FFGR-1	78°48.14'N 05°49.74'E	2470 (HSW)	09.07.10 16:00 UTC	NEMO float	3000340- 13006970	0-270

Mooring	Latitude Longitude	Water depth (m)	Date and time of first useful record	Instrument type	Serial number	Instr. depth (m)
FSQ1-2	79°38.55'N 03°00.84'W	2440 (HSW) 2472 (DWS)	19.07.10 18:00 UTC	Webb sound source	02	ca. 700
FSQ2-2	79°19.43'N 04°05.80'W	2010 (HSW) 2031 (corr. CTD)	22.07.10 10:00 UTC	Webb sound source	68	ca. 700
FSQ3-1	78°30.00'N 01°59.91'W	2780 (HSW) 2817 (DWS)	21.07.10 12:00 UTC	Webb sound source	22	ca. 700

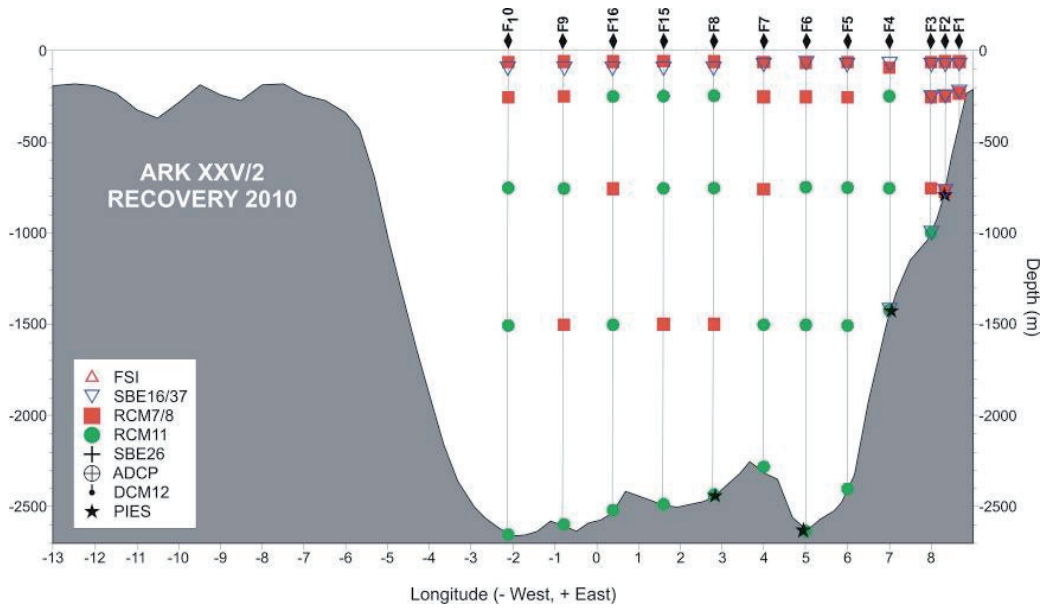
Abbreviations

ADCP WH	RDI Inc. Self-Contained Acoustic Doppler Current Profiler Work Horse 300 Hz
ADCP QM	RDI Inc. Self-Contained Acoustic Doppler Current Profiler Quarter Master 150 Hz
VTP	Aanderaa current meter with temperature and pressure sensor
VT	Aanderaa current meter with temperature sensor
RCM7	Aanderaa current meter type RCM7
RCM8	Aanderaa current meter type RCM8
RCM 11	Aanderaa Doppler current meter with temperature sensor
SBE 16	Seabird Electronics SBE16 recording temperature, conductivity, and pressure
SBE 37	Seabird Electronics SBE37 recording temperature and conductivity (optionally pressure 37P)
Aural M2	Acoustic recorder
AR	Acoustic recorder

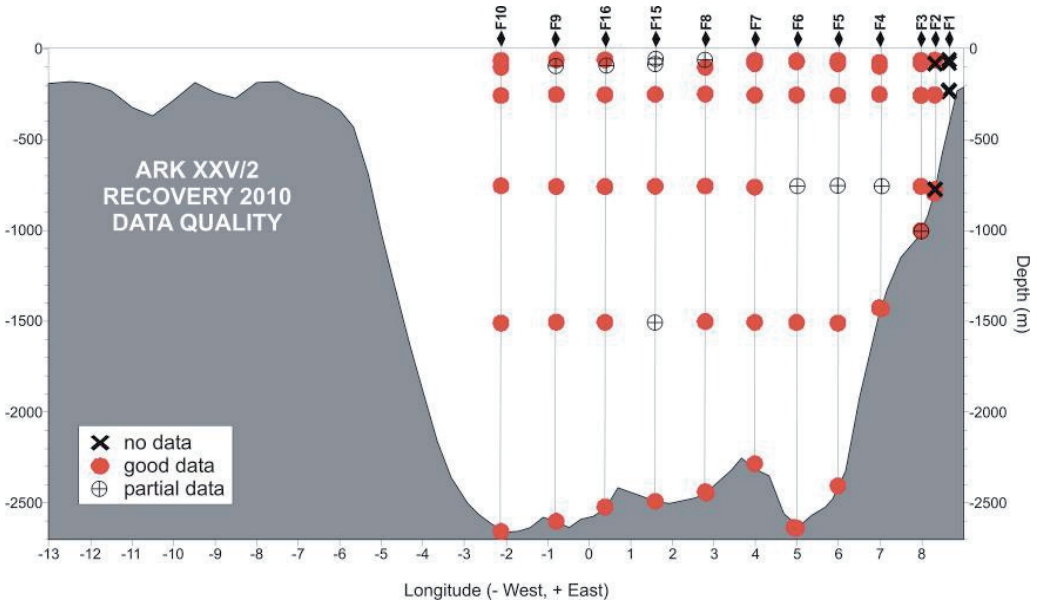
Underway measurements with a vessel-mounted narrow band 150 kHz ADCP from RD Instruments and a Sea-Bird SBE45 thermosalinograph were conducted along the transect to supply temperature, salinity and current data at a much higher spatial resolution than given through the moorings. Two thermosalinograph sensors were in use, one in 6 m depth in the bow thruster tunnel and one in 11 m depth in the keel. Both instruments are controlled by taking water samples, which are measured on board.

Tab. 4.3: CTD stations carried out during ARK-XXV/2

File	Station	Cast	Lat	Lon	Depth	PMax	Day	Month	Year	Hour	Minute
8301.dat	830	1	78.834	9.831	98	95	1	7	2010	0	48
8401.dat	840	1	78.833	9.666	85	82	1	7	2010	1	22
8501.dat	850	1	78.832	9.506	171	168	1	7	2010	1	55
8601.dat	860	1	78.835	9.330	199	196	1	7	2010	2	41
9401.dat	940	1	78.835	6.497	1934	1959	1	7	2010	18	49
9501.dat	950	1	78.835	6.322	2185	2216	1	7	2010	20	31
9601.dat	960	1	78.834	6.170	2326	2360	1	7	2010	22	12
9701.dat	970	1	78.833	5.668	2525	2563	2	7	2010	0	24
9801.dat	980	1	78.833	5.337	2576	2616	2	7	2010	2	40
10201.dat	102	1	78.834	5.000	2651	2692	2	7	2010	12	46
10301.dat	103	1	78.833	6.662	1753	1775	2	7	2010	18	49
10401.dat	104	1	78.833	6.834	1601	1620	2	7	2010	20	20
10501.dat	105	1	78.835	7.163	1324	1339	2	7	2010	21	55
10601.dat	106	1	78.834	7.331	1204	1216	2	7	2010	23	7
10701.dat	107	1	78.833	7.502	1138	1149	3	7	2010	0	18
10801.dat	108	1	78.833	7.673	1079	1089	3	7	2010	1	17
10901.dat	109	1	78.833	7.999	1008	1018	3	7	2010	4	2
11001.dat	110	1	78.833	8.335	773	779	3	7	2010	6	40
11101.dat	111	1	78.833	8.667	238	236	3	7	2010	8	47
11301.dat	113	1	78.833	9.166	214	211	3	7	2010	14	31
11401.dat	114	1	78.835	8.996	212	210	3	7	2010	15	19
11501.dat	115	1	78.834	8.833	229	228	3	7	2010	15	52
11601.dat	116	1	78.833	8.502	566	569	3	7	2010	16	40
11701.dat	117	1	78.834	8.202	895	902	3	7	2010	17	38
11801.dat	118	1	78.833	7.834	1057	1067	3	7	2010	18	59
12002.dat	120	2	78.779	5.330	2414	2450	4	7	2010	2	17
12101.dat	121	1	78.834	6.998	1425	1442	4	7	2010	6	8
12201.dat	122	1	78.833	5.990	2428	2463	4	7	2010	9	54
12403.dat	124	3	78.610	5.050	2293	2327	4	7	2010	21	13
12901.dat	129	1	78.917	5.001	2584	2625	5	7	2010	15	17
13201.dat	132	1	79.134	6.096	1250	1263	6	7	2010	4	27
13401.dat	134	1	79.028	6.997	1270	1284	6	7	2010	17	29
13501.dat	135	1	78.979	9.519	226	223	6	7	2010	23	4
13601.dat	136	1	79.028	11.086	279	279	7	7	2010	2	44
13801.dat	138	1	79.129	4.897	1522	1541	7	7	2010	14	59
13901.dat	139	1	79.107	4.604	1890	1917	7	7	2010	16	35
14902.dat	149	2	79.066	4.184	2413	2450	8	7	2010	23	35
15601.dat	156	1	78.834	5.827	2480	2518	9	7	2010	16	3
15701.dat	157	1	78.833	5.494	2561	2599	9	7	2010	18	41
15801.dat	158	1	78.832	5.160	2596	2636	9	7	2010	20	55
15902.dat	159	2	78.807	6.005	2413	2450	10	7	2010	1	57
16201.dat	162	1	78.834	3.330	2341	2375	10	7	2010	15	18
16301.dat	163	1	78.833	3.659	2255	2287	10	7	2010	17	21
16401.dat	164	1	78.833	4.331	2354	2388	10	7	2010	19	45
16501.dat	165	1	78.832	4.662	2481	2518	10	7	2010	21	49
16601.dat	166	1	78.834	3.995	2286	2319	11	7	2010	0	35
16701.dat	167	1	78.834	2.796	2445	2481	11	7	2010	7	22
16705.dat	167	5	78.833	2.830	2437	2473	11	7	2010	12	59
16801.dat	168	1	78.833	2.998	2414	2449	11	7	2010	14	50
17002.dat	170	2	79.144	2.761	5551	5678	11	7	2010	22	20
17301.dat	173	1	79.002	4.302	400	505	12	7	2010	12	48
17401.dat	174	1	79.054	3.743	2794	2838	12	7	2010	14	30
17501.dat	175	1	79.046	3.594	3415	3476	12	7	2010	20	2
17601.dat	176	1	79.060	3.478	4015	4092	13	7	2010	2	31
17801.dat	178	1	79.063	3.310	5090	5202	13	7	2010	19	19
17903.dat	179	3	79.735	4.478	2638	215	14	7	2010	10	36
18003.dat	180	3	79.735	4.489	2658	2698	14	7	2010	18	55



a)



b)

Fig. 4.2: Transect across Fram Strait with the moored instruments recovered (a) and data quality (b) during ARK-XXV/2

18101.dat	181	1	79.594	5.215	2697	2742	15	7	2010	0	0
18201.dat	182	1	79.928	3.073	2546	2584	15	7	2010	7	51
18401.dat	184	1	79.427	4.748	2549	2587	15	7	2010	20	22
18501.dat	185	1	79.281	4.329	2344	2378	16	7	2010	1	6
19001.dat	190	1	78.835	2.580	2468	2504	17	7	2010	0	41
19101.dat	191	1	78.833	2.251	2488	2526	17	7	2010	3	0
19401.dat	194	1	78.834	0.389	2531	2570	17	7	2010	10	36
19601.dat	196	1	78.834	0.098	2576	2616	17	7	2010	14	32
19703.dat	197	3	78.833	0.703	2422	2458	17	7	2010	18	3
19801.dat	198	1	78.833	0.996	2426	2462	17	7	2010	20	8
19901.dat	199	1	78.832	1.295	2473	2510	17	7	2010	22	20
20001.dat	200	1	78.833	1.911	2505	2542	18	7	2010	0	53
20101.dat	201	1	78.832	1.596	2495	2533	18	7	2010	3	8
20301.dat	203	1	78.833	-0.803	2607	2648	18	7	2010	12	15
20401.dat	204	1	78.834	-0.499	2635	2676	18	7	2010	16	8
20501.dat	205	1	78.833	-0.199	2590	2630	18	7	2010	18	22
20601.dat	206	1	78.833	-1.087	2533	2571	18	7	2010	21	21
20805.dat	208	5	79.618	-3.001	2463	107	19	7	2010	18	53
20901.dat	209	1	78.832	-2.338	2614	2654	20	7	2010	2	32
21002.dat	210	2	78.827	-2.117	2655	2696	20	7	2010	7	9
21101.dat	211	1	78.835	-1.427	2633	2674	20	7	2010	12	9
21201.dat	212	1	78.833	-1.754	2657	2698	20	7	2010	14	30
21501.dat	215	1	78.833	-2.665	2558	2597	20	7	2010	22	20
21601.dat	216	1	78.833	-2.994	2478	2516	21	7	2010	0	34
21701.dat	217	1	78.832	-3.310	2354	2389	21	7	2010	2	52
21801.dat	218	1	78.834	-3.631	2157	2187	21	7	2010	5	15
21903.dat	219	3	78.505	-1.996	2753	2796	21	7	2010	12	5
22001.dat	220	1	78.833	-3.903	1956	1982	21	7	2010	17	51
22101.dat	221	1	79.335	-3.989	2022	2048	22	7	2010	6	5
22201.dat	222	1	78.834	-4.243	1696	1716	22	7	2010	14	38
22301.dat	223	1	78.834	-4.576	1400	1416	22	7	2010	21	0
22401.dat	224	1	78.833	-4.925	1080	1090	22	7	2010	22	59
22501.dat	225	1	78.833	-5.330	691	695	23	7	2010	0	44
22601.dat	226	1	78.834	-5.663	430	430	23	7	2010	1	58
22703.dat	227	3	78.837	-5.969	343	343	23	7	2010	4	42
22801.dat	228	1	78.826	-6.449	283	282	23	7	2010	7	7
22901.dat	229	1	78.830	-7.037	245	243	23	7	2010	9	12
23001.dat	230	1	78.831	-7.514	180	178	23	7	2010	10	38
23101.dat	231	1	78.833	-7.998	185	182	23	7	2010	11	55
23201.dat	232	1	78.835	-8.498	271	270	23	7	2010	13	16
23301.dat	233	1	78.833	-8.987	244	242	23	7	2010	14	24
23401.dat	234	1	78.833	-9.502	191	188	23	7	2010	15	42
23501.dat	235	1	78.833	-10.020	288	287	23	7	2010	16	58
23601.dat	236	1	78.833	-10.502	368	368	23	7	2010	18	19
23701.dat	237	1	78.835	-11.006	323	323	23	7	2010	19	43
23801.dat	238	1	78.834	-11.512	227	226	23	7	2010	21	12
23903.dat	239	3	78.839	-11.972	188	186	23	7	2010	23	14
24001.dat	240	1	78.836	-12.508	182	180	24	7	2010	0	48

Preliminary Results

The data from the moored instruments were read out from the memories and preliminary processed onboard, but the final processing including the pressure correction is on-going. The analysis of the hydrographic data occurred on the basis of preliminary data available on board. The post-cruise calibration might result in minor changes.

The temperature and salinity sections across the Fram Strait are shown in Fig. 4.3. The main core of northward flowing warm and saline Atlantic Water (AW) is found at the eastern side of the transect in the shallow to intermediate layers. The West Spitsbergen Current (WSC) is visible at the eastern slope by downward sloping isolines.

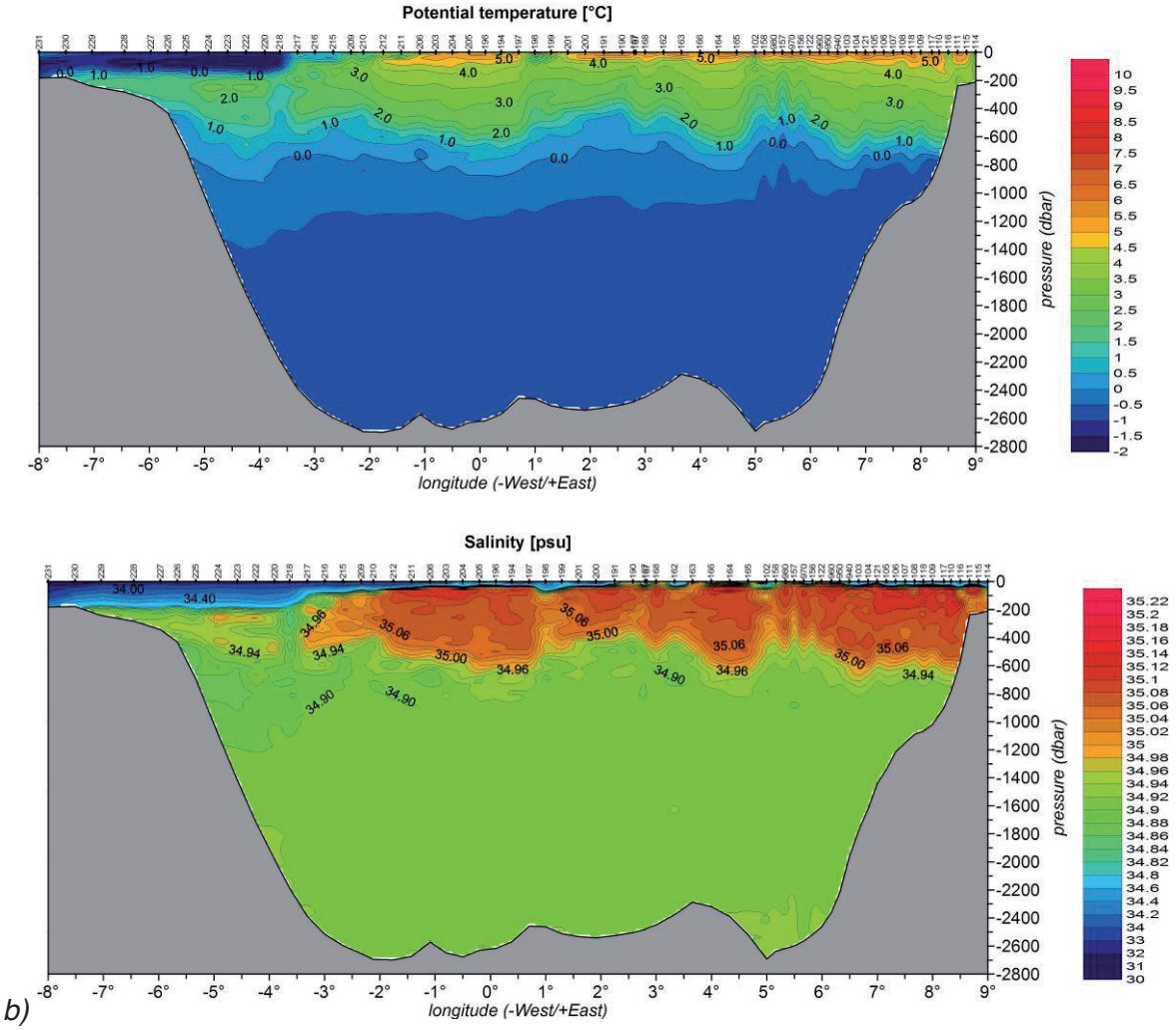


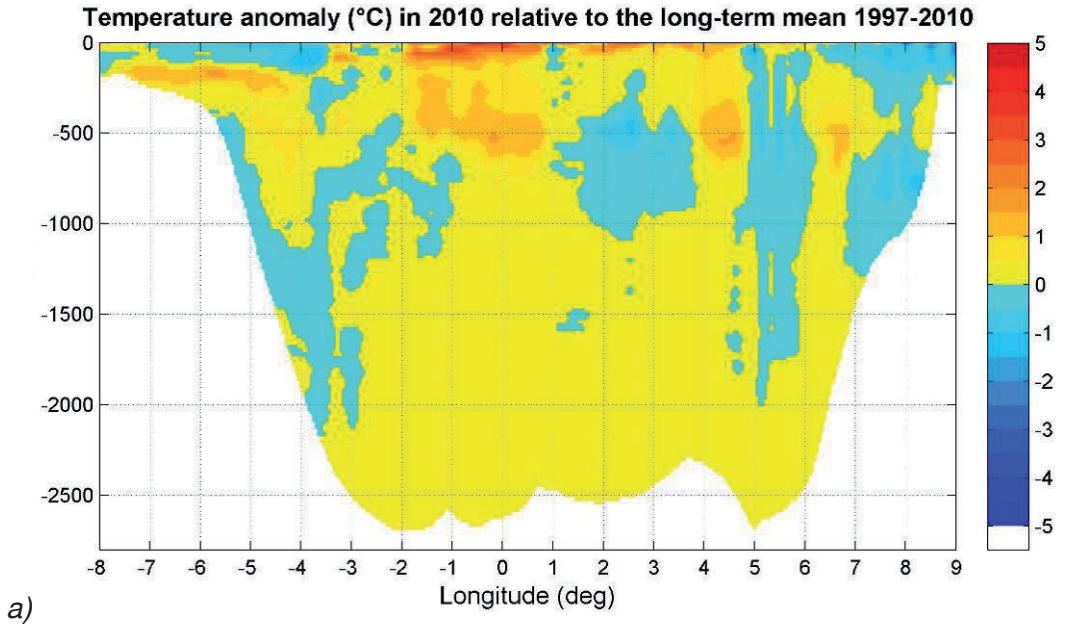
Fig. 4.3: Vertical distribution of potential temperature (a) and salinity (b) across Fram Strait measured during ARK-XXV/2

The AW layer in the West Spitsbergen Current above the slope was shallower and the amount of AW in the recirculation area has decreased as compared to previous year. Maximum temperatures of the AW in WSC and in the recirculation area were lower as compared to 2009. In summer 2010, the temperature of the Atlantic Water in the WSC core and in the offshore WSC branch were similar, as opposite to the usually warmer core. The off-shore branch of WSC is well pronounced and reached far to the central part of the strait (at about 1°30'E). The re-circulating Atlantic Water westward extent was similar as in previous years (to about 2°W), but its temperature was slightly lower than the year before, while the thickness of the re-circulating AW layer was significantly larger. The salinity of the AW in 2010 was higher than in 2009, in particular in the

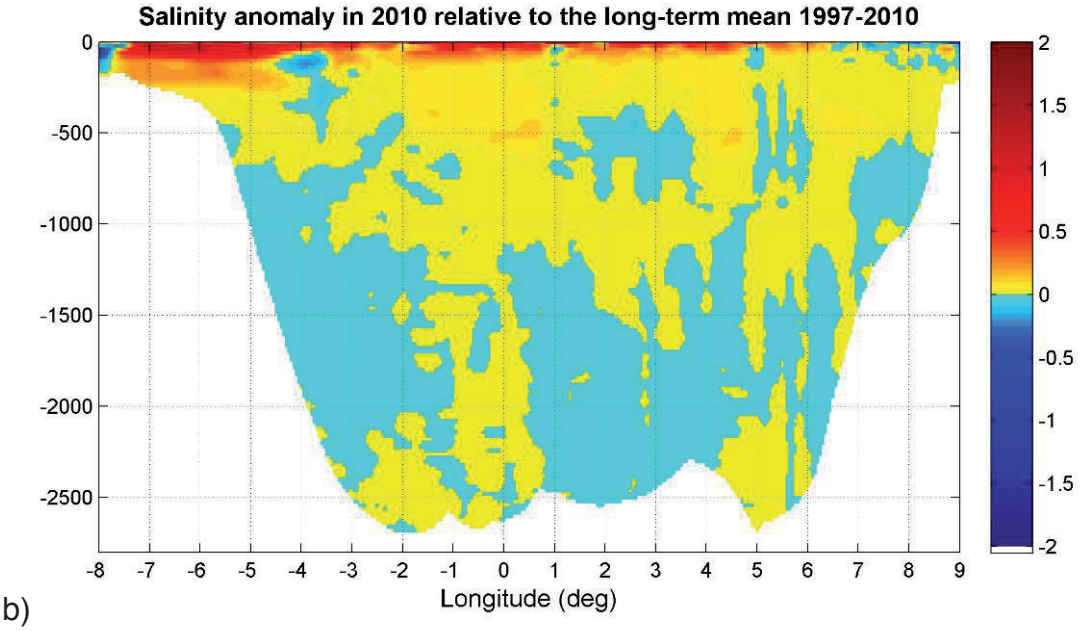
central part of the strait. AW with salinity above 35.04 occupied most of the section east of 2°W. The cold and low saline Polar Waters of the East Greenland Current can be found down to 200 m in the western part of Fram Strait, above the shelf and shelf slope.

The anomalies of temperature and salinity from their long-term means (1997-2010) are shown on Figs 4.4 a,b. In summer 2010, temperature in the WSC was slightly lower than its long-term mean, while in the central part of the strait the re-circulating Atlantic Water was significantly warmer (up to 3°C) than average. Above the shelf slope east of Greenland, the Arctic Atlantic Water below the Polar Water was also warmer as the long-term average. Strongest positive anomalies of salinity were manifested in the upper 200 m layer across the whole strait except the WSC area, positive anomalies were also found in deeper AW waters in the recirculation area and in particular, above the Greenland upper shelf slope. Areas of the slight warming were observed in the deep water, however this finding has to be confirmed after the post-cruise calibration.

To identify the longer-term variability, time-series of mean temperatures and salinities for typical water masses were derived for the depth interval from 50 to 500 m (Fig. 4.5). Three characteristic areas were distinguished in relation to the main flows: the West Spitsbergen Current (WSC) between the shelf edge and 5°E, the Return Atlantic Current (RAC) between 3°W and 5°E, and Polar Water in the East Greenland Current (EGC) between 3°W and the Greenland Shelf. In all three domains, spatially averaged salinities (in boxes defined by the longitude and depth ranges) in 2010 were higher than in 2009 (in respect to the EGC, higher than in 2008). Average temperatures in the WSC and RAC were slightly lower than the year before, however, for the WSC, temperature was close to the long-term average and in the RAC it remained significantly higher than the long-term average. Temperature in the EGC in 2010 increased substantially in comparison to 2008 (no measurement in 2009), when the second lowest value in the time-series was observed.



a)



b)

Fig. 4.4: Temperature and salinity anomalies during ARK-XXV/2 relative to their long-term means (1997-2010)

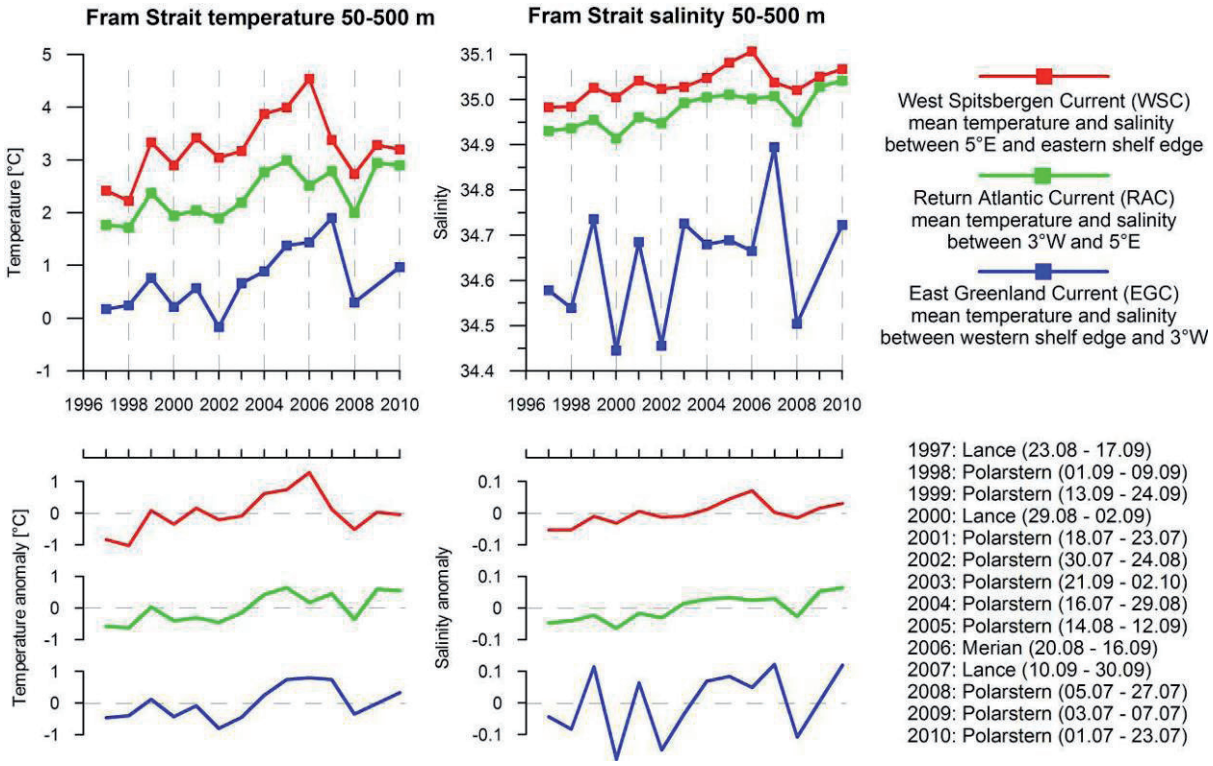
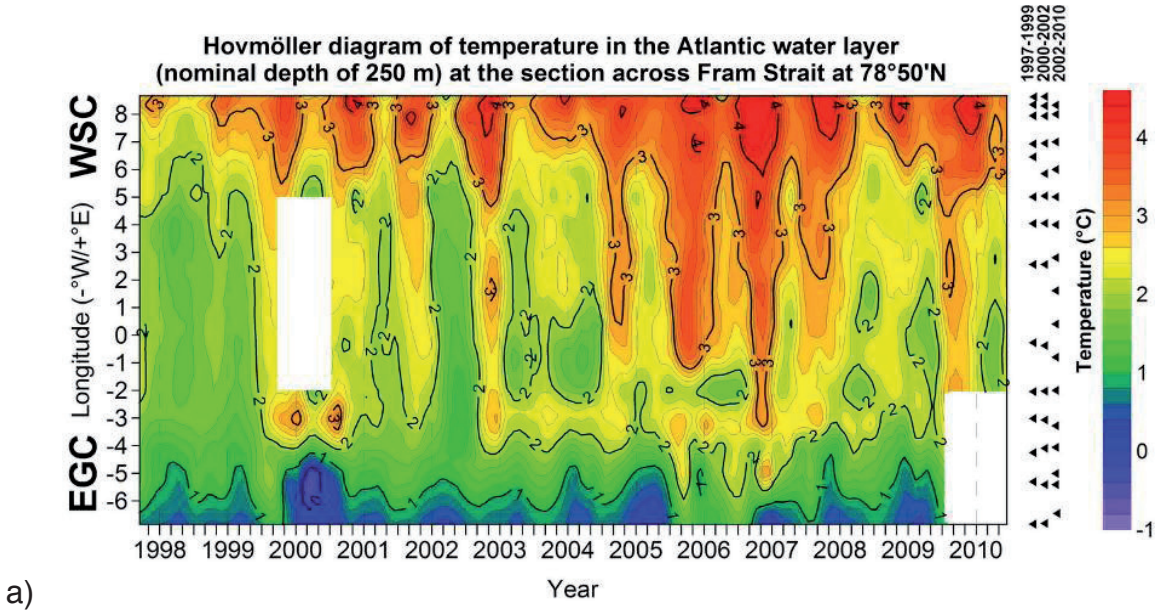
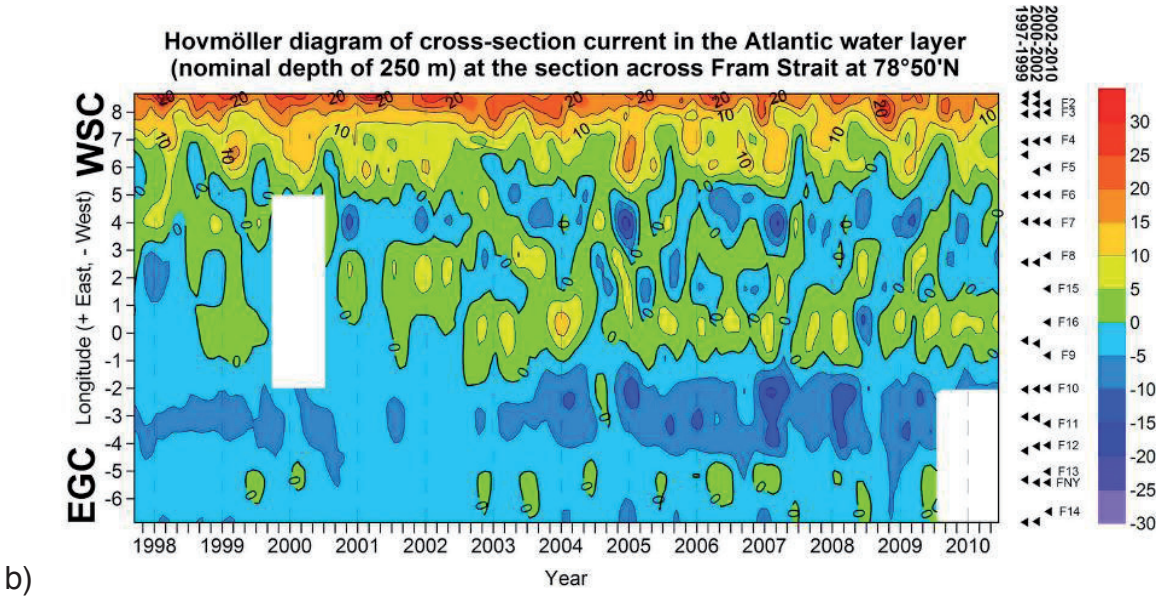


Fig. 4.5: The variations of the mean temperatures and salinities in the Fram Strait in the West Spitsbergen Current (WSC), Return Atlantic Current (RAC) and East Greenland Current (EGC).

The preliminary results obtained by the moored array confirm findings from the hydrographic snapshot. Variability of temperature and cross-section current speed in the Atlantic Water (at the nominal depth of 250 m) is presented on Fig. 4.6 as the time-space (Hovmöller) diagram, based on monthly averaged values. Since 2007 lower temperatures have been observed in the eastern and central Fram Strait and the westward extent of the isotherm 3°C has been significantly shortened. In 2008 and in early winter 2009 temperatures in the eastern and central Fram Strait reached minimum and water warmer than 3°C disappeared completely from the recirculation area. From mid 2009 on, the slow warming has been observed in the WSC and in particular in the central part of the strait. The northward flow in the WSC core in 2009-10 was slightly weaker than in the previous years, although the strength and variability of the offshore WSC branch was comparable in last five years. Winter intensification of the offshore branch was less pronounced in 2009-10 than in previous years. Data from the western part of Fram Strait are still missing, but the relatively strong southward flow at the westernmost recovered mooring suggests the intensive outflow in the East Greenland Current.



a)



b)

Fig. 4.6: Time-space diagram of (a) temperature and (b) cross-section currentin the Atlantic Water layer (at approx. 250 m water depth) in Fram Strait, based on monthly averaged measurements by the moored array in 1997-2010

The preliminary time-series of the volume transport through Fram Strait (updated till 2009) and volume transports separately in the WSC and RAC domains (updated till 2010), are presented on Figs. 4.7 and 4.8. The net volume transport in 2008-09 (winter-centred mean) was 3.9 Sv, being lower that in three previous years (all above 4.3 Sv). However, both north- and southward monthly volume transports in 2008-09 were higher than in the preceding winter-centred year.

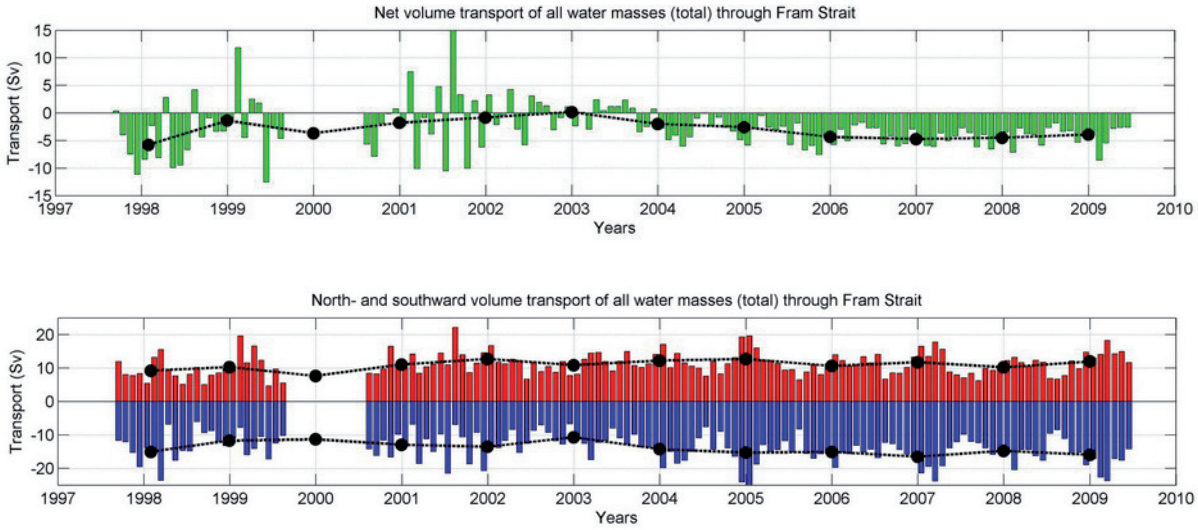


Fig. 4.7: Variability of a) net and b) north- and southward volume transport through Fram Strait based on monthly averaged measurements by the moored array in 1997-2010 (black dots – winter centred yearly averages)

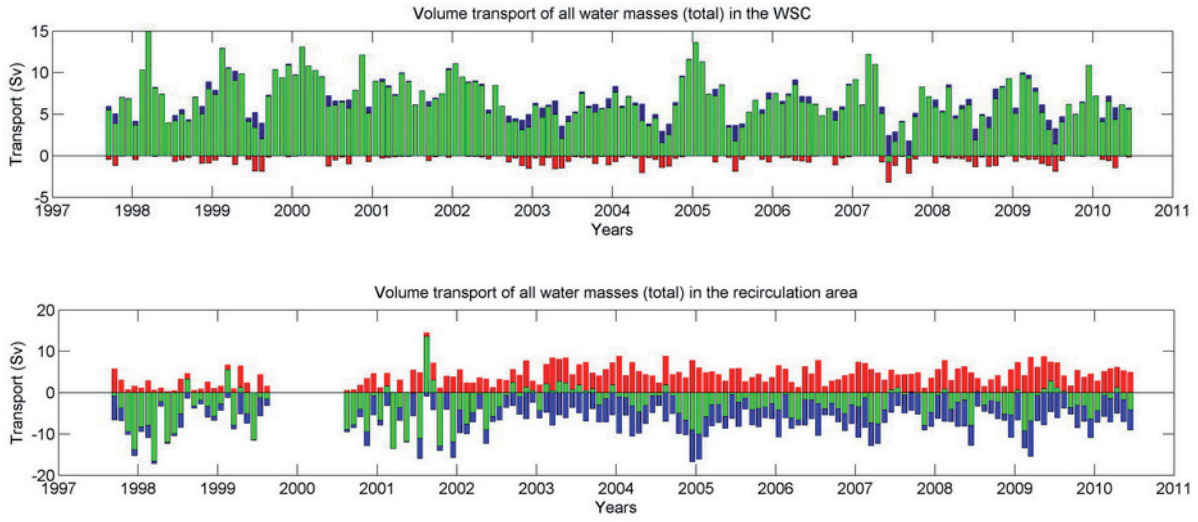


Fig. 4.8: Variability of volume transport in (a) the West Spitsbergen Current and in (b) the Return Atlantic Current in Fram Strait, based on monthly averaged measurements by the moored array in 1997-2010 (red – inflow, blue – outflow, green – net)

Maximum volume transport was observed in early winter, while the summer minimum was less pronounced. Updated volume fluxes for the entire section in 2009-10 will be available after recovery of mooring in the western Fram Strait. For the WSC domain, monthly volume fluxes in 2009-10 were lower than in previous years, except one winter month. The winter-centred mean was 5.6 Sv, about 1 Sv lower than the long-term

average. In the re-circulation area the southward net monthly volume fluxes prevailed and winter-centred mean flux of 2.1 Sv to the south was lower that observed in previous five years. In the re-circulation area southward volume transport occurs in autumn and winter months, while in summer the net transport is close to zero. The volume fluxes in the re-circulation area are characterized by the strongest month-to-month variability, as compared to the WSC and EGC domains.

Spatially averaged temperatures of AW observed at the moored array in 2008-2010 were lower than in previous two years, in particular summer and autumn seasonal peaks (Fig. 4.9). Together with the weaker inflow in the WSC in 2009-10 and high temperature in the re-circulating AW carried southward, it will likely result in relatively low heat flux into the Arctic Ocean.

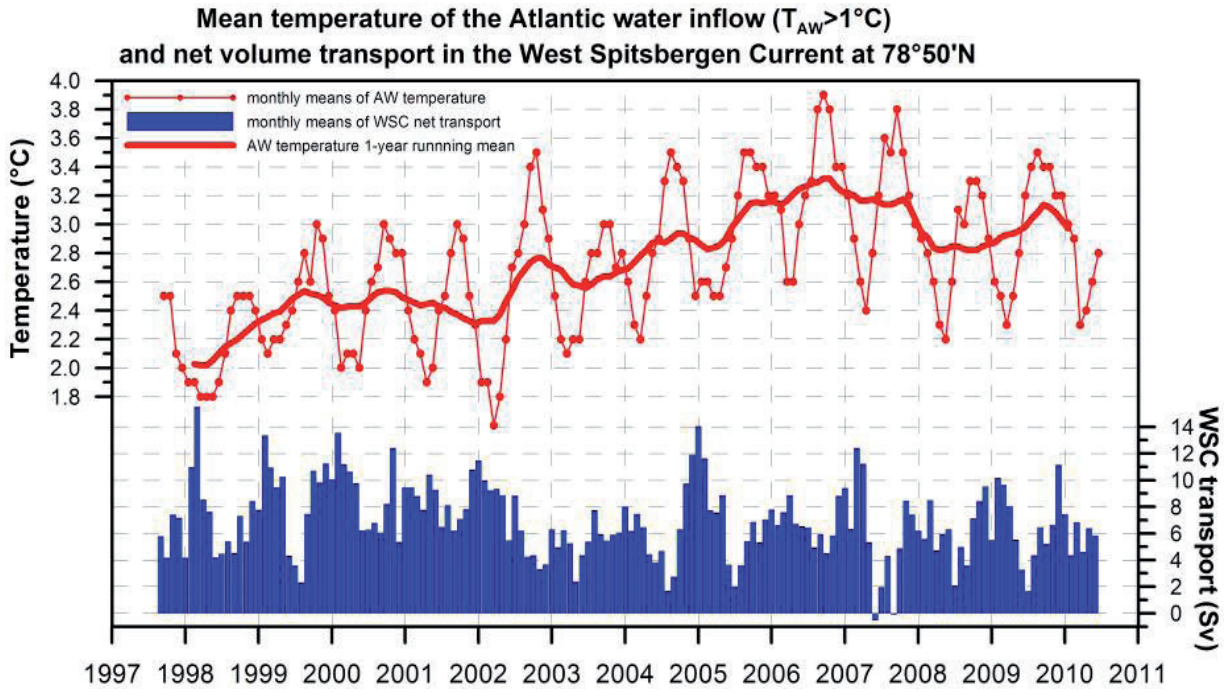


Fig. 4.9: Mean temperature of Atlantic Water and inflow in the West Spitsbergen Current

A trajectory of the summer glider mission from the deployment till September 5 is shown in Fig. 4.10 together with vertically averaged current vectors for the upper 1,000 m measured by the glider. Four long zonal sections between 0° and 9°E were accomplished in this period, providing 250 down- and upcast profiles of temperature, salinity, oxygen and other variables. Averaged current vector reveal a coherent, strong northward flow in the West Spitsbergen Current and strong variability in the central part of Fram Strait. A detail analysis of data provided by the Seaglider SG127 is under preparation.

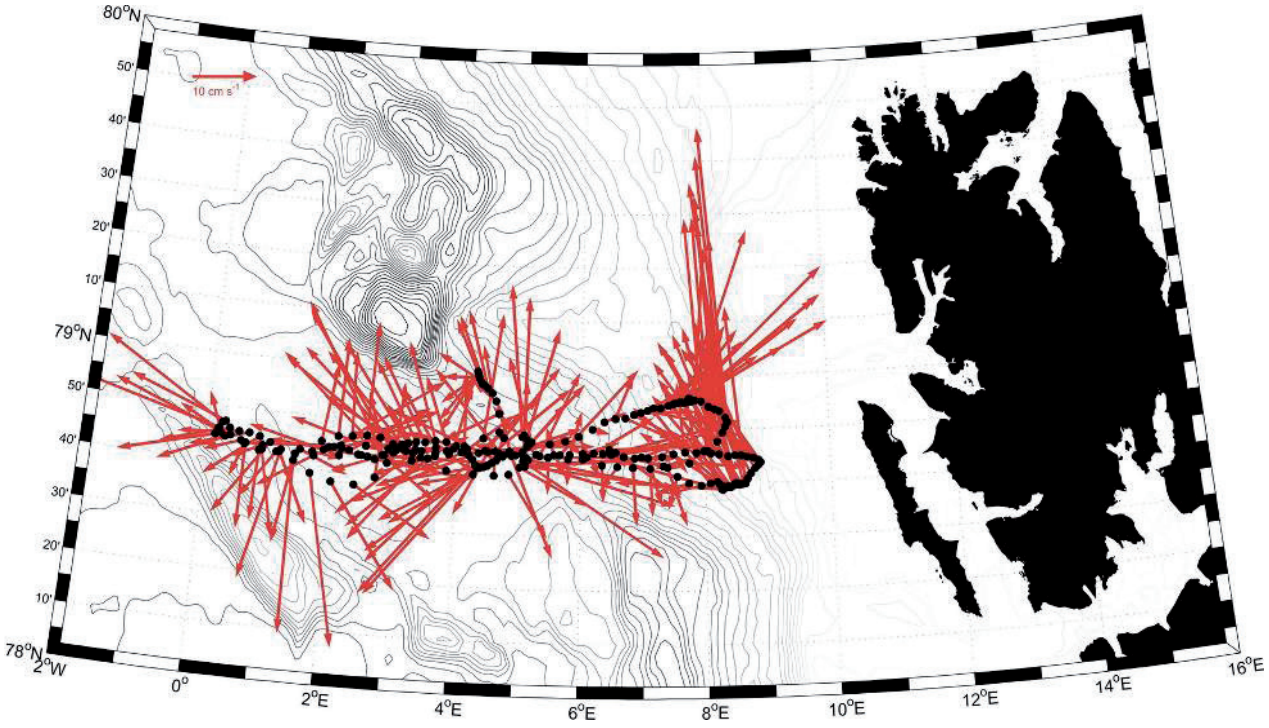


Fig. 4.10: Locations of the Seaglider surfacing positions between successive dives and vertically averaged currents from July 8 to September 5, 2010

5. CLIMATE INDUCED CHANGES OF ARCTIC PHYTOPLANKTON AND POSSIBLE IMPACTS ON TRACE GAS PRODUCTION

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[1]Alfred-Wegener-Institut, [2]LSCE

Introduction

Climate Change is increasingly affecting physical and biological systems. The polar oceans appear to be very sensitive to global warming due to the positive feedbacks associated with melting sea-ice and snow, and the concomitant reduction in albedo (IPCC 2007). In the Arctic Ocean, the area covered by sea ice is reducing over the last decades (Comiso 2002; Parkinson et al. 1999), reaching the most drastic summer decrease in 2007 (Comiso et al. 2008). The proceeding of these dramatic changes in the sea-ice cover will have major implications for the ecosystem of the Arctic (Carmack and Wassmann 2006), as it has been already seen by the northward progressing of the temperate species *Emiliania huxleyi* into the polar habitat (Bauerfeind et al. 2009; Hegseth and Sundfjord 2008) or the shift to pico- and nanoplankton dominated communities (Tremblay et al. 2009).

Changes in phytoplankton species will also affect the primary production, which can be globally derived from satellite observations of sea surface temperature (SST), photosynthetic available radiation (PAR), and chlorophyll *a* concentrations. Besides the advantage of satellite measurements providing a much better temporal and spatial coverage, they have the disadvantage of being less precise than *in-situ* measurements. Their degree of uncertainty results from the lack of global information on phytoplankton absorption and light penetration depth. Recently, Vountas et al. (2007) and Bracher et al. (2009) showed that specific phytoplankton absorption spectra as well as information on the light penetration depth can be derived by the differential optical absorption spectroscopy retrieval technique applied to retrieve these oceanic compounds (PhytoDOAS) from hyperspectral measurements of the satellite instruments SCIAMACHY (operating onboard the European environmental satellite ENVISAT). So far, the satellite information on phytoplankton distribution and primary production has not been acquainted to the Arctic Ocean, because the validation with *in-situ* data focused on all other regions of the global oceans due to the lack of *in-situ* data.

In the surface layers of the oceans (euphotic zone), planktonic biomass through photosynthesis results in production of organic compounds into the surrounding seawater. Some of these volatile species with low Henry's Law coefficients are able to escape to the atmosphere. Among these species, some can have a significant influence on the photochemistry of the atmosphere, particularly unsaturated hydrocarbons (such

as isoprene:2-methyl-1,3 butadiene, or light alkenes) and carbon monoxide (CO) which have a strong impact on the OH radical and ozone budget as well as on the formation of organic aerosols (Claeys et al. 2004).

Isoprene production from the oceans results from the "*in-situ* biological production in the euphotic zone by seaweeds and phytoplankton under PAR radiation" (Bonsang et al. 1992; Milne et al. 1995; Broadgate et al., 1997; Shaw et al. 2003, Bonsang et al., 2010). Currently there are very few studies available on the quantification of emissions of these volatile organics by the ocean.

Scientific questions

- Do we observe a further northward intrusion of *E. huxleyi* in the Arctic?
- Will other key species in the Arctic be affected by Climate Change?
- Can we monitor the changes of Phytoplankton Functional Types (PFTs) with satellite data in the Arctic?
- Can we improve remote sensing algorithms for the investigated research area for a better characterisation of the primary production in the Arctic Ocean?
- What is the role of phytoplankton for emissions of carbon monoxide (CO) and Non Methane Hydrocarbons (NMHC) in the Arctic?
- How will sea ice affect emissions of CO and NMHC in the Arctic?

Work at sea

Phytoplankton distribution and biomass and bio-optical measurements

Samples for HPLC (High Performance Liquid Chromatography) measurements and flow cytometry were taken on stations with Niskin bottles and for surface layers with the membrane pump from about 8 m water depth. In total 106 surface samples were collected during the cruise and the sampling strategy was combined with observations of the trace gas measurements (see below). 54 stations were sampled from the upper 100 m with a depth resolution of minimum 6 and maximum 10 samples per station. Samples for HPLC were filtered on 25 mm GF/F filters (Whatman), immediately frozen in liquid nitrogen, and thereafter stored at -80°C. Samples for flow cytometer measurements were preserved with glutaraldehyde and also frozen at -80°C. For particulate absorption (PAB), samples were generally taken for the surface layers, the fluorescence maximum and below. Samples were filtered over 47 mm filters and immediately frozen at -80°C. All samples will be analysed within the next months and compared with previous phytoplankton measurements of the same region. The data will further allow a validation of the satellite data and will also be used to determine the sources of various trace gases (see below).

Additional particulate absorption in suspension and absorption of coloured dissolved organic matter (CDOM) were measured during the cruise using the point-source integrating-cavity absorption meter (PSICAM) (Röttgers et al. 2005). Data from PSICAM will be analysed together with the PAB filters in order to compare these two different techniques of measuring the same parameters.

For online *in-situ* optical measurements of photosynthetic efficiency and chlorophyll fluorescence, a FastTracka Fast Repetition Rate Fluorimeter (FRRF) was installed in a flow-through system with a continuous water supply from the membrane pump. During 18 stations outside the drifting ice floes radiances and irradiances from 300 to 900 nm were measured with the set of four radiometers. One sensor, mounted on deck, was measuring downwelling irradiance at the sea surface. At the same time, the three other radiometers were measuring upwelling and downwelling irradiances throughout the water column down to ~80 m water depth.

The radiometric data are now being processed by Anja Theis (PhD student, PHYTOOPTICS, AWI) in order to obtain remote sensing reflectance, i.e. parameters that are measured by satellite sensors, and other apparent optical properties (e.g. diffuse attenuation). Later on, these data will be used to validate MERIS, MODIS and SeaWiFS remote sensing reflectance and chlorophyll *a* products, and will also be used to characterise the underwater radiance field in these waters and adapt current oceanic radiative transfer models for the Arctic seas.

The information on the irradiance profiles together with particulate absorption and absorption by CDOM will be assimilated in the satellite-based primary production model by Antoine and Morel (1996) and Antoine et al. (1996) to receive more correct primary production estimates or the Arctic Ocean.

Trace gases

Online measurements of surface waters (~6 m) using the ship membrane pump were performed during steaming time of the ship in order to document the horizontal distribution of studied compounds. In addition, a special focus was laid on the study of the compound vertical profiles in the upper 100 m of the water column. For this purpose, water samples from the CTD were analysed for 23 selected stations. On average, 10 depths were investigated according to the fluorescence profile as shown by the CTD sensor in order to get a better resolution around the supposed chlorophyll maximum. A first water sample was analysed immediately after retrieving; all the remaining samples were stored at 0°C and were analysed subsequently). A 10-depths profile analysis (including blank and calibration measurements) required about 10 hours of measurements and, therefore, limited the total number of investigated stations.

Measurements of CO and NMHC were performed by gas chromatography and, therefore, the first step of the measurement was dedicated to the extraction of the compounds from the water. For this purpose, extraction cells similar to the system described by Xie et al. (2001) were used. The principle of the extraction is briefly described here. The cell is a home-made glass coil where the water sample and synthetic air are continuously injected. Along the pathway, phase equilibration between CO (NMHC) in the water and CO (NMHC) in the synthetic air occurs, and the partially equilibrated gas-phase is then directly injected into the instruments. For CO, the extracted gas was directly injected in the instrument which was a gas chromatograph equipped with a hot mercuric oxide detector (RGD2, Trace Analytical, Menlo Park, CA, USA), according to the method described in Gros et al. (1999). For NMHC, the sample was first pre-concentrated over 20 min. on a dedicated trap and then injected in a gas chromatograph equipped with a Photo Ionisation Detector (GC-PID, Intersciences, The Netherlands). Measured NMHC

include light alkanes (propane, butanes, etc), light alkenes (ethane, propene, butanes, etc) as well as isoprene, a compound known to be directly emitted by phytoplankton. Blank measurement (same analysis but without water sample) and calibrations were performed regularly, at least once a day.

Preliminary Results

Data presented here are preliminary and values should not be considered as absolute. CO values are given as measured ppb whereas NMHC values are given as arbitrary units. Fluorescence data are extracted from CTD downcast profiles and values are in an arbitrary unit (courtesy Andreas Wisotzki).

Fig. 5.1 shows the variability of CO in surface water along with some measurements of atmospheric CO. Whereas atmospheric CO shows constant values during the campaign (82 +/- 4 ppb), CO in surface water shows a high degree of variability (207 ppb +/-159 ppb), with baseline levels around 60 ppb and levels up to 850 ppb. This high degree of variability can be explained by the different water masses (in terms of temperature, salinity, chlorophyll amount, etc) sampled during the campaign and will be further investigated in the coming months. Note that the period with enhanced CO (between July 19 and 25) corresponds to the period when the ship was surrounded by ice.

Fig. 5.2 shows the CO, isoprene and fluorescence profile as measured for station 179 (79.73°N, 04.48°E). The profile shown by CO seems to be almost exclusively driven by light availability whereas isoprene clearly shows a maximum at 20 m corresponding to the assumed chlorophyll maximum. This finding is in agreement with the known biological source of isoprene (directly emitted by the living cell of the phytoplankton, see Shaw et al. 2003) and the fact that oceanic CO is mainly produced by the photo degradation of the dissolved organic matter (Stubbins et al. 2006).

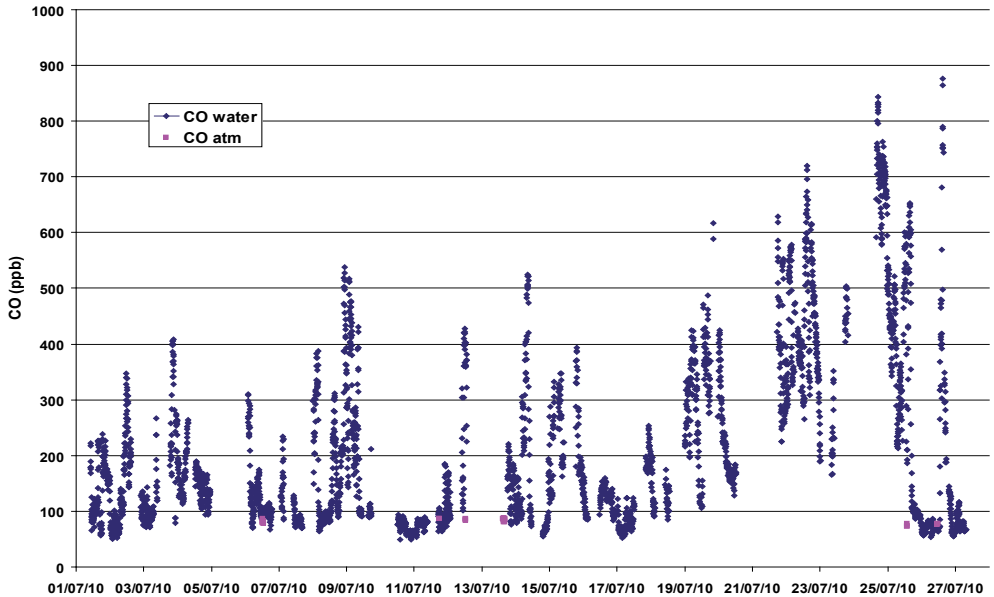

Fig. 5.1: Surface CO measured in the water along the cruise track (pink squares indicate atmospheric CO measurements)

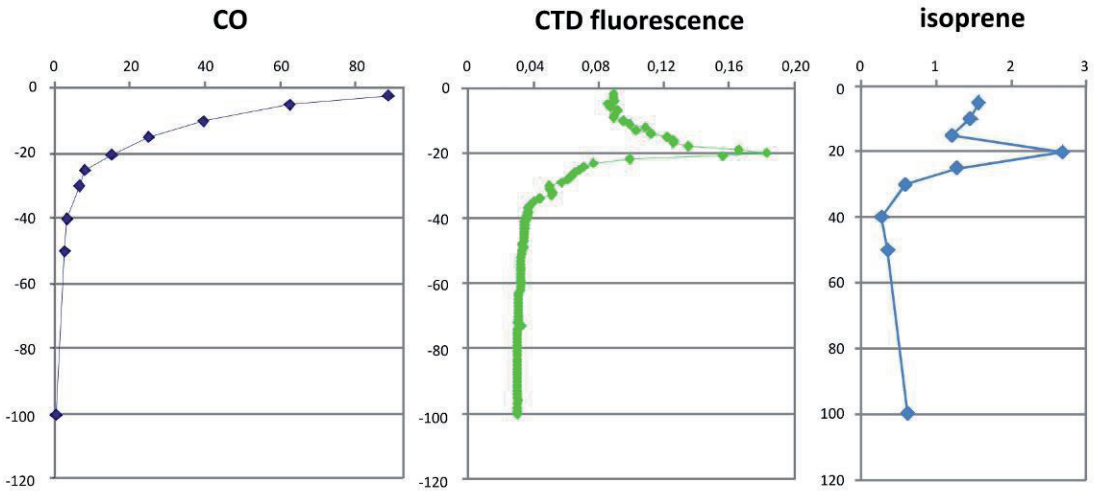

Fig. 5.2: Depth profiles of CO, CTD fluorescence and isoprene for station PS76/179

Fig. 5.3 shows the CO, isoprene and fluorescence profile as measured for station 134 (79°02'N, 07°00'E). Again, the isoprene shows clearly a maximum at the chlorophyll maximum but this time CO as well shows the impact of the biological production as suggested by enhanced values between -15 m and -25 m.

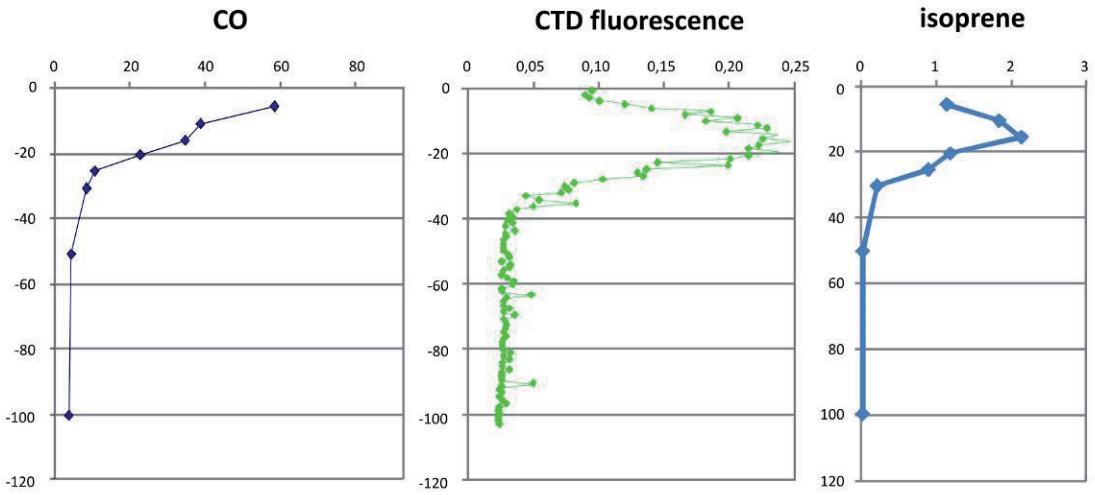

Fig. 5.3: Depth profiles of CO, CTD fluorescence and isoprene for station PS76/134

All profiles will be carefully examined with the biological measurements which have been sampled at the same depths and which will help to determine which phytoplankton species are the main contributor to isoprene and CO production in the Arctic sea. In addition, other light hydrocarbons which have been measured will be also investigated.

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6. PLANKTON ECOLOGY AND BIOGEOCHEMISTRY IN THE CHANGING ARCTIC OCEAN

PEBCAO GROUP
Coordination Eva-Maria Nöthig
Alfred-Wegener-Institut

Introduction

The Arctic Ocean is one of the most vulnerable regions on earth where effects of Climate Change are most apparent. During the last decade, a drastic decrease in sea ice cover and extent, a temperature increase, and changes in surface ocean chemical equilibrium and elemental cycling due to ocean acidification were observed. However, little is known about the consequences of climatic changes on the Arctic plankton community, food web structures, and related biogeochemical changes such as the net carbon balance of Arctic ecosystems. Our aim is to contribute to a better understanding of the direction and strength of biological feedback processes in the future Arctic Ocean by detection and tracking of large-scale environmental changes.

6.1 Production, fate and aggregation of organic matter

Mascha Wurst (not on board: Anja Engel)
Alfred-Wegener-Institut

Objectives

Based on the awareness that Global Change has increasingly altered marine ecosystems, we intend to examine the 'present day' situation of pelagic microbiology and biogeochemistry in the Arctic Ocean, with emphasis on the turnover of organic matter during production and decomposition processes. The data shall serve as a database for a better evaluation of the relevance of changes that are determined in perturbation experiments, such as the Svalbard CO_2 mesocosm study 2010 (EPOCA). Our overarching goal is to contribute to a better understanding of the direction and strength of biogeochemical and microbiological feedback processes in the future ocean. The investigations were conducted along the 75°N transect during ARK-XXV/1, and continued during ARK-XXV/2 in the HAUSGARTEN area and along the 79°N transect.

Work at sea

During ARK-XXV/2, seawater samples were collected by CTD/rosette sampler at different depths according to the station list (Tab. 6.1.1) to determine the impact of microbial processes on aggregation and sedimentation as part of the work of the PEBCAO group, in close cooperation with the project of Ilka Peeken et al. (AWI) and the AWI Deep-Sea Research Group. Analyses include biogeochemical parameters such as dissolved organic carbon (DOC), dissolved organic nitrogen (DON), dissolved and particulate phosphorus (DOP/POP), dissolved and total polysaccharides (DCHO/CHO), dissolved and total amino acids (DAA/AA), transparent exopolymer particles (TEP), coomassie stainable particles (CSP), pH, total alkalinity (TA), and microbiological

parameters (bacterial cell numbers, bacterial DNA). Samples were preserved, kept refrigerated or frozen at -20°C/-80°C for further analyses in the home laboratory.

Furthermore, samples were collected from two Autonomous Underwater Vehicle (AUV) dives (no. 7 & 12) in cooperation with the AWI Deep-Sea Research Group. Analyses of samples include DOC, DON, DOP, inorganic nutrients, and bacterial cell numbers. Samples were preserved and/or kept frozen at -20°C for further analyses in the home laboratory.

Tab. 6.1.1: Stations where water samples were taken from bottles of the CTD/rosette sampling system (CTD) (abbreviation see text above)

Station Nr. PS76	HAUS-GARTEN Station	DOC / TDN	Carbo-hydrates (CHO)	Amino acids	Inorganic nurients	POP	DOP	TEP & CSP	TA, pH	Bacteria cell numbers	Bacterial DNA
120	S2	x	x	x	x	x	x	x	x	x	x
124	S3	x	x	x	x	x	x	x	x	x	x
129	S1	x	x	x	x	x	x	x	x	x	x
134	KH	x	x	x	x	x	x	x	x	x	x
135	V12	x	x	x	x	x	x	x	x	x	x
136	Kb0	x	x	x	x	x	x	x	x	x	x
138	HG II	x	x	x	x	x	x	x	x	x	x
149	HG IV	x	x	x	x	x	x	x	x	x	x
170	HG IX	x	x	x	x	x	x	x	x	x	x
173	HG IV	x	x	x	x	x	x	x	x	x	x
174	HG V	x	x	x	x	x	x	x	x	x	x
175	HG VI	x	x	x	x	x	x	x	x	x	x
176	HG VII	x	x	x	x	x	x	x	x	x	x
178	HG VIII	x	x	x	x	x	x	x	x	x	x
179	N4	x	x	x	x	x	x	x	x	x	x
181	N3	x	x	x	x	x	x	x	x	x	x
184	N2	x	x	x	x	x	x	x	x	x	x
185	N1	x	x	x	x	x	x	x	x	x	x
98	Transect					x			x	x	x
102	Transect	x	x	x	x	x	x	x	x	x	x
111	Transect	x	x	x	x	x	x	x	x	x	x
166	Transect	x	x	x	x	x	x	x	x	x	x
194	Transect	x	x	x	x	x	x	x	x	x	x
210	Transect	x	x	x	x	x	x	x	x	x	x
220	Transect	x	x	x	x	x	x	x	x	x	x
229	Transect	x	x	x	x	x	x	x	x	x	x
237	Transect	x	x	x	x	x	x	x	x	x	x

6.2 Investigations on nanoplankton with focus on the key species *Phaeocystis pouchetii*

Sigrid Pfaff (not on board: Steffi Gäbler-Schwarz)
Alfred-Wegener-Institut

Objectives

Phaeocystis pouchetii is a bloom-forming algae and recognized as an ecologically important part of the Arctic phytoplankton. Dissolved organic compounds released by *Phaeocystis* during bloom conditions can accumulate. *Phaeocystis* is also thought to be a major contributor to the global sulphur budget by releasing substantial quantities of dimethylsulfide (DMS). Climatically induced changes will also impact species selection

in pelagic ecosystems. A shift in species composition is expected in all size classes of the phytoplankton; smaller planktonic algae will gain more importance in mediating element, matter and export fluxes. One of them, *Phaeocystis pouchetii*, having an intermediate position regarding size, can play a key role in the cycle of sulphur and carbon in the Arctic Ocean. However, little is known about the diversity distribution, occurrence and physiology of this species in Arctic pelagic regions.

Work at sea / Preliminary results

During the cruise ARK-XXV/2 handnet-samples (mesh size: 35 µm) were taken from the different stations shown in Fig. 6.2.1. The samples were taken from 20 to 25 m water depth mostly in daytime simultaneous to the mooring-work.

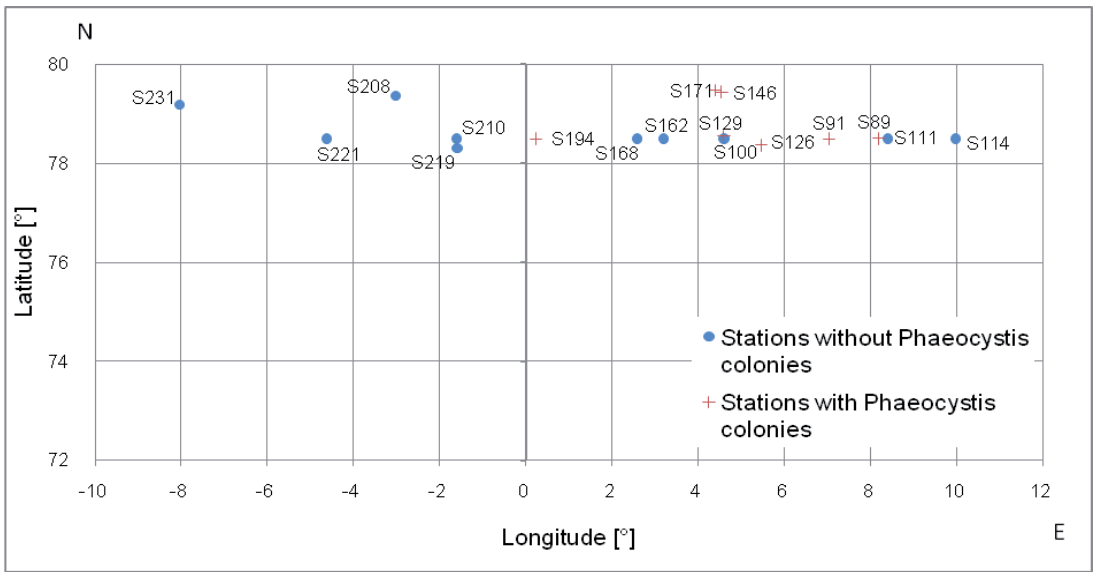

Fig. 6.2.1: Handnet stations sampled during ARK-XXV/2

The isolation of organisms was carried out in a temperature-controlled lab-container with an ambient temperature of 10°C. The isolates were first stored at 4°C and later on partially shifted to 0°C. During the entire cruise, the isolates where exposed to light for 24 h per day. In addition to this work, isolates for the DNA conservation of the algae were taken at every station. These samples are stored frozen at -20°C.

Preliminary results

A total of 17 stations were sampled during ARK-XXV/2. Eleven of them contained colonies of *Phaeocystis pouchetii*. The number of cultures and the amount of isolates for the DNA conservation which were created from every station is shown in Table 6.2.1.

Tab. 6.2.1: Number of cultures and DNA isolates retrieved during ARK-XXV/2

Stat. No. (see Fig. 6.2.1)	Number of cultures	Number of isolates for DNA conservation
S89	4	10
S91	13	10
S100	10	10
S126	4	8
S129	9	10
S146	17	10
S171	14	9
S194	9	6
Total	**80**	**73**

6.3 Investigations on selected phyto- and zooplankton and related biogeochemical parameters

Eduard Bauerfeind, Angelina Kraft, Nadine Knüppel,
Catherine Lalande, Annika Schröer (not on board: Katja Metfies)
Alfred-Wegener-Institut

Objectives

Understanding plankton ecology, biodiversity and a potential impact of environmental change on the base of the Arctic marine food web requires intensive sampling of phyto- and zooplankton organisms, and measurement of biogeochemical parameters, all together complementing the studies on microbiological production and fate of organic matter (see above).

Phytoplankton

An assessment of eukaryotic primary production and its origin involves the assessment of parameters that provide information on the amount of phytoplankton biomass and diversity, e.g. the measurement of chlorophyll *a* (Chl. *a*), particulate organic carbon (POC), particulate organic nitrogen (PON), particulate biogenic silica (PbSi), and taxonomic as well as molecular genetic assessments of phytoplankton communities.

Zooplankton

Pelagic amphipods are major components of epi- and mesopelagic zooplankton communities throughout the World Ocean. Amphipod species can serve as indicators for warming water masses in the Fram Strait. Sampling for detailed species analyses

of the dominating groups can reveal additional insight to results already obtained in the swimmer fraction within the sediment-trap program at HAUSGARTEN.

Work at sea

Phytoplankton

We sampled Arctic seawater at the HAUSGARTEN stations and along the 79°N transect to obtain water for biogeochemical analysis, caught phytoplankton for isolation and molecular-biological investigations as part of the work of the PEBCAO group in close cooperation with the project of Ilka Peeken et al. (AWI) and the AWI Deep-Sea Research Group. This program is an extended sampling program continuing investigations at the HAUSGARTEN and along 79°N since the year 2000. Samples were taken from the CTD/rosette sampling system for biogeochemical parameters such as chlorophyll *a* (Chl. *a*), particulate biogenic silica (PbSi), particulate organic carbon (POC), particulate organic nitrogen (PON), seston and, fractionated filtration (pico-, nano-, microplankon) for molecular biological analyses and microscopical analyses of phytoplankton abundance (Tab. 6.3.1). Water samples were filtered and filters were deep frozen; organisms were sampled in brown glass bottles and preserved with a 0.5-1 % formalin hexamine buffered solution.

Tab. 6.3.1: Stations where water samples were taken from bottles of the CTD/rosette sampling system (abbreviation see text above)

Station No. PS76	HAUSGARTEN Station	Chl. a	POC/N	PbSi	Seston	^{15}N Isotopes	Protists counts	Nutrients	Molecular biology
120	S2	x	x				x		x
124	S3	x	x				x		x
129	S1	x	x				x		x
134	KH	x	x	x	x	x	x	x	x
135	V12	x	x	x	x	x	x	x	x
136	Kb0	x	x	x	x	x	x	x	x
138	HG II	x	x				x	x	x
139	HG III	x	x				x	x	x
149	HG IV	x	x	x	x	x	x	x	
170	HG IX	x	x	x			x		x
173	HG IV	x	x	x	x	x	x	x	x
174	HG V	x	x				x		x
175	HG VI	x	x				x		x
176	HG VII	x	x				x		x
178	HG VIII	x	x				x		x
179	N4	x	x	x	x	x	x	x	x
180	N4	x	x	x	x	x	x	x	
181	N3	x	x				x		x
182	N5	x	x				x		
184	N2	x	x				x		x
185	N1	x	x				x		x
Station No. PS76	**WE Transect**	**Chl. a**	**POC/N**	**PbSi**	**Seston**	**^{15}N Isotopes**	**Protists counts**	**Nutrients**	**Molecular biology**
98	Transect	x	x				x		x
102	Transect	x	x				x		x
111	Transect	x	x				x		x
122	Transect	x	x				x		
132	Transect	x	x				x		x
157	Transect	x	x				x		
166	Transect	x	x				x		x
194	Transect	x	x				x		x
196	Transect	x	x				x		
198	Transect	x	x				x		
200	Transect	x	x				x		x
201	Transect	x	x				x		
203	Transect	x	x				x		
204	Transect	x	x				x		x
210	Transect	x	x				x		x
211	Transect	x	x				x		
216	Transect	x	x				x		
220	Transect	x	x				x		x
223	Transect	x	x				x		
224	Transect	x	x				x		x
227	Transect	x	x				x		
229	Transect	x	x				x		x
231	Transect	x	x				x		
233	Transect	x	x				x		x
235	Transect	x	x				x		x
237	Transect	x	x				x		x
239	Transect	x	x				x		x

Zooplankton

The zooplankton sampling during the cruise ARK-XXV/2 focused on pelagic Amphipoda at the HAUSGARTEN and along the Fram Strait transect in order to compare community compositions to data from sediment trap samples, and to collect organisms for lipid and biomarker analysis. In addition, dominant groups of zooplankton were sampled (Fig. 6.3.1). Bongo-net hauls (mesh size: 500 μm) were carried out at nine stations in order to obtain the amphipods. The sampling focused on the upper 300 m of the water column (including two nets to more than 1000 m depth) with vertical Bongo-net hauls. The net samples were placed in buckets with filtered seawater and transferred into a cooling container (ambient temperature +4°C) immediately after capture for sorting and identification. In total, 657 amphipods of the genus *Themisto* from nine hauls were identified, with a clear dominance of the species *T. abyssorum* at most stations. After separation into adult and juvenile individuals, the samples were deep frozen at -80°C for later analysis at AWI and the University of Bremen. All other samples were preserved or frozen at -20°C for further analyses or haltered in the cooling culture container for clonal culturing and physiological experiments in the home laboratory at AWI.

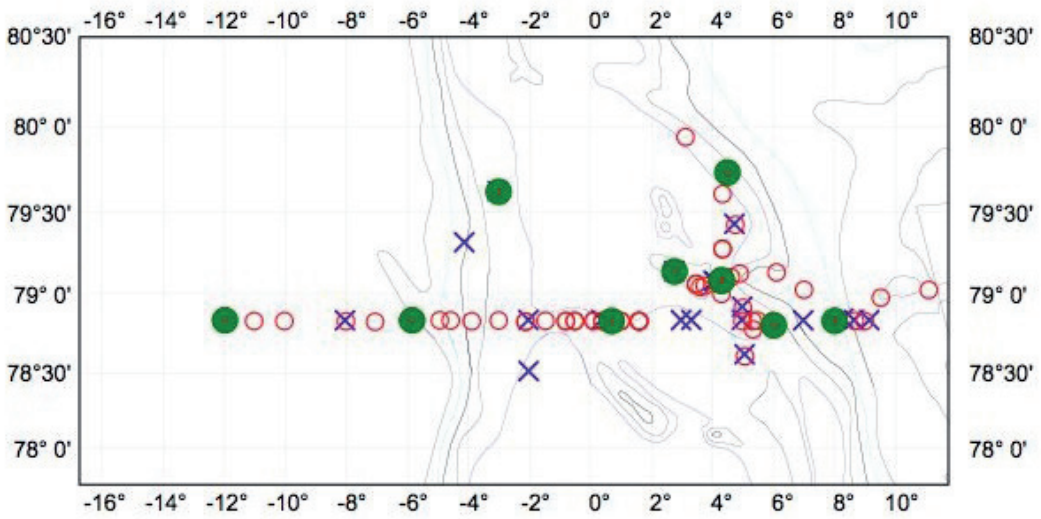

Fig. 6.3.1: Stations sampled with the CTD (red circle), handnet (blue cross), and Bongo-net (green dot) during ARK-XXV/2

7. HIGHER TROPHIC LEVELS: DISTRIBUTION OF SEABIRDS AND MARINE MAMMALS

Dominique Verbelen, Victor Legrand, Damien Sevrin
(not on board: Claude R. Joiris)
Laboratory for Polar Ecology (PolE)

Objective and context

The main objective of the campaign was to quantify and qualify the at-sea distribution of seabirds and marine mammals in the Norwegian and Greenland Seas. The quantitative and qualitative data are to be interpreted as a function of the hydrological parameters (i.e. water temperature and salinity, ice cover) that characterize the main water bodies (Atlantic Water, Arctic Water, Polar Water, pack ice), and the fronts between water masses or between ice and open water, such as the ice-edge. The collected data can be considered as an indirect representation of food availability for vertebrates in these water masses.

The data collected during this leg and the previous one will be integrated into a time series running since 1973. The data will be used to detect potential modification in numbers and evolution in distribution during the last 30-35 years.

The campaign was negatively influenced by poor visibility on many days, due to warmer winds from a southern direction causing fog when coming over colder or ice-covered water.

Methods

Continuous counts without width limit were done from the ship's bridge; counts were only made while the ship was moving at a speed of 5 knots minimum. If the data collected were to be used for densities estimates, specific conversion factors should be applied as the detection limit depends on the visibility at the time of the observation, as well as the size and behaviour of each species (Jizz; Dooley 2005), as defined and applied earlier in polar marine ecosystems by this team. Many of the birds, especially Fulmars and Kittiwakes, are attracted by the ship and follow for prolonged periods. Other species, on the other hand, are known to actively avoid the proximity of vessels (e.g. Narval). The raw data should therefore not be used for density estimates. Each recording period is of 30 minutes. In addition to high quality binoculars, a camera was used on multiple occasions to ease the identification of species which are more difficult to identify (mainly distant cetaceans).

Preliminary results

A total of 546 periods of data recording, each consisting of 30 minutes, were conducted. 21 bird species and 14 species of marine mammals (including 4 species of pinnipeds, 8 species of cetaceans, seals and Polar Bear) were observed.

The total number of individual seabirds encountered is 20.373 individuals (up till 28 July 2010; Tab. 7.1). The mean number of seabirds was 37 per count, remarkably close to the mean number of birds seen during the first leg (41). The community included the four most common species: Little Auks (*Alle alle*), Brünnich's Guillemots (*Uria lomvia*), Fulmars (*Fulmarus glacialis*), and Kittiwakes (*Rissa tridactyla*).

At first examination, quantitatively speaking, these results are very comparable to what was observed during previous July campaigns conducted by the same team along the same transects, including a pack ice component (see overview in Joiris 2000).

The most numerous species are the same as those recorded during previous censuses conducted between 1973 and 2007; Little Auk was the most numerous species, whereas Fulmar is often the most common one. Compared to some previous campaigns in 2008 and 2009, the number of Glaucous Gull (*Larus hyperboreus*) seems to have decreased. The total number of birds counted seems very similar to those counts obtained during the same month in the same area in the 1980s and 1990s, and no large movements of birds flying north were observed in 2010. But as 2010 seems to have been a good year for pack-ice cover, similar to situation observed in those ten years periods, this is not an unexpected result.

One of the most important findings of this long term survey is the dramatic increase of cetaceans in the Greenland and Norwegian seas since 2005. As a consequence of both, the long term decrease of pack-ice coverage in the Arctic and a severe Atlantic Oscillation in 2005, the ice coverage in the studied area in 2005 was the lowest ever on record. This led to the opening of both the north-eastern and north-western passages, enabling the rich North Pacific stock to merge with the severely depleted populations of the NE Atlantic. High numbers of cetaceans were encountered (Tab. 7.2) with 104 Fin Whales (75 during counts), 8 Blue Whales (6 during counts), 13 Humpback Whales (12 during counts), 7 Northern Atlantic Minke Whales, 9 Sperm Whales (8 during counts), 67 unidentified large whales (of which the vast majority most probably refer to Fin Whales), and 147 White-beaked dolphins (135 during counts). The record of a well documented Sei Whale presents the first ever since the beginning of this long-term survey and might well be one of the northernmost records ever on record. These numbers are in line with the data collected since 2005, but differ with one or more orders of magnitude with the data of the pre 2005 period. Surprisingly, no Bowhead was positively identified although one distant animal most probably belonged to this rare species. In addition, 48 large cetaceans were recorded, the vast majority most probably being Fin Whales.

Tab. 7.1: Numbers of birds seen during the 546 recording periods from the moving ship (data collected up to July 28, 2010)

Species	Latin name	Number
Fulmar	*Fulmaris glacialis*	2504
Gannet	*Morus bassanus*	5
King Eider	*Somateria spectabilis*	12
Eider	*Somateria mollissima*	5
Turnstone	*Arenaria interpres*	9
Great Skua	*Stercorarius skua*	16
Pomarine Skua	*Stercorarius pomarinus*	2
Arctic Skua	*Stercorarius parasiticus*	18
Long-tailed Skua	*Stercorarius longicaudus*	13
Kittiwake	*Rissa tridactyla*	2068
Ivory Gull	*Pagophila eburnea*	65
Sabine's Gull	*Xema sabini*	3
Glaucous Gull	*Larus hyperboreus*	43
Greater Black-backed Gull	*Larus marinus*	14
Lesser Black-backed Gull	*Larus fuscus*	1
Arctic Tern	*Sterna paradisaea*	33
Guillemot	*Uria aalge*	112
Brunnich's Guillemot	*Uria lomvia*	5338
Black Guillemot	*Cepphys grylle*	63
Puffin	*Fratercula arctica*	291
Little Auk	*Alle alle*	9096

Tab. 7.2: Numbers of cetaceans seen during the 546 recording periods from the moving ship (data collected up to July 28, 2010)

Species	Latin name	Number
Sperm Whale	*Physeter macrocephalus*	8
Humpback Whale	*Megaptera novaeangliae*	12
Blue Whale	*Balaenopera musculus*	6
Fin Whale	*Balaenopera physalus*	75
Sei Whale	*Balaenoptera borealis*	1
Northern Minke Whale	*Balaenoptera acutosrostrata*	7
White-beaked dolphins	*Lagenorhynchus albirostris*	135

Pinnipeds were seen in "normal" numbers with 29 Harp Seals (including a group of 12), 9 Hooded Seals, 5 Bearded Seals (mainly at the higher altitudes), 2 Ringed Seals and 64 undetermined pinnipeds due to long distance.

A special note on Polar Bears, representing the largest living terrestrial carnivore and a true ambassador of the high Arctic. In total no less than 21 individuals were seen (7 during counts), a high number compared to earlier expeditions on board RV *Polarstern*. Whether this should be regarded as a positive sign, remains to be answered. Only on two occasions, a female was seen with one and two cubs, respectively, and the BBQ was attended by three individuals. One Polar Bear was seen near a seal kill.

References

Dooley S (2005). The Big Twitch. Allen & Unwin, 78 pp.

Joiris CR (2000). Summer at-sea distribution of seabirds and marine mammals in polar ecosystems: a comparison between the European Arctic seas and the Weddell Sea, Antarctica. Journal of Marine Systems, 27, 267-276.

Photos taken during the ARK-XXV/2 expedition by V. Legrand

Transect counts are made from the bridge of RV Polarstern

Humpback Whales were seen lunge feeding close to RV Polarstern, here attracting many Kittiwakes and a dark Fulmar

The number of Fin Whales recorded during the ARK cruises on board RV Polarstern still seem to be on the increase

A well-documented record of Sei Whale, the first ever since the start of the survey in 1973 and probably one of the northernmost records ever; composite picture showing 3-times the same individual.

Harp Seal was the most numerous of the pinnipeds recorded, at times illustrating the back-swimming, a behaviour typical of this species

A close encounter with a female Polar Bear and her cub, the highlight of this trip

APPENDIX

A.1 Beteiligte Institute / Participating institutes

A.2 Fahrtteilnehmer/Cruise participants

A.3 Schiffsbesatzung/ Ship's crew

A.4 Stationsliste / Station list

A.1 BETEILIGTE INSTITUTE/ PARTICIPATING INSTITUTES

	Address
AWI	Alfred-Wegener-Institut für Polar- und Meeresforschung in der Helmholtz-Gemeinschaft Am Handelshafen 12 27570 Bremerhaven / Germany
Bluefin	Bluefin Robotics Bluefin Robotics Corporation 237 Putnam Avenue Cambridge, MA 02139 / USA
DWD	Deutscher Wetterdienst Geschäftsbereich Wettervorhersage Seeschifffahrtsberatung Bernhard-Nocht-Strasse 76 20359 Hamburg /Germany
HSI	HeliService international Am Luneort 15 27572 Bremerhaven /Germany
IOPAS	Institute of Oceanology, Polish Academy of Sciences Powstańców Warszawy 55 81-712 Sopot / Poland
ISITEC	iSiTEC GmbH Bussestraße 27 27570 Bremerhaven / Germany
LSCE	Laboratoire des Sciences du Climat et de l'Environnement Centre National de la Recherche Scientifique, CNRS-UMR 8212 Orme des Merisiers, Bat 701 91191Gif sur Yvette / France
MPI-MM	Max-Planck-Institut für Marine Mikrobiologie Microbial Habitat Group Celsiusstrasse 1 28359 Bremen / Germany
PolE	Laboratory for Polar Ecology Rue du Fodia 18 B-1367 Ramillies / Belgium

A.2 FAHRTTEILNEHMER / CRUISE PARTICIPANTS

Name	First name	Institute	Profession
Allison	Ted	Bluefin	Technician
Baldyga	Barbara	IOPAS	Biologist
Bauerfeind	Eduard	AWI	Biologist
Beszczynska-Möller	Agnieszka	AWI	Oceanographer
Büchner	Jürgen	HSI	Pilot
Cherkasheva	Alexandra	AWI	Oceanographer
Czub	Michal	IOPAS	Biologist
Felden	Janine	MPI-MM	Biologist
Gall	Fabian	HSI	Heli-Technician
Ginzburg	Michael	AWI	Student apprentice
Gros	Valerie	CNRS	Atmospheric chemist
Hasemann	Christiane	AWI	Biologist
Heckmann	Markus	HSI	Heli-Technician
Hoge	Ulrich	AWI	Engineer, biology
Hoops	Jan	ISITEC	Technical assistant
Hülz	Jan	AWI	Engineer, oceanography
Jacob	Juliane	AWI	Student, oceanography
Jacob	Marianne	AWI	Biologist
Knüppel	Nadine	AWI	Biologist
Kraft	Angelina	AWI	Biologist
Lalande	Catharine	AWI	Biologist
Legrand	Vincent	PoIE	Biologist
Lehmenhecker	Sascha	AWI	Engineer, biology
Lindner	Roland	HSI	Pilot
Lochthofen	Normen	AWI	Engineer, biology
Lürig	Moritz	AWI	Student, oceanography
Menzel	Uta	AWI	Student, oceanography
Miller	Max	DWD	Meteorologist
Monsees	Matthias	AWI	Technician, oceanography
Moos	Simone	AWI	Student, oceanography
Peeken	Ilka	AWI	Biological oceanographer
Pfaff	Siegrid	AWI	Biologist
Sablotny	Burkhard	AWI	Engineer, biology
Schewe	Ingo	AWI	Biologist
Schröer	Annika	AWI	Technician, biology
Sevrin	Damien	PoIE	Biologist
Shurn	Kimberly	Bluefin	Technician
Soltwedel	Thomas	AWI	Biologist
Sonnabend	Hartmut	DWD	Meteorologist
Strothmann	Olaf	AWI	Technician, oceanography
Tran	Sophie	LSCE	Atmospheric chemist
Verbelen	Dominique	PoIE	Biologist
von Egan-Krieger	Sascha	AWI	Student, oceanography
Wend	Britta	AWI	Biological oceanographer
Wenzhöfer	Frank	AWI	Geochemist
Wilm	Rosa	AWI	Student, oceanography

Name	First name	Institute	Profession
Wisotzki	Andreas	AWI	Oceanographer
Wulff	Thorben	AWI	Engineer, biology
Wurst	Mascha	AWI	Biologist
Zakrzewski	Svenja	AWI	Student, oceanography
Zoch	Nico	AWI	Student, oceanography

A.3 SCHIFFSBESATZUNG / SHIP'S CREW

No.	Name	Rank
01.	Schwarze, Stefan	Master
02.	Birnbaum, Thilo	1. Offc.
03.	Krohn, Günter	Ch.Eng.
04.	Fallei, Holger	2. Offc.
05.	Gründling, Ulli	2. Offc.
06.	Dugge, Heike	2. Offc.
07.	Erich, Matthias	Doctor
08.	Hecht, Andreas	R.Offc.
09.	Sümnicht, Stefan	1. Eng.
10.	Minzlaff, Hans-Ulrich	2. Eng.
11.	Schaefer, Marc	2. Eng.
12.	Scholz, Manfred	ElecEng.
13.	Muhle, Helmut	ELO
14.	Himmel, Frank	ELO
15.	Stronzeck, David	ELO
16.	Winter, Andreas	ELO
17.	Loidl, Reiner	Boatsw.
18.	Reise, Lutz	Carpenter
19.	Bäcker, Andreas	A.B.
20.	Brickmann, Peter	A.B.
21.	Guse, Hartmut	A.B.
22.	Hagemann, Manfred	A.B.
23.	Scheel, Sebastian	A.B.
24.	Schmidt, Uwe	A.B.
25.	Wende, Uwe	A.B.
26.	Winkler,Michael	A.B.
27	Preußner, Jörg	Storek.
28.	Elsner, Klaus	Mot-man
29.	Pinske, Lutz	Mot-man
30.	Schütt, Norbert	Mot-man
31.	Teichert, Uwe	Mot-man
32.	Voy, Bernd	Mot-man
33.	Müller-Homburg, R.-D	Cook
34.	Martens, Michael	Cooksmate
35.	Silinski, Frank	Cooksmate
36.	Jürgens, Monika	1.Stwdess
37.	Wöckener, Martina	Stwdss/Kr
38.	Czyborra, Bärbel	2.Stwdess
39.	Gaude, Hans-Jürgen	2.Steward
40.	Huang, Wu-Mei	2.Steward
41.	Möller, Wolfgang	2.Steward
42.	Silinski, Carmen	2.Stwdess
43.	Yu Kwok Yuen	Laundrym.

A. 4 STATIONSLISTE / STATION LIST

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0083-1	01.07.10	00:43:00	78°50.00'N	9°49.79'E	103.2	CTD/RO	in the water
0083-1	01.07.10	00:54:00	78°50.03'N	9°49.73'E	103.0	CTD/RO	on ground/max depth
0083-1	01.07.10	00:55:00	78°50.03'N	9°49.72'E	102.7	CTD/RO	hoisting
0083-1	01.07.10	00:58:59	78°50.05'N	9°49.70'E	102.5	CTD/RO	on deck
0084-1	01.07.10	01:20:00	78°50.01'N	9°40.04'E	88.5	CTD/RO	in the water
0084-1	01.07.10	01:27:00	78°50.03'N	9°39.98'E	89.2	CTD/RO	on ground/max depth
0084-1	01.07.10	01:27:01	78°50.03'N	9°39.98'E	89.2	CTD/RO	hoisting
0084-1	01.07.10	01:30:59	78°50.04'N	9°39.90'E	90.2	CTD/RO	on deck
0085-1	01.07.10	01:51:00	78°49.94'N	9°30.38'E	174.0	CTD/RO	in the water
0085-1	01.07.10	02:00:00	78°49.99'N	9°30.17'E	176.2	CTD/RO	on ground/max depth
0085-1	01.07.10	02:06:59	78°49.99'N	9°30.35'E	177.0	CTD/RO	on deck
0086-1	01.07.10	02:38:00	78°50.06'N	9°19.93'E	205.0	CTD/RO	in the water
0086-1	01.07.10	02:49:00	78°50.12'N	9°19.92'E	206.5	CTD/RO	on ground/max depth
0086-1	01.07.10	02:54:59	78°50.14'N	9°19.86'E	207.7	CTD/RO	on deck
0087-1	01.07.10	04:04:00	78°49.01'N	8°41.19'E	275.0	MOR	in the water
0087-1	01.07.10	04:13:00	78°49.05'N	8°41.04'E	275.0	MOR	on deck
0087-1	01.07.10	04:21:00	78°49.03'N	8°39.71'E	332.2	MOR	in the water
0087-1	01.07.10	04:25:00	78°49.05'N	8°39.64'E	333.0	MOR	on deck
0087-1	01.07.10	05:08:00	78°49.96'N	8°39.79'E	252.2	MOR	in the water
0087-1	01.07.10	05:09:00	78°49.96'N	8°39.80'E	251.7	MOR	on deck
0087-1	01.07.10	05:12:00	78°49.96'N	8°39.78'E	251.7	MOR	information
0087-1	01.07.10	05:28:00	78°49.91'N	8°39.34'E	266.0	MOR	information
0087-1	01.07.10	05:30:59	78°50.01'N	8°38.63'E	284.5	MOR	on ground/max depth
0088-1	01.07.10	06:06:00	78°50.54'N	8°21.36'E	761.7	MOR	in the water
0088-1	01.07.10	06:06:01	78°50.54'N	8°21.36'E	761.7	MOR	on ground/max depth
0088-1	01.07.10	06:08:00	78°50.56'N	8°21.44'E	759.7	MOR	on deck
0088-1	01.07.10	06:11:00	78°50.60'N	8°21.29'E	760.7	MOR	at surface
0088-1	01.07.10	06:20:00	78°50.56'N	8°19.82'E	787.0	MOR	action
0088-1	01.07.10	06:22:00	78°50.58'N	8°19.74'E	788.0	MOR	on deck
0088-1	01.07.10	06:28:00	78°50.68'N	8°19.57'E	794.2	MOR	on deck
0088-1	01.07.10	06:45:59	78°50.92'N	8°19.51'E	792.0	MOR	on deck
0089-1	01.07.10	07:11:01	78°50.49'N	8°19.23'E	797.7	PIES	action

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0089-1	01.07.10	07:14:01	78°50.50'N	8°19.16'E	799.0	PIES	on ground/max depth
0089-1	01.07.10	07:16:01	78°50.52'N	8°19.12'E	799.5	PIES	in the water
0089-1	01.07.10	07:18:01	78°50.54'N	8°19.10'E	799.7	PIES	on deck
0089-1	01.07.10	07:21:00	78°50.59'N	8°19.10'E	799.5	PIES	in the water
0089-2	01.07.10	07:22:00	78°50.60'N	8°19.10'E	799.5	HN	in the water
0089-1	01.07.10	07:23:00	78°50.61'N	8°19.09'E	799.7	PIES	action
0089-2	01.07.10	07:25:00	78°50.63'N	8°19.06'E	800.5	HN	on ground/max depth
0089-2	01.07.10	07:25:59	78°50.63'N	8°19.06'E	800.5	HN	on deck
0089-1	01.07.10	07:45:01	78°50.66'N	8°18.81'E	806.7	PIES	action
0089-1	01.07.10	07:56:01	78°50.75'N	8°18.89'E	806.0	PIES	at surface
0089-1	01.07.10	08:03:01	78°50.71'N	8°19.23'E	799.7	PIES	in the water
0089-1	01.07.10	08:07:01	78°50.74'N	8°19.21'E	800.2	PIES	action
0089-1	01.07.10	08:09:59	78°50.49'N	8°19.13'E	802.0	PIES	on deck
0090-1	01.07.10	08:47:00	78°50.30'N	8°0.66'E	1030.2	MOR	action
0090-1	01.07.10	08:47:01	78°50.30'N	8°0.66'E	1030.2	MOR	on ground/max depth
0090-1	01.07.10	08:50:00	78°50.34'N	8°0.57'E	1031.0	MOR	at surface
0090-1	01.07.10	09:06:00	78°50.19'N	7°59.73'E	1037.5	MOR	action
0090-1	01.07.10	09:07:00	78°50.20'N	7°59.76'E	1040.0	MOR	on deck
0090-1	01.07.10	09:14:00	78°50.29'N	7°59.72'E	1055.0	MOR	on deck
0090-1	01.07.10	09:29:00	78°50.47'N	7°59.29'E	1040.7	MOR	on deck
0090-1	01.07.10	09:37:59	78°50.56'N	7°59.27'E	1042.5	MOR	on deck
0091-1	01.07.10	11:08:00	78°49.95'N	7°1.13'E	1448.0	MOR	action
0091-1	01.07.10	11:08:01	78°49.95'N	7°1.13'E	1448.0	MOR	on ground/max depth
0091-1	01.07.10	11:09:00	78°49.96'N	7°1.11'E	1448.2	MOR	action
0091-1	01.07.10	11:33:00	78°49.92'N	7°0.36'E	1460.0	MOR	action
0091-1	01.07.10	11:36:00	78°49.90'N	7°0.42'E	1460.2	MOR	on deck
0091-2	01.07.10	11:38:00	78°49.90'N	7°0.44'E	1459.7	HN	in the water
0091-2	01.07.10	11:40:00	78°49.91'N	7°0.41'E	1460.0	HN	on ground/max depth
0091-2	01.07.10	11:42:59	78°49.91'N	7°0.34'E	1461.0	HN	on deck
0091-1	01.07.10	11:46:00	78°49.92'N	7°0.23'E	1462.5	MOR	on deck
0091-1	01.07.10	11:55:00	78°49.89'N	7°0.25'E	1464.0	MOR	on deck
0091-1	01.07.10	12:04:00	78°49.87'N	7°0.36'E	1463.2	MOR	on deck
0091-1	01.07.10	12:12:00	78°49.81'N	7°0.66'E	1460.5	MOR	on deck
0091-1	01.07.10	12:25:59	78°49.86'N	7°0.34'E	1463.7	MOR	on ground/max depth
0092-1	01.07.10	12:55:00	78°50.22'N	7°3.00'E	1418.5	PIES	action

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0092-1	01.07.10	12:56:00	78°50.22'N	7°3.02'E	1422.0	PIES	on ground/max depth
0092-1	01.07.10	12:58:00	78°50.22'N	7°3.06'E	1421.7	PIES	action
0092-1	01.07.10	13:04:00	78°50.24'N	7°2.90'E	1423.7	PIES	on deck
0092-1	01.07.10	13:38:00	78°50.22'N	7°2.92'E	1423.7	PIES	action
0092-1	01.07.10	13:41:00	78°50.23'N	7°2.93'E	1423.5	PIES	in the water
0092-1	01.07.10	13:47:00	78°50.24'N	7°2.98'E	1423.0	PIES	action
0092-1	01.07.10	13:48:00	78°50.24'N	7°2.99'E	1422.7	PIES	on deck
0092-1	01.07.10	13:54:00	78°50.26'N	7°3.00'E	1422.5	PIES	action
0092-1	01.07.10	14:27:00	78°50.14'N	7°2.06'E	1437.2	PIES	action
0092-1	01.07.10	14:44:00	78°50.19'N	7°3.25'E	1419.2	PIES	action
0092-1	01.07.10	14:44:01	78°50.19'N	7°3.25'E	1419.2	PIES	on deck
0092-1	01.07.10	14:46:59	78°50.19'N	7°3.19'E	1420.0	PIES	on deck
0093-1	01.07.10	16:16:00	78°50.29'N	6°0.58'E	2468.7	MOR	information
0093-1	01.07.10	16:21:00	78°50.27'N	6°0.49'E	2469.2	MOR	action
0093-1	01.07.10	16:28:00	78°50.26'N	6°0.40'E	2469.7	MOR	at surface
0093-1	01.07.10	16:40:00	78°50.15'N	5°59.64'E	2474.0	MOR	action
0093-1	01.07.10	16:43:00	78°50.14'N	5°59.57'E	2474.7	MOR	on deck
0093-1	01.07.10	16:49:00	78°50.16'N	5°59.81'E	2472.7	MOR	on deck
0093-1	01.07.10	17:02:00	78°50.25'N	5°59.96'E	2472.7	MOR	on deck
0093-1	01.07.10	17:24:00	78°50.37'N	5°59.93'E	2474.2	MOR	on deck
0093-1	01.07.10	17:36:00	78°50.43'N	5°59.95'E	2474.5	MOR	on deck
0093-1	01.07.10	17:36:01	78°50.43'N	5°59.95'E	2474.5	MOR	on deck
0093-1	01.07.10	17:54:01	78°50.52'N	6°0.05'E	2474.7	MOR	on ground/max depth
0093-1	01.07.10	17:54:59	78°50.52'N	6°0.05'E	2474.7	MOR	information
0094-1	01.07.10	18:47:00	78°50.08'N	6°29.83'E	1977.0	CTD/RO	in the water
0094-2	01.07.10	18:57:00	78°50.08'N	6°29.77'E	1978.0	SPR	in the water
0094-2	01.07.10	19:05:00	78°50.10'N	6°29.79'E	1977.0	SPR	on ground/max depth
0094-2	01.07.10	19:09:59	78°50.10'N	6°29.86'E	1975.5	SPR	on deck
0094-1	01.07.10	19:24:00	78°50.19'N	6°29.77'E	1974.2	CTD/RO	on ground/max depth
0094-1	01.07.10	20:01:59	78°50.29'N	6°29.92'E	1968.0	CTD/RO	on deck
0095-1	01.07.10	20:33:00	78°50.09'N	6°19.27'E	2201.5	CTD/RO	in the water
0095-1	01.07.10	21:13:00	78°50.32'N	6°17.96'E	2231.7	CTD/RO	on ground/max depth
0095-1	01.07.10	21:49:59	78°50.48'N	6°17.31'E	2240.0	CTD/RO	on deck
0096-1	01.07.10	22:12:00	78°50.02'N	6°10.22'E	2360.5	CTD/RO	in the water
0096-1	01.07.10	22:54:00	78°50.24'N	6°9.10'E	2376.2	CTD/RO	on ground/max depth
0096-1	01.07.10	22:54:01	78°50.24'N	6°9.10'E	2376.2	CTD/RO	hoisting

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0096-1	01.07.10	23:31:59	78°50.22'N	6°8.84'E	2379.7	CTD/RO	on deck
0097-1	02.07.10	00:22:00	78°49.96'N	5°40.08'E	1882.0	CTD/RO	in the water
0097-1	02.07.10	01:22:00	78°49.74'N	5°39.34'E	1549.2	CTD/RO	on ground/max depth
0097-1	02.07.10	01:23:00	78°49.74'N	5°39.34'E	1703.5	CTD/RO	hoisting
0097-1	02.07.10	02:04:59	78°49.71'N	5°38.74'E	1671.5	CTD/RO	on deck
0098-1	02.07.10	02:38:00	78°49.97'N	5°20.30'E	2629.0	CTD/RO	in the water
0098-1	02.07.10	03:27:00	78°49.96'N	5°19.72'E	2629.2	CTD/RO	on ground/max depth
0098-1	02.07.10	04:14:59	78°49.96'N	5°19.17'E	2630.0	CTD/RO	on deck
0099-1	02.07.10	04:48:00	78°50.12'N	5°30.51'E	2611.0	MOR	information
0099-1	02.07.10	04:48:01	78°50.12'N	5°30.51'E	2611.0	MOR	in the water
0099-1	02.07.10	04:52:00	78°50.12'N	5°30.38'E	2611.2	MOR	action
0099-1	02.07.10	04:58:00	78°50.11'N	5°30.09'E	2612.2	MOR	at surface
0099-1	02.07.10	04:59:00	78°50.11'N	5°30.05'E	2612.5	MOR	on deck
0099-1	02.07.10	05:15:00	78°50.01'N	5°28.70'E	2614.5	MOR	action
0099-1	02.07.10	05:16:00	78°50.00'N	5°28.71'E	2614.5	MOR	action
0099-1	02.07.10	05:25:00	78°49.99'N	5°28.52'E	2614.5	MOR	in the water
0099-1	02.07.10	05:27:00	78°50.00'N	5°28.49'E	2614.7	MOR	action
0099-1	02.07.10	05:30:00	78°50.00'N	5°28.47'E	2614.7	MOR	on deck
0099-1	02.07.10	05:33:00	78°49.99'N	5°28.40'E	2614.7	MOR	on deck
0099-1	02.07.10	05:40:00	78°49.95'N	5°28.29'E	2614.2	MOR	on deck
0099-1	02.07.10	05:50:00	78°49.93'N	5°28.17'E	2614.2	MOR	on deck
0099-1	02.07.10	06:36:00	78°49.91'N	5°27.54'E	2614.7	MOR	on deck
0099-1	02.07.10	06:37:00	78°49.92'N	5°27.53'E	2614.7	MOR	on ground/max depth
0099-1	02.07.10	06:39:59	78°49.92'N	5°27.51'E	2614.7	MOR	on deck
0100-1	02.07.10	07:19:00	78°50.00'N	5°1.34'E	2700.7	MOR	action
0100-1	02.07.10	07:24:00	78°49.99'N	5°1.11'E	2703.0	MOR	action
0100-1	02.07.10	07:35:00	78°50.08'N	5°1.40'E	2685.5	MOR	action
0100-1	02.07.10	07:41:00	78°50.09'N	5°1.40'E	2704.7	MOR	in the water
0100-1	02.07.10	07:42:00	78°50.10'N	5°1.39'E	2705.5	MOR	action
0100-1	02.07.10	07:46:00	78°50.09'N	5°1.34'E	2698.0	MOR	on deck
0100-1	02.07.10	07:48:00	78°50.09'N	5°1.30'E	2705.0	MOR	at surface
0100-1	02.07.10	07:49:00	78°50.09'N	5°1.30'E	2705.5	MOR	on ground/max depth
0100-1	02.07.10	08:02:00	78°50.07'N	4°59.99'E	2706.7	MOR	in the water
0100-1	02.07.10	08:04:00	78°50.08'N	4°59.90'E	2706.5	MOR	action
0100-1	02.07.10	08:06:00	78°50.08'N	4°59.87'E	2707.7	MOR	on deck
0100-1	02.07.10	08:07:00	78°50.08'N	4°59.86'E	2707.2	MOR	hoisting
0100-1	02.07.10	08:09:00	78°50.06'N	4°59.85'E	2706.0	MOR	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0100-1	02.07.10	08:15:00	78°50.08'N	4°59.63'E	2707.0	MOR	on ground/max depth
0100-1	02.07.10	08:31:00	78°50.07'N	4°59.79'E	2706.0	MOR	on deck
0100-2	02.07.10	08:33:00	78°50.07'N	4°59.80'E	2705.7	HN	in the water
0100-2	02.07.10	08:35:00	78°50.07'N	4°59.82'E	2706.0	HN	on ground/max depth
0100-2	02.07.10	08:37:59	78°50.07'N	4°59.82'E	2705.7	HN	on deck
0100-3	02.07.10	08:38:00	78°50.07'N	4°59.83'E	2705.7	HN	in the water
0100-3	02.07.10	08:38:01	78°50.07'N	4°59.83'E	2705.7	HN	on ground/max depth
0100-1	02.07.10	08:40:00	78°50.07'N	4°59.83'E	2706.2	MOR	on deck
0100-3	02.07.10	08:41:59	78°50.08'N	4°59.83'E	2706.2	HN	on deck
0100-1	02.07.10	09:08:00	78°50.05'N	4°59.97'E	2706.0	MOR	on deck
0100-1	02.07.10	09:24:59	78°50.07'N	4°59.70'E	2706.2	MOR	on deck
0101-1	02.07.10	10:37:00	78°50.07'N	4°56.25'E	2639.2	PIES	action
0101-1	02.07.10	10:37:01	78°50.07'N	4°56.25'E	2639.2	PIES	on ground/max depth
0101-1	02.07.10	10:38:00	78°50.07'N	4°56.24'E	2638.7	PIES	in the water
0101-1	02.07.10	10:40:00	78°50.07'N	4°56.22'E	2641.5	PIES	action
0101-1	02.07.10	10:43:00	78°50.07'N	4°56.18'E	2639.0	PIES	on deck
0101-1	02.07.10	10:59:00	78°50.08'N	4°56.13'E	2638.5	PIES	action
0101-2	02.07.10	11:08:00	78°50.12'N	4°56.37'E	2686.7	AUV	in the water
0101-2	02.07.10	11:42:00	78°50.01'N	4°55.99'E	2614.7	AUV	on ground/max depth
0101-2	02.07.10	11:42:01	78°50.01'N	4°55.99'E	2614.7	AUV	profilestart
0101-1	02.07.10	11:51:00	78°49.97'N	4°55.94'E	2601.7	PIES	at surface
0101-2	02.07.10	11:54:00	78°49.96'N	4°55.97'E	2600.0	AUV	hoisting
0101-2	02.07.10	11:54:01	78°49.96'N	4°55.97'E	2600.0	AUV	profileend
0101-1	02.07.10	12:00:00	78°49.91'N	4°56.01'E	2592.2	PIES	action
0101-1	02.07.10	12:05:59	78°49.91'N	4°56.08'E	2593.7	PIES	on deck
0101-2	02.07.10	12:20:59	78°49.83'N	4°56.19'E	2590.0	AUV	on deck
0102-1	02.07.10	12:42:00	78°50.00'N	5°0.09'E	2706.2	CTD/RO	in the water
0102-2	02.07.10	12:54:00	78°50.06'N	4°59.77'E	2705.5	SPR	in the water
0102-2	02.07.10	13:11:00	78°50.05'N	4°59.59'E	2707.5	SPR	on ground/max depth
0102-2	02.07.10	13:17:59	78°50.03'N	4°59.65'E	2706.7	SPR	on deck
0102-1	02.07.10	13:32:00	78°50.06'N	4°59.16'E	2709.0	CTD/RO	on ground/max depth
0102-1	02.07.10	13:33:00	78°50.06'N	4°59.15'E	2709.0	CTD/RO	hoisting
0102-1	02.07.10	14:22:59	78°50.01'N	4°58.99'E	2706.0	CTD/RO	on deck
0102-3	02.07.10	14:36:00	78°50.03'N	5°0.00'E	2705.7	MOR	information
0102-3	02.07.10	14:37:00	78°50.03'N	5°0.02'E	2706.2	MOR	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0102-3	02.07.10	14:39:00	78°50.03'N	5°0.04'E	2711.7	MOR	in the water
0102-3	02.07.10	14:39:01	78°50.03'N	5°0.04'E	2711.7	MOR	in the water
0102-3	02.07.10	15:11:00	78°50.02'N	4°59.98'E	2706.0	MOR	in the water
0102-3	02.07.10	15:34:00	78°50.01'N	4°59.96'E	2706.7	MOR	in the water
0102-3	02.07.10	15:46:00	78°50.01'N	5°0.03'E	2706.0	MOR	in the water
0102-3	02.07.10	15:55:00	78°50.00'N	4°59.99'E	2706.0	MOR	in the water
0102-3	02.07.10	16:06:00	78°50.00'N	5°0.04'E	2705.7	MOR	in the water
0102-3	02.07.10	16:13:00	78°50.00'N	4°60.00'E	2705.5	MOR	in the water
0102-3	02.07.10	16:14:00	78°50.00'N	5°0.01'E	2705.7	MOR	in the water
0102-3	02.07.10	16:15:00	78°50.01'N	5°0.01'E	2705.7	MOR	in the water
0102-3	02.07.10	16:17:00	78°50.01'N	4°60.00'E	2706.2	MOR	action
0102-3	02.07.10	16:17:01	78°50.01'N	4°60.00'E	2706.2	MOR	on deck
0102-3	02.07.10	16:17:02	78°50.01'N	4°60.00'E	2706.2	MOR	on deck
0102-3	02.07.10	16:17:59	78°50.01'N	4°60.00'E	2706.2	MOR	on ground/max depth
0103-1	02.07.10	18:49:00	78°49.98'N	6°39.74'E	1783.2	CTD/RO	in the water
0103-1	02.07.10	19:23:00	78°50.16'N	6°38.82'E	1796.0	CTD/RO	on ground/max depth
0103-1	02.07.10	19:51:59	78°50.28'N	6°38.19'E	1804.7	CTD/RO	on deck
0104-1	02.07.10	20:20:00	78°49.95'N	6°50.02'E	1623.5	CTD/RO	in the water
0104-1	02.07.10	20:52:00	78°50.01'N	6°49.58'E	1631.2	CTD/RO	on ground/max depth
0104-1	02.07.10	21:16:59	78°50.04'N	6°49.19'E	1645.7	CTD/RO	on deck
0105-1	02.07.10	21:55:00	78°50.08'N	7°9.74'E	1358.5	CTD/RO	in the water
0105-1	02.07.10	22:23:00	78°50.16'N	7°10.10'E	1345.7	CTD/RO	on ground/max depth
0105-1	02.07.10	22:23:01	78°50.16'N	7°10.10'E	1345.7	CTD/RO	hoisting
0105-1	02.07.10	22:44:59	78°50.17'N	7°10.22'E	1342.0	CTD/RO	on deck
0106-1	02.07.10	23:06:00	78°50.02'N	7°19.83'E	1239.0	CTD/RO	in the water
0106-1	02.07.10	23:33:00	78°50.06'N	7°20.54'E	1233.0	CTD/RO	on ground/max depth
0106-1	02.07.10	23:33:01	78°50.06'N	7°20.54'E	1233.0	CTD/RO	hoisting
0106-1	02.07.10	23:53:59	78°50.12'N	7°20.97'E	1228.2	CTD/RO	on deck
0107-1	03.07.10	00:14:00	78°49.98'N	7°30.03'E	1171.7	CTD/RO	in the water
0107-1	03.07.10	00:39:00	78°49.97'N	7°30.64'E	1161.7	CTD/RO	on ground/max depth
0107-1	03.07.10	00:39:01	78°49.97'N	7°30.64'E	1161.7	CTD/RO	hoisting
0107-1	03.07.10	00:57:59	78°49.98'N	7°30.98'E	1165.2	CTD/RO	on deck
0108-1	03.07.10	01:15:00	78°49.99'N	7°40.19'E	1109.5	CTD/RO	in the water
0108-1	03.07.10	01:39:00	78°49.98'N	7°40.77'E	1106.2	CTD/RO	on ground/max depth
0108-1	03.07.10	01:39:01	78°49.98'N	7°40.77'E	1106.2	CTD/RO	hoisting

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0108-1	03.07.10	01:56:59	78°49.98'N	7°40.74'E	1106.7	CTD/RO	on deck
0109-1	03.07.10	02:38:00	78°50.00'N	8°0.39'E	1030.7	MN	in the water
0109-1	03.07.10	02:45:00	78°50.03'N	8°0.30'E	1031.7	MN	on ground/max depth
0109-1	03.07.10	02:54:59	78°50.09'N	8°0.39'E	1032.2	MN	on deck
0109-2	03.07.10	03:04:00	78°50.09'N	8°0.51'E	1031.5	BONGO	in the water
0109-2	03.07.10	03:17:00	78°50.11'N	8°0.66'E	1030.5	BONGO	on ground/max depth
0109-2	03.07.10	03:26:59	78°50.11'N	8°0.75'E	1029.7	BONGO	on deck
0109-3	03.07.10	04:02:00	78°49.99'N	7°59.93'E	1034.5	CTD/RO	in the water
0109-3	03.07.10	04:26:00	78°50.04'N	8°0.10'E	1033.5	CTD/RO	on ground/m.depth
0109-3	03.07.10	04:50:59	78°50.09'N	8°0.14'E	1034.0	CTD/RO	on deck
0109-4	03.07.10	05:00:00	78°50.00'N	8°0.14'E	1033.0	MOR	information
0109-4	03.07.10	05:02:00	78°49.99'N	8°0.16'E	1032.5	MOR	in the water
0109-4	03.07.10	05:06:00	78°49.98'N	8°0.12'E	1032.5	MOR	in the water
0109-4	03.07.10	05:06:01	78°49.98'N	8°0.12'E	1032.5	MOR	in the water
0109-4	03.07.10	05:10:00	78°49.98'N	8°0.04'E	1033.3	MOR	in the water
0109-4	03.07.10	05:31:00	78°50.00'N	8°0.00'E	2065.9	MOR	in the water
0109-4	03.07.10	05:45:00	78°50.00'N	7°59.99'E	1037.0	MOR	in the water
0109-4	03.07.10	05:57:00	78°50.01'N	7°60.00'E	1036.0	MOR	in the water
0109-4	03.07.10	05:58:00	78°50.01'N	8°0.01'E	1036.0	MOR	in the water
0109-4	03.07.10	06:00:00	78°50.01'N	8°0.01'E	2065.3	MOR	in the water
0109-4	03.07.10	06:01:00	78°50.00'N	7°59.99'E	1036.0	MOR	action
0109-4	03.07.10	06:01:01	78°50.00'N	7°59.99'E	1036.0	MOR	on deck
0109-4	03.07.10	06:02:00	78°50.00'N	7°59.97'E	1036.0	MOR	on ground/m.depth
0109-4	03.07.10	06:05:59	78°50.00'N	8°0.07'E	2056.6	MOR	on deck
0110-1	03.07.10	06:39:00	78°49.99'N	8°20.00'E	790.6	CTD/RO	in the water
0110-1	03.07.10	07:00:00	78°50.01'N	8°20.06'E	786.2	CTD/RO	on ground/m.depth
0110-1	03.07.10	07:18:59	78°50.01'N	8°20.04'E	790.5	CTD/RO	on deck
0110-2	03.07.10	07:22:00	78°50.00'N	8°20.07'E	789.5	MOR	information
0110-2	03.07.10	07:25:00	78°50.00'N	8°20.06'E	789.5	MOR	in the water
0110-2	03.07.10	07:30:00	78°50.00'N	8°20.02'E	790.2	MOR	in the water
0110-2	03.07.10	07:43:00	78°50.01'N	8°20.01'E	790.5	MOR	in the water
0110-2	03.07.10	07:56:00	78°50.01'N	8°20.03'E	790.2	MOR	in the water
0110-2	03.07.10	08:00:00	78°50.00'N	8°20.02'E	790.0	MOR	in the water
0110-2	03.07.10	08:02:00	78°50.00'N	8°20.01'E	790.2	MOR	in the water
0110-2	03.07.10	08:03:00	78°50.01'N	8°20.01'E	790.6	MOR	action
0110-2	03.07.10	08:04:00	78°50.01'N	8°20.03'E	790.3	MOR	on deck
0110-2	03.07.10	08:06:00	78°50.01'N	8°20.02'E	790.5	MOR	on ground/m.depth
0110-2	03.07.10	08:08:59	78°50.01'N	8°20.01'E	790.5	MOR	action
0111-1	03.07.10	08:48:00	78°49.98'N	8°40.00'E	248.6	CTD/RO	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0111-2	03.07.10	08:59:00	78°50.01'N	8°40.20'E	241.7	SPR	in the water
0111-1	03.07.10	09:00:00	78°50.01'N	8°40.21'E	244.7	CTD/RO	on ground/m.depth
0111-1	03.07.10	09:12:59	78°50.01'N	8°40.14'E	243.0	CTD/RO	on deck
0111-2	03.07.10	09:14:00	78°50.01'N	8°40.12'E	244.2	SPR	on ground/m.depth
0111-2	03.07.10	09:18:59	78°50.01'N	8°40.09'E	245.7	SPR	on deck
0111-3	03.07.10	10:33:00	78°50.01'N	8°40.05'E	232.0	MOR	in the water
0111-3	03.07.10	10:35:00	78°50.02'N	8°40.11'E	230.0	MOR	in the water
0111-3	03.07.10	10:40:00	78°50.02'N	8°40.06'E	232.0	MOR	in the water
0111-4	03.07.10	10:48:00	78°50.01'N	8°40.05'E	232.0	HN	in the water
0111-3	03.07.10	10:50:00	78°50.01'N	8°40.09'E	231.0	MOR	in the water
0111-4	03.07.10	10:55:00	78°50.00'N	8°40.09'E	232.0	HN	on ground/m.depth
0111-3	03.07.10	10:56:00	78°50.00'N	8°40.09'E	232.0	MOR	on ground/max depth
0111-4	03.07.10	10:57:59	78°50.00'N	8°40.09'E	232.0	HN	on deck
0111-3	03.07.10	11:01:59	78°49.97'N	8°40.03'E	234.0	MOR	on deck
0112-1	03.07.10	12:01:00	78°50.42'N	8°21.44'E	762.2	AUV	in the water
0112-1	03.07.10	12:07:00	78°50.41'N	8°21.31'E	764.4	AUV	in the water
0112-1	03.07.10	12:35:00	78°50.53'N	8°21.19'E	765.0	AUV	on ground/m.depth
0112-1	03.07.10	12:36:00	78°50.53'N	8°21.18'E	765.0	AUV	profilestart
0112-1	03.07.10	12:41:00	78°50.54'N	8°21.15'E	765.8	AUV	profileend
0112-1	03.07.10	12:42:00	78°50.55'N	8°21.16'E	765.5	AUV	hoisting
0112-1	03.07.10	13:13:00	78°50.83'N	8°21.43'E	761.2	AUV	on deck
0112-1	03.07.10	13:16:59	78°50.86'N	8°21.48'E	759.8	AUV	on deck
0113-1	03.07.10	14:32:00	78°49.98'N	9°9.97'E	220.6	CTD/RO	in the water
0113-1	03.07.10	14:42:00	78°49.99'N	9°10.03'E	220.6	CTD/RO	on ground/m.depth
0113-2	03.07.10	14:42:00	78°49.99'N	9°10.03'E	220.6	HN	in the water
0113-2	03.07.10	14:43:00	78°49.99'N	9°10.03'E	220.4	HN	on ground/max depth
0113-2	03.07.10	14:44:00	78°49.99'N	9°10.04'E	220.4	HN	on deck
0113-2	03.07.10	14:45:00	78°49.99'N	9°10.03'E	220.5	HN	in the water
0113-2	03.07.10	14:46:00	78°49.99'N	9°10.03'E	220.5	HN	on ground/max depth
0113-2	03.07.10	14:46:59	78°49.99'N	9°10.03'E	220.5	HN	on deck
0113-1	03.07.10	14:49:59	78°49.99'N	9°10.01'E	220.2	CTD/RO	on deck
0114-1	03.07.10	15:16:00	78°50.07'N	8°59.79'E	219.5	CTD/RO	in the water
0114-1	03.07.10	15:26:00	78°50.08'N	8°59.74'E	218.6	CTD/RO	on ground/max depth
0114-1	03.07.10	15:32:59	78°50.08'N	8°59.75'E	219.0	CTD/RO	on deck
0115-1	03.07.10	15:52:00	78°50.04'N	8°49.98'E	233.0	CTD/RO	in the water
0115-1	03.07.10	16:04:00	78°50.05'N	8°49.94'E	229.8	CTD/RO	on ground/max depth

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0115-1	03.07.10	16:10:59	78°50.06'N	8°49.94'E	230.2	CTD/RO	on deck
0116-1	03.07.10	16:42:00	78°50.02'N	8°30.09'E	101.4	CTD/RO	in the water
0116-1	03.07.10	16:57:00	78°50.06'N	8°30.14'E	580.4	CTD/RO	on ground/max depth
0116-1	03.07.10	17:08:59	78°50.07'N	8°30.13'E	580.4	CTD/RO	on deck
0117-1	03.07.10	17:38:00	78°50.02'N	8°12.13'E	915.5	CTD/RO	in the water
0117-1	03.07.10	17:59:00	78°50.05'N	8°11.99'E	918.7	CTD/RO	on ground/max depth
0117-1	03.07.10	18:13:59	78°50.07'N	8°12.06'E	918.0	CTD/RO	on deck
0118-1	03.07.10	18:58:00	78°50.00'N	7°50.00'E	1082.4	CTD/RO	in the water
0118-1	03.07.10	19:22:00	78°50.07'N	7°50.38'E	1083.2	CTD/RO	on ground/max depth
0118-1	03.07.10	19:39:59	78°50.07'N	7°50.66'E	1082.1	CTD/RO	on deck
0119-1	03.07.10	21:22:00	78°54.01'N	6°46.08'E	1554.9	GKG	in the water
0119-1	03.07.10	21:46:00	78°54.01'N	6°46.03'E	1555.1	GKG	on ground/max depth
0119-1	03.07.10	22:09:59	78°53.98'N	6°45.92'E	1556.6	GKG	on deck
0120-1	04.07.10	00:27:00	78°46.81'N	5°20.07'E	2463.0	MUC	in the water
0120-1	04.07.10	01:21:00	78°46.80'N	5°19.72'E	2470.4	MUC	on ground/max depth
0120-1	04.07.10	01:21:01	78°46.80'N	5°19.72'E	2470.4	MUC	hoisting
0120-1	04.07.10	01:22:00	78°46.80'N	5°19.73'E	2470.2	MUC	offground
0120-1	04.07.10	02:08:59	78°46.74'N	5°19.74'E	2466.9	MUC	on deck
0120-2	04.07.10	02:18:00	78°46.76'N	5°19.82'E	2466.3	CTD/RO	in the water
0120-2	04.07.10	03:03:00	78°46.80'N	5°19.60'E	2473.0	CTD/RO	on ground/max depth
0120-2	04.07.10	03:48:59	78°46.81'N	5°19.77'E	2470.2	CTD/RO	on deck
0121-1	04.07.10	06:08:00	78°50.06'N	6°59.86'E	1462.8	CTD/RO	in the water
0121-1	04.07.10	06:38:00	78°50.10'N	7°0.03'E	1458.9	CTD/RO	on ground/max depth
0121-1	04.07.10	07:08:59	78°50.17'N	7°0.42'E	1452.6	CTD/RO	on deck
0121-2	04.07.10	07:22:00	78°50.08'N	7°0.30'E	1456.1	MOR	information
0121-2	04.07.10	07:23:00	78°50.08'N	7°0.31'E	1456.7	MOR	in the water
0121-2	04.07.10	07:25:00	78°50.08'N	7°0.34'E	1455.5	MOR	in the water
0121-2	04.07.10	07:31:00	78°50.09'N	7°0.39'E	1454.8	MOR	in the water
0121-2	04.07.10	07:44:00	78°50.08'N	7°0.38'E	1455.0	MOR	in the water
0121-2	04.07.10	08:01:00	78°50.08'N	7°0.42'E	1454.4	MOR	in the water
0121-2	04.07.10	08:13:00	78°50.09'N	7°0.37'E	1453.7	MOR	in the water
0121-2	04.07.10	08:14:00	78°50.09'N	7°0.37'E	1454.6	MOR	in the water
0121-2	04.07.10	08:17:00	78°50.08'N	7°0.36'E	1454.5	MOR	in the water
0121-2	04.07.10	08:18:00	78°50.08'N	7°0.35'E	1455.4	MOR	action
0121-2	04.07.10	08:18:01	78°50.08'N	7°0.35'E	1455.4	MOR	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0121-2	04.07.10	08:20:00	78°50.08'N	7°0.36'E	1454.6	MOR	on deck
0121-2	04.07.10	08:21:59	78°50.09'N	7°0.37'E	1454.3	MOR	on ground/max depth
0122-1	04.07.10	09:54:00	78°50.01'N	5°59.41'E	2474.1	CTD/RO	in the water
0122-2	04.07.10	09:56:00	78°50.00'N	5°59.40'E	2474.6	SPR	in the water
0122-2	04.07.10	10:10:00	78°50.00'N	5°59.02'E	2477.1	SPR	on ground/max depth
0122-2	04.07.10	10:10:01	78°50.00'N	5°59.02'E	2477.1	SPR	hoisting
0122-2	04.07.10	10:15:59	78°50.00'N	5°58.88'E	2478.8	SPR	on deck
0122-1	04.07.10	10:38:00	78°50.02'N	5°58.97'E	2478.0	CTD/RO	on ground/max depth
0122-1	04.07.10	10:38:01	78°50.02'N	5°58.97'E	2478.0	CTD/RO	hoisting
0122-1	04.07.10	11:24:59	78°50.04'N	5°59.19'E	2475.4	CTD/RO	on deck
0122-3	04.07.10	11:31:00	78°49.95'N	6°0.08'E	2468.7	MOR	in the water
0122-3	04.07.10	11:33:00	78°49.96'N	6°0.08'E	2468.5	MOR	in the water
0122-3	04.07.10	11:43:00	78°49.98'N	6°0.06'E	2469.5	MOR	in the water
0122-3	04.07.10	12:01:00	78°49.98'N	5°60.00'E	2470.5	MOR	in the water
0122-3	04.07.10	12:22:00	78°49.97'N	6°0.01'E	2469.6	MOR	in the water
0122-3	04.07.10	12:42:00	78°49.99'N	6°0.01'E	2470.2	MOR	in the water
0122-3	04.07.10	12:57:00	78°49.97'N	5°59.97'E	2470.5	MOR	in the water
0122-3	04.07.10	12:58:00	78°49.97'N	5°60.00'E	2469.7	MOR	in the water
0122-3	04.07.10	13:00:00	78°49.97'N	6°0.03'E	2469.3	MOR	on ground/max depth
0122-3	04.07.10	13:02:59	78°49.96'N	6°0.01'E	2469.4	MOR	on deck
0123-1	04.07.10	15:38:00	78°21.58'N	6°35.50'E	2239.7	MOR	information
0123-1	04.07.10	15:38:01	78°21.58'N	6°35.50'E	2239.7	MOR	in the water
0123-1	04.07.10	15:42:00	78°21.55'N	6°35.49'E	2225.1	MOR	action
0123-1	04.07.10	15:43:00	78°21.55'N	6°35.48'E	2213.1	MOR	on deck
0123-1	04.07.10	15:52:00	78°21.56'N	6°35.37'E	2201.6	MOR	at surface
0123-1	04.07.10	16:16:00	78°20.79'N	6°35.54'E	2210.7	MOR	action
0123-1	04.07.10	16:19:00	78°20.80'N	6°35.48'E	2190.4	MOR	on deck
0123-1	04.07.10	16:42:00	78°20.78'N	6°35.73'E	2196.6	MOR	on deck
0123-1	04.07.10	16:46:00	78°20.76'N	6°35.77'E	2233.6	MOR	on deck
0123-1	04.07.10	16:47:00	78°20.76'N	6°35.78'E	2227.2	MOR	information
0123-1	04.07.10	16:48:59	78°20.76'N	6°35.79'E	2213.4	MOR	on ground/max depth
0124-1	04.07.10	20:29:00	78°36.47'N	5°3.75'E	2340.8	BL_P	in the water
0124-1	04.07.10	20:31:59	78°36.49'N	5°3.73'E	2341.3	BL_P	on ground/max depth
0124-2	04.07.10	21:00:00	78°36.59'N	5°3.14'E	2344.6	BL_C	in the water
0124-2	04.07.10	21:01:59	78°36.60'N	5°3.12'E	2344.9	BL_C	on ground/max depth

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0124-3	04.07.10	21:13:00	78°36.63'N	5°2.99'E	2346.4	CTD/RO	in the water
0124-3	04.07.10	21:57:00	78°36.59'N	5°3.28'E	2344.1	CTD/RO	on ground/max depth
0124-3	04.07.10	21:58:00	78°36.59'N	5°3.28'E	2343.6	CTD/RO	hoisting
0124-3	04.07.10	22:39:59	78°36.47'N	5°3.81'E	2341.0	CTD/RO	on deck
0124-4	04.07.10	22:47:00	78°36.46'N	5°3.82'E	2340.3	MUC	in the water
0124-4	04.07.10	23:38:00	78°36.37'N	5°3.97'E	2341.2	MUC	on ground/max depth
0124-4	04.07.10	23:41:00	78°36.38'N	5°3.92'E	2340.0	MUC	hoisting
0124-4	04.07.10	23:41:01	78°36.38'N	5°3.92'E	2340.0	MUC	offground
0124-4	05.07.10	00:27:59	78°36.39'N	5°3.69'E	2342.0	MUC	on deck
0125-1	05.07.10	01:30:00	78°36.95'N	4°59.92'E	2366.1	OFOS	in the water
0125-1	05.07.10	01:39:00	78°36.95'N	4°59.86'E	2365.9	OFOS	hoisting
0125-1	05.07.10	01:46:00	78°36.94'N	4°59.90'E	2366.6	OFOS	at surface
0125-1	05.07.10	01:46:01	78°36.94'N	4°59.90'E	2366.6	OFOS	on deck
0125-1	05.07.10	01:47:00	78°36.94'N	4°59.91'E	2366.1	OFOS	information
0125-1	05.07.10	02:35:00	78°36.96'N	4°59.69'E	2366.7	OFOS	information
0125-1	05.07.10	02:38:00	78°36.97'N	4°59.75'E	2366.3	OFOS	profilestart
0125-1	05.07.10	02:38:59	78°36.97'N	4°59.75'E	2366.3	OFOS	profileend
0126-1	05.07.10	04:54:00	78°36.98'N	5°5.51'E	2341.5	AUV	information
0126-1	05.07.10	04:58:00	78°36.97'N	5°5.50'E	2342.3	AUV	in the water
0126-1	05.07.10	05:02:00	78°36.97'N	5°5.53'E	2343.0	AUV	on deck
0126-1	05.07.10	06:07:00	78°36.89'N	5°5.30'E	2342.7	AUV	in the water
0126-1	05.07.10	06:10:00	78°36.88'N	5°5.29'E	2343.4	AUV	in the water
0126-1	05.07.10	06:11:00	78°36.88'N	5°5.29'E	2342.9	AUV	action
0126-1	05.07.10	06:26:00	78°36.87'N	5°5.36'E	2343.0	AUV	action
0126-1	05.07.10	06:27:00	78°36.87'N	5°5.36'E	2341.8	AUV	profilestart
0126-1	05.07.10	06:34:00	78°36.87'N	5°5.39'E	2343.2	AUV	on deck
0126-1	05.07.10	06:35:00	78°36.87'N	5°5.40'E	2332.7	AUV	in the water
0126-1	05.07.10	06:35:01	78°36.87'N	5°5.40'E	2332.7	AUV	profileend
0126-1	05.07.10	06:49:00	78°36.93'N	5°4.61'E	2342.3	AUV	on deck
0126-1	05.07.10	06:53:00	78°36.91'N	5°4.31'E	2341.4	AUV	in the water
0126-1	05.07.10	07:39:00	78°36.79'N	5°5.62'E	2341.5	AUV	on deck
0126-1	05.07.10	07:40:00	78°36.80'N	5°5.44'E	2340.9	AUV	at surface
0126-2	05.07.10	07:56:00	78°36.87'N	5°5.04'E	2342.2	HN	in the water
0126-1	05.07.10	07:57:00	78°36.86'N	5°5.01'E	2341.7	AUV	action
0126-2	05.07.10	07:58:00	78°36.86'N	5°4.99'E	2342.1	HN	on ground/max depth
0126-2	05.07.10	08:00:59	78°36.86'N	5°4.93'E	2342.1	HN	on deck
0126-1	05.07.10	08:02:00	78°36.87'N	5°4.87'E	2342.1	AUV	in the water
0126-1	05.07.10	08:32:00	78°36.90'N	5°3.98'E	2340.5	AUV	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0126-1	05.07.10	08:46:00	78°36.89'N	5°4.26'E	2341.0	AUV	at surface
0126-1	05.07.10	08:46:01	78°36.89'N	5°4.26'E	2341.0	AUV	in the water
0126-1	05.07.10	09:02:00	78°36.99'N	5°4.38'E	2341.8	AUV	hoisting
0126-1	05.07.10	09:04:59	78°36.99'N	5°4.32'E	2341.8	AUV	on deck
0127-1	05.07.10	09:33:00	78°36.41'N	5°4.79'E	2335.6	MOR	information
0127-1	05.07.10	09:34:00	78°36.41'N	5°4.75'E	2340.9	MOR	in the water
0127-2	05.07.10	09:45:00	78°36.36'N	5°5.09'E	2340.5	MOR	in the water
0127-2	05.07.10	09:47:00	78°36.35'N	5°5.14'E	2340.6	MOR	in the water
0127-2	05.07.10	09:48:00	78°36.35'N	5°5.16'E	2340.7	MOR	in the water
0127-2	05.07.10	09:49:00	78°36.35'N	5°5.14'E	2341.2	MOR	in the water
0127-2	05.07.10	09:52:00	78°36.35'N	5°5.14'E	2341.5	MOR	in the water
0127-2	05.07.10	09:53:00	78°36.36'N	5°5.16'E	2341.0	MOR	in the water
0127-2	05.07.10	09:54:00	78°36.36'N	5°5.18'E	2341.1	MOR	action
0127-1	05.07.10	09:58:00	78°36.37'N	5°5.21'E	2340.7	MOR	information
0127-2	05.07.10	10:01:59	78°36.38'N	5°5.15'E	2340.9	MOR	on ground/max depth
0127-1	05.07.10	10:02:59	78°36.39'N	5°5.11'E	2341.4	MOR	on ground/max depth
0128-1	05.07.10	10:22:00	78°36.65'N	5°4.11'E	2340.3	BL_P	on ground/max depth
0128-1	05.07.10	10:25:00	78°36.65'N	5°4.22'E	2340.0	BL_P	information
0128-1	05.07.10	10:56:00	78°36.66'N	5°3.71'E	2341.0	BL_P	at surface
0128-1	05.07.10	11:12:00	78°36.44'N	5°3.50'E	2342.1	BL_P	action
0128-1	05.07.10	11:16:59	78°36.44'N	5°3.31'E	2343.4	BL_P	on deck
0128-2	05.07.10	11:44:00	78°36.32'N	5°3.51'E	2343.1	BL_C	on ground/max depth
0128-2	05.07.10	11:48:00	78°36.34'N	5°3.50'E	2343.1	BL_C	in the water
0128-2	05.07.10	11:49:00	78°36.33'N	5°3.51'E	2342.7	BL_C	action
0128-2	05.07.10	11:53:00	78°36.31'N	5°3.51'E	2342.7	BL_C	on deck
0128-2	05.07.10	12:01:00	78°36.27'N	5°3.44'E	2343.5	BL_C	information
0128-2	05.07.10	12:50:00	78°36.38'N	5°2.86'E	2346.9	BL_C	at surface
0128-2	05.07.10	13:02:00	78°36.49'N	5°2.89'E	2347.3	BL_C	action
0128-2	05.07.10	13:05:59	78°36.51'N	5°2.92'E	2347.0	BL_C	on deck
0129-1	05.07.10	15:18:00	78°55.01'N	5°0.03'E	2636.1	CTD/RO	in the water
0129-2	05.07.10	15:20:00	78°55.03'N	5°0.00'E	2635.3	HN	in the water
0129-2	05.07.10	15:22:00	78°55.05'N	4°59.96'E	2635.9	HN	on ground/max depth
0129-2	05.07.10	15:23:59	78°55.06'N	4°59.93'E	2635.7	HN	on deck
0129-3	05.07.10	15:26:00	78°55.05'N	4°59.84'E	2636.3	SPR	in the water
0129-3	05.07.10	15:39:00	78°55.11'N	4°59.75'E	2635.4	SPR	on ground/max depth
0129-3	05.07.10	15:43:59	78°55.12'N	4°59.71'E	2635.1	SPR	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0129-1	05.07.10	16:04:00	78°55.17'N	4°59.52'E	2634.2	CTD/RO	on ground/max depth
0129-1	05.07.10	16:54:59	78°55.00'N	4°59.87'E	2637.5	CTD/RO	on deck
0129-4	05.07.10	17:02:00	78°54.98'N	4°59.86'E	2637.6	MUC	in the water
0129-4	05.07.10	17:55:00	78°55.01'N	5°0.02'E	2636.4	MUC	on ground/max depth
0129-4	05.07.10	17:59:00	78°54.99'N	5°0.10'E	2635.1	MUC	offground
0129-4	05.07.10	18:01:00	78°55.00'N	5°0.10'E	2636.4	MUC	hoisting
0129-4	05.07.10	18:51:00	78°55.00'N	5°0.64'E	2633.9	MUC	at surface
0129-4	05.07.10	18:54:59	78°54.99'N	5°0.69'E	2634.3	MUC	on deck
0130-1	05.07.10	20:29:00	79°4.98'N	4°19.05'E	2284.2	MN	in the water
0130-1	05.07.10	20:40:00	79°5.03'N	4°18.84'E	2283.0	MN	on ground/max depth
0130-1	05.07.10	20:54:59	79°5.05'N	4°18.63'E	2282.9	MN	on deck
0130-2	05.07.10	20:59:00	79°5.06'N	4°18.57'E	2283.2	BONGO	in the water
0130-2	05.07.10	21:13:00	79°5.09'N	4°18.43'E	2283.2	BONGO	on ground/max depth
0130-2	05.07.10	21:23:59	79°5.10'N	4°18.34'E	2283.5	BONGO	on deck
0130-3	05.07.10	21:30:00	79°5.10'N	4°18.32'E	2283.9	GKG	in the water
0130-3	05.07.10	22:02:00	79°5.16'N	4°18.41'E	2278.3	GKG	on ground/max depth
0130-3	05.07.10	22:02:01	79°5.16'N	4°18.41'E	2278.3	GKG	offground
0130-3	05.07.10	22:02:02	79°5.16'N	4°18.41'E	2278.3	GKG	hoisting
0130-3	05.07.10	22:33:59	79°5.23'N	4°18.37'E	2275.6	GKG	on deck
0130-4	05.07.10	22:40:00	79°5.18'N	4°17.93'E	2282.8	BONGO	in the water
0130-4	05.07.10	23:17:00	79°5.24'N	4°17.81'E	2279.8	BONGO	on ground/max depth
0130-4	05.07.10	23:41:59	79°5.32'N	4°17.83'E	2275.1	BONGO	on deck
0131-1	06.07.10	00:36:00	79°7.75'N	4°54.10'E	1556.3	MUC	in the water
0131-1	06.07.10	01:08:00	79°7.83'N	4°54.13'E	1548.0	MUC	on ground/max depth
0131-1	06.07.10	01:09:00	79°7.84'N	4°54.17'E	1547.3	MUC	offground
0131-1	06.07.10	01:09:01	79°7.84'N	4°54.17'E	1547.3	MUC	hoisting
0131-1	06.07.10	01:40:59	79°7.80'N	4°54.21'E	1548.9	MUC	on deck
0131-2	06.07.10	01:50:00	79°7.80'N	4°53.92'E	1550.8	GKG	in the water
0131-2	06.07.10	02:14:00	79°7.78'N	4°53.96'E	1554.6	GKG	on ground/max depth
0131-2	06.07.10	02:15:00	79°7.78'N	4°53.95'E	1555.2	GKG	hoisting
0131-2	06.07.10	02:40:59	79°7.75'N	4°53.93'E	1557.4	GKG	on deck
0132-1	06.07.10	04:22:00	79°8.05'N	6°5.80'E	1282.0	CTD/RO	in the water
0132-1	06.07.10	04:53:00	79°8.13'N	6°5.81'E	1282.9	CTD/RO	on ground/max depth
0132-1	06.07.10	05:22:59	79°8.20'N	6°5.91'E	1283.7	CTD/RO	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0132-2	06.07.10	05:32:00	79°8.21'N	6°6.03'E	1283.0	MUC	in the water
0132-2	06.07.10	06:03:00	79°8.16'N	6°6.35'E	1282.5	MUC	on ground/max depth
0132-2	06.07.10	06:04:00	79°8.16'N	6°6.36'E	1281.5	MUC	offground
0132-2	06.07.10	06:04:01	79°8.16'N	6°6.36'E	1281.5	MUC	hoisting
0132-2	06.07.10	06:30:59	79°8.15'N	6°6.76'E	1279.5	MUC	on deck
0132-3	06.07.10	06:42:00	79°8.11'N	6°6.86'E	1279.1	GKG	in the water
0132-3	06.07.10	07:03:00	79°8.13'N	6°7.16'E	1279.5	GKG	on ground/max depth
0132-3	06.07.10	07:03:01	79°8.13'N	6°7.16'E	1279.5	GKG	offground
0132-3	06.07.10	07:03:02	79°8.13'N	6°7.16'E	1279.5	GKG	hoisting
0132-3	06.07.10	07:22:59	79°8.13'N	6°7.31'E	1279.0	GKG	on deck
0133-1	06.07.10	12:16:00	78°45.01'N	6°29.84'E	1882.1	AUV	in the water
0133-1	06.07.10	12:17:00	78°45.02'N	6°29.80'E	1882.7	AUV	action
0133-1	06.07.10	12:19:00	78°45.04'N	6°29.70'E	1885.2	AUV	information
0133-1	06.07.10	12:22:00	78°45.07'N	6°29.54'E	1889.9	AUV	profilestart
0133-1	06.07.10	12:26:00	78°45.12'N	6°29.28'E	1896.9	AUV	in the water
0133-1	06.07.10	13:16:00	78°45.62'N	6°26.32'E	1972.4	AUV	on deck
0133-1	06.07.10	13:20:00	78°45.58'N	6°26.24'E	1973.5	AUV	at surface
0133-1	06.07.10	13:35:00	78°45.55'N	6°27.31'E	1949.5	AUV	action
0133-1	06.07.10	13:40:00	78°45.60'N	6°26.83'E	1960.9	AUV	in the water
0133-1	06.07.10	13:52:00	78°45.72'N	6°25.94'E	1984.4	AUV	on deck
0133-1	06.07.10	13:52:01	78°45.72'N	6°25.94'E	1984.4	AUV	profileend
0133-1	06.07.10	14:00:00	78°45.54'N	6°26.44'E	1967.0	AUV	at surface
0133-1	06.07.10	14:15:00	78°45.27'N	6°27.27'E	1941.6	AUV	in the water
0133-1	06.07.10	14:25:00	78°45.37'N	6°27.35'E	1943.5	AUV	action
0133-1	06.07.10	14:27:00	78°45.39'N	6°27.33'E	1944.0	AUV	on deck
0133-1	06.07.10	14:30:59	78°45.42'N	6°27.21'E	1948.8	AUV	on deck
0133-2	06.07.10	14:40:00	78°45.54'N	6°27.01'E	1956.1	OFOS	in the water
0133-2	06.07.10	15:02:00	78°45.75'N	6°26.71'E	1969.6	OFOS	on ground/max depth
0133-2	06.07.10	15:26:01	78°45.83'N	6°26.62'E	1974.0	OFOS	profilestart
0133-2	06.07.10	15:26:02	78°45.83'N	6°26.62'E	1974.0	OFOS	profileend
0133-2	06.07.10	15:26:59	78°45.83'N	6°26.62'E	1974.0	OFOS	on deck
0134-1	06.07.10	17:30:00	79°1.66'N	6°59.82'E	1299.4	CTD/RO	in the water
0134-2	06.07.10	17:35:00	79°1.65'N	6°59.84'E	1299.5	SPR	in the water
0134-2	06.07.10	17:52:00	79°1.73'N	7°0.02'E	1301.8	SPR	on ground/max depth
0134-1	06.07.10	17:57:00	79°1.75'N	7°0.04'E	1302.7	CTD/RO	on ground/max depth
0134-2	06.07.10	17:58:59	79°1.75'N	7°0.04'E	1302.5	SPR	on deck
0134-1	06.07.10	18:26:59	79°1.77'N	6°59.83'E	1302.4	CTD/RO	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0134-3	06.07.10	18:34:00	79°1.77'N	6°59.72'E	1302.1	MUC	in the water
0134-3	06.07.10	19:07:00	79°1.85'N	6°59.57'E	1304.3	MUC	on ground/max depth
0134-3	06.07.10	19:09:00	79°1.85'N	6°59.55'E	1304.4	MUC	offground
0134-3	06.07.10	19:10:00	79°1.85'N	6°59.54'E	1304.9	MUC	hoisting
0134-3	06.07.10	19:39:00	79°1.90'N	6°59.49'E	1306.1	MUC	at surface
0134-3	06.07.10	19:42:59	79°1.91'N	6°59.49'E	1305.8	MUC	on deck
0135-1	06.07.10	23:03:00	78°58.72'N	9°31.15'E	234.0	CTD/RO	in the water
0135-1	06.07.10	23:14:00	78°58.76'N	9°31.05'E	235.4	CTD/RO	on ground/max depth
0135-1	06.07.10	23:15:00	78°58.78'N	9°31.04'E	233.1	CTD/RO	hoisting
0135-1	06.07.10	23:27:59	78°58.86'N	9°30.94'E	232.6	CTD/RO	on deck
0135-2	06.07.10	23:33:00	78°58.86'N	9°30.92'E	232.7	MUC	in the water
0135-2	06.07.10	23:41:00	78°58.86'N	9°30.85'E	231.8	MUC	on ground/max depth
0135-2	06.07.10	23:43:00	78°58.87'N	9°30.87'E	231.4	MUC	hoisting
0135-2	06.07.10	23:44:00	78°58.87'N	9°30.87'E	231.8	MUC	offground
0135-2	06.07.10	23:53:59	78°58.87'N	9°30.90'E	233.9	MUC	on deck
0135-3	06.07.10	23:58:00	78°58.85'N	9°30.86'E	231.6	MUC	in the water
0135-3	07.07.10	00:06:00	78°58.85'N	9°30.89'E	232.3	MUC	on ground/max depth
0135-3	07.07.10	00:09:00	78°58.84'N	9°30.85'E	232.5	MUC	hoisting
0135-3	07.07.10	00:09:01	78°58.84'N	9°30.85'E	232.5	MUC	offground
0135-3	07.07.10	00:19:59	78°58.85'N	9°30.87'E	231.7	MUC	on deck
0135-4	07.07.10	00:23:00	78°58.89'N	9°30.99'E	233.0	MUC	in the water
0135-4	07.07.10	00:29:00	78°58.88'N	9°31.01'E	232.5	MUC	on ground/max depth
0135-4	07.07.10	00:30:00	78°58.87'N	9°31.01'E	232.3	MUC	hoisting
0135-4	07.07.10	00:30:01	78°58.87'N	9°31.01'E	232.3	MUC	offground
0135-4	07.07.10	00:39:59	78°58.83'N	9°31.00'E	233.1	MUC	on deck
0136-1	07.07.10	02:44:00	79°1.70'N	11°5.15'E	290.0	CTD/RO	in the water
0136-2	07.07.10	02:48:00	79°1.72'N	11°5.14'E	290.7	SPR	in the water
0136-1	07.07.10	02:57:00	79°1.72'N	11°5.12'E	291.1	CTD/RO	on ground/max depth
0136-2	07.07.10	03:03:00	79°1.71'N	11°5.11'E	290.4	SPR	on ground/max depth
0136-2	07.07.10	03:10:59	79°1.72'N	11°5.10'E	290.9	SPR	on deck
0136-1	07.07.10	03:12:59	79°1.71'N	11°5.09'E	290.7	CTD/RO	on deck
0136-3	07.07.10	03:18:00	79°1.70'N	11°5.08'E	290.9	MUC	in the water
0136-3	07.07.10	03:31:00	79°1.71'N	11°5.08'E	290.8	MUC	on ground/max depth
0136-3	07.07.10	03:31:01	79°1.71'N	11°5.08'E	290.8	MUC	hoisting

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0136-3	07.07.10	03:31:02	79°1.71'N	11°5.08'E	290.8	MUC	offground
0136-3	07.07.10	03:40:59	79°1.71'N	11°5.08'E	290.8	MUC	on deck
0136-4	07.07.10	04:18:00	79°1.70'N	11°5.02'E	290.5	GKG	in the water
0136-4	07.07.10	04:25:00	79°1.71'N	11°5.02'E	290.6	GKG	on ground/max depth
0136-4	07.07.10	04:25:01	79°1.71'N	11°5.02'E	290.6	GKG	hoisting
0136-4	07.07.10	04:34:59	79°1.70'N	11°5.00'E	290.4	GKG	on deck
0137-1	07.07.10	12:36:00	79°8.08'N	6°4.34'E	1279.5	LANDER	on ground/max depth
0137-1	07.07.10	12:38:00	79°8.08'N	6°4.31'E	1280.0	LANDER	information
0137-1	07.07.10	12:57:00	79°8.16'N	6°4.27'E	1282.2	LANDER	at surface
0137-1	07.07.10	13:12:00	79°8.16'N	6°5.55'E	1281.3	LANDER	action
0137-1	07.07.10	13:14:59	79°8.16'N	6°5.59'E	1281.8	LANDER	on deck
0138-1	07.07.10	15:00:00	79°7.75'N	4°53.84'E	1557.9	CTD/RO	in the water
0138-2	07.07.10	15:04:00	79°7.78'N	4°53.86'E	1554.5	SPR	in the water
0138-2	07.07.10	15:18:00	79°7.79'N	4°53.91'E	1553.6	SPR	on ground/max depth
0138-2	07.07.10	15:22:59	79°7.79'N	4°54.00'E	1551.5	SPR	on deck
0138-1	07.07.10	15:29:00	79°7.77'N	4°53.95'E	1554.3	CTD/RO	on ground/max depth
0138-1	07.07.10	16:02:59	79°7.80'N	4°53.89'E	1552.7	CTD/RO	on deck
0139-1	07.07.10	16:36:00	79°6.42'N	4°36.14'E	1922.0	CTD/RO	in the water
0139-1	07.07.10	17:11:00	79°6.50'N	4°36.48'E	1909.7	CTD/RO	on ground/max depth
0139-1	07.07.10	17:50:59	79°6.47'N	4°36.50'E	1922.5	CTD/RO	on deck
0140-1	07.07.10	19:17:00	79°9.05'N	4°13.57'E	2032.6	GKG	in the water
0140-1	07.07.10	19:42:00	79°9.06'N	4°12.88'E	2042.2	GKG	on ground/max depth
0140-1	07.07.10	19:42:01	79°9.06'N	4°12.88'E	2042.2	GKG	hoisting
0140-1	07.07.10	19:43:00	79°9.07'N	4°12.86'E	2042.5	GKG	offground
0140-1	07.07.10	20:08:00	79°9.07'N	4°12.36'E	2049.3	GKG	at surface
0140-1	07.07.10	20:11:59	79°9.08'N	4°12.31'E	2049.2	GKG	on deck
0141-1	07.07.10	21:30:00	79°6.42'N	4°36.38'E	1933.3	MUC	in the water
0141-1	07.07.10	22:07:00	79°6.52'N	4°36.35'E	1906.8	MUC	on ground/max depth
0141-1	07.07.10	22:08:00	79°6.52'N	4°36.33'E	1896.3	MUC	hoisting
0141-1	07.07.10	22:09:00	79°6.52'N	4°36.29'E	1905.1	MUC	offground
0141-1	07.07.10	22:50:59	79°6.68'N	4°37.12'E	1879.4	MUC	on deck
0142-1	07.07.10	23:47:00	79°3.84'N	4°10.94'E	2466.3	BL_P	in the water
0142-1	07.07.10	23:48:59	79°3.84'N	4°10.91'E	2466.5	BL_P	on ground/max depth
0142-2	08.07.10	00:00:00	79°3.95'N	4°11.05'E	2459.2	BL_C	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0142-3	08.07.10	00:10:00	79°3.95'N	4°10.92'E	2461.0	MUC	in the water
0142-3	08.07.10	00:56:00	79°3.87'N	4°10.38'E	2471.4	MUC	on ground/max depth
0142-3	08.07.10	01:01:00	79°3.87'N	4°10.36'E	2471.6	MUC	hoisting
0142-3	08.07.10	01:01:01	79°3.87'N	4°10.36'E	2471.6	MUC	offground
0142-3	08.07.10	01:51:59	79°3.95'N	4°10.13'E	2470.5	MUC	on deck
0142-2	08.07.10	01:59:59	79°3.95'N	4°11.03'E	2459.5	BL_C	on ground/max depth
0143-1	08.07.10	02:06:00	79°4.97'N	4°8.79'E	2453.4	GKG	in the water
0143-1	08.07.10	02:39:00	79°4.95'N	4°8.95'E	2452.4	GKG	on ground/max depth
0143-1	08.07.10	03:14:59	79°4.98'N	4°9.31'E	2446.1	GKG	on deck
0144-1	08.07.10	04:50:00	79°0.03'N	4°21.20'E	2606.3	AUV	information
0144-1	08.07.10	04:50:01	79°0.03'N	4°21.20'E	2606.3	AUV	in the water
0144-1	08.07.10	05:00:00	79°0.04'N	4°21.29'E	2605.9	AUV	in the water
0144-1	08.07.10	05:01:00	79°0.04'N	4°21.24'E	2606.0	AUV	on ground/max depth
0144-1	08.07.10	05:12:00	79°0.02'N	4°21.00'E	2608.1	AUV	hoisting
0144-1	08.07.10	05:18:00	79°0.02'N	4°20.98'E	2608.3	AUV	at surface
0144-1	08.07.10	05:21:00	79°0.02'N	4°20.97'E	2608.1	AUV	lowering
0144-1	08.07.10	05:24:00	79°0.02'N	4°20.86'E	2608.9	AUV	on ground/max depth
0144-1	08.07.10	05:30:00	79°0.02'N	4°20.67'E	2610.2	AUV	hoisting
0144-1	08.07.10	05:31:00	79°0.02'N	4°20.66'E	2530.7	AUV	on deck
0144-1	08.07.10	05:34:00	79°0.02'N	4°20.61'E	2609.9	AUV	on deck
0144-1	08.07.10	05:34:01	79°0.02'N	4°20.61'E	2609.9	AUV	profilestart
0144-1	08.07.10	05:34:59	79°0.02'N	4°20.61'E	2609.9	AUV	profileend
0145-1	08.07.10	06:05:00	79°0.22'N	4°20.43'E	2606.2	MOR	action
0145-1	08.07.10	06:06:00	79°0.23'N	4°20.42'E	2606.2	MOR	action
0145-1	08.07.10	06:14:00	79°0.22'N	4°20.17'E	2607.7	MOR	in the water
0145-1	08.07.10	06:17:00	79°0.23'N	4°20.14'E	2607.3	MOR	at surface
0145-1	08.07.10	06:18:00	79°0.24'N	4°20.14'E	2607.3	MOR	on deck
0145-1	08.07.10	06:35:00	79°0.42'N	4°19.88'E	2603.9	MOR	action
0145-1	08.07.10	06:37:00	79°0.43'N	4°19.86'E	2604.1	MOR	on deck
0145-1	08.07.10	06:39:00	79°0.41'N	4°19.86'E	2604.6	MOR	hoisting
0145-1	08.07.10	06:40:00	79°0.40'N	4°19.81'E	2604.7	MOR	on deck
0145-1	08.07.10	06:45:00	79°0.43'N	4°19.49'E	2605.7	MOR	on deck
0145-1	08.07.10	06:54:00	79°0.43'N	4°19.28'E	2607.0	MOR	on deck
0145-1	08.07.10	07:12:00	79°0.44'N	4°18.95'E	2608.5	MOR	on deck
0145-1	08.07.10	07:22:00	79°0.45'N	4°18.80'E	2609.0	MOR	on deck
0145-1	08.07.10	07:39:00	79°0.46'N	4°18.52'E	2610.1	MOR	on deck
0145-1	08.07.10	07:45:00	79°0.48'N	4°18.32'E	2610.4	MOR	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0145-1	08.07.10	07:52:00	79°0.47'N	4°18.19'E	2612.0	MOR	on deck
0145-1	08.07.10	07:53:59	79°0.47'N	4°18.19'E	2611.9	MOR	on ground/max depth
0145-2	08.07.10	09:01:00	79°0.45'N	4°19.86'E	2602.9	AUV	in the water
0145-2	08.07.10	09:04:00	79°0.45'N	4°19.84'E	2603.0	AUV	in the water
0145-2	08.07.10	10:03:00	79°0.65'N	4°19.80'E	2597.9	AUV	profilestart
0145-2	08.07.10	10:15:00	79°0.82'N	4°19.94'E	2593.2	AUV	in the water
0145-2	08.07.10	10:31:00	79°1.05'N	4°19.99'E	2584.5	AUV	on deck
0145-2	08.07.10	10:58:00	79°0.50'N	4°19.77'E	2601.9	AUV	in the water
0145-3	08.07.10	11:03:00	79°0.51'N	4°19.70'E	2594.6	GLD	action
0145-2	08.07.10	11:04:00	79°0.52'N	4°19.69'E	2602.5	AUV	on deck
0145-2	08.07.10	11:06:00	79°0.53'N	4°19.67'E	2601.7	AUV	at surface
0145-2	08.07.10	11:06:01	79°0.53'N	4°19.67'E	2601.7	AUV	profileend
0145-3	08.07.10	11:10:00	79°0.55'N	4°19.63'E	2600.9	GLD	in the water
0145-3	08.07.10	11:14:00	79°0.55'N	4°19.61'E	2601.5	GLD	action
0145-3	08.07.10	11:34:00	79°0.62'N	4°19.66'E	2598.8	GLD	on ground/max depth
0145-3	08.07.10	11:52:59	79°0.65'N	4°19.71'E	2598.7	GLD	at surface
0145-2	08.07.10	12:15:00	79°0.35'N	4°19.09'E	2609.1	AUV	action
0145-2	08.07.10	12:18:59	79°0.33'N	4°18.94'E	2611.0	AUV	on deck
0146-2	08.07.10	13:37:00	79°4.51'N	4°5.59'E	2516.0	HN	in the water
0146-2	08.07.10	13:41:00	79°4.46'N	4°5.58'E	2517.8	HN	on ground/max depth
0146-2	08.07.10	13:44:59	79°4.44'N	4°5.44'E	2521.3	HN	on deck
0146-1	08.07.10	13:53:00	79°4.35'N	4°5.41'E	2525.4	LANDER	on ground/max depth
0146-1	08.07.10	13:55:00	79°4.33'N	4°5.38'E	2527.1	LANDER	information
0146-1	08.07.10	14:31:00	79°4.68'N	4°6.96'E	2495.3	LANDER	at surface
0146-1	08.07.10	14:44:00	79°4.58'N	4°6.88'E	2499.4	LANDER	action
0146-1	08.07.10	14:45:00	79°4.56'N	4°6.84'E	2500.5	LANDER	on deck
0146-1	08.07.10	14:46:00	79°4.55'N	4°6.75'E	2501.7	LANDER	on deck
0146-1	08.07.10	14:48:59	79°4.54'N	4°6.58'E	2504.6	LANDER	information
0147-1	08.07.10	15:40:00	79°0.42'N	4°20.01'E	2602.8	MOR	information
0147-1	08.07.10	15:40:01	79°0.42'N	4°20.01'E	2602.8	MOR	in the water
0147-1	08.07.10	15:42:00	79°0.42'N	4°19.96'E	2603.1	MOR	in the water
0147-1	08.07.10	15:47:00	79°0.42'N	4°19.81'E	2604.0	MOR	in the water
0147-1	08.07.10	15:50:00	79°0.43'N	4°19.85'E	2603.5	MOR	action
0147-1	08.07.10	15:56:00	79°0.41'N	4°19.59'E	2605.0	MOR	in the water
0147-1	08.07.10	15:58:00	79°0.42'N	4°19.62'E	2605.1	MOR	action
0147-1	08.07.10	16:08:00	79°0.44'N	4°19.60'E	2604.6	MOR	on deck
0147-1	08.07.10	16:18:00	79°0.44'N	4°19.41'E	2604.9	MOR	at surface
0147-1	08.07.10	16:31:00	79°0.37'N	4°19.56'E	2606.5	MOR	action

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0147-1	08.07.10	16:38:00	79°0.36'N	4°19.38'E	2607.7	MOR	on deck
0147-1	08.07.10	16:38:01	79°0.36'N	4°19.38'E	2607.7	MOR	on deck
0147-1	08.07.10	16:40:00	79°0.35'N	4°19.34'E	2608.5	MOR	information
0147-1	08.07.10	16:49:00	79°0.42'N	4°19.90'E	2603.2	MOR	information
0147-1	08.07.10	16:50:00	79°0.42'N	4°19.91'E	2602.8	MOR	in the water
0147-1	08.07.10	16:52:00	79°0.43'N	4°19.93'E	2602.9	MOR	in the water
0147-1	08.07.10	16:58:00	79°0.44'N	4°19.90'E	2602.5	MOR	in the water
0147-1	08.07.10	17:05:00	79°0.43'N	4°19.85'E	2603.3	MOR	in the water
0147-1	08.07.10	17:12:00	79°0.43'N	4°19.96'E	2603.0	MOR	in the water
0147-1	08.07.10	17:17:00	79°0.42'N	4°19.89'E	2603.0	MOR	in the water
0147-1	08.07.10	17:31:00	79°0.44'N	4°20.00'E	2601.9	MOR	in the water
0147-1	08.07.10	17:59:00	79°0.41'N	4°19.79'E	2604.0	MOR	in the water
0147-1	08.07.10	18:05:00	79°0.41'N	4°19.80'E	2604.1	MOR	in the water
0147-1	08.07.10	18:09:00	79°0.41'N	4°19.93'E	2603.3	MOR	in the water
0147-1	08.07.10	18:31:00	79°0.42'N	4°19.96'E	2602.6	MOR	in the water
0147-1	08.07.10	18:50:00	79°0.42'N	4°19.86'E	2603.7	MOR	in the water
0147-1	08.07.10	18:56:00	79°0.41'N	4°19.90'E	2603.8	MOR	in the water
0147-1	08.07.10	19:05:00	79°0.42'N	4°19.80'E	2603.9	MOR	in the water
0147-1	08.07.10	19:12:00	79°0.41'N	4°19.90'E	2604.1	MOR	action
0147-1	08.07.10	19:12:01	79°0.41'N	4°19.90'E	2604.1	MOR	in the water
0147-1	08.07.10	19:13:00	79°0.41'N	4°19.90'E	2603.7	MOR	action
0147-1	08.07.10	19:13:01	79°0.41'N	4°19.90'E	2603.7	MOR	on deck
0147-1	08.07.10	19:16:00	79°0.41'N	4°19.83'E	2603.8	MOR	on deck
0147-1	08.07.10	19:16:59	79°0.41'N	4°19.83'E	2603.8	MOR	on ground/max depth
0148-1	08.07.10	20:50:00	79°2.04'N	4°10.32'E	2622.9	OFOS	in the water
0148-1	08.07.10	21:04:00	79°2.02'N	4°10.40'E	2623.4	OFOS	on ground/max depth
0148-1	08.07.10	21:14:00	79°2.03'N	4°9.94'E	2626.1	OFOS	at surface
0148-1	08.07.10	21:15:00	79°2.04'N	4°9.90'E	2626.7	OFOS	profilestart
0148-1	08.07.10	21:16:00	79°2.05'N	4°9.86'E	2626.3	OFOS	profileend
0148-1	08.07.10	21:17:59	79°2.06'N	4°9.83'E	2626.5	OFOS	on deck
0149-1	08.07.10	21:42:00	79°3.87'N	4°10.74'E	2468.0	MUC	in the water
0149-1	08.07.10	22:33:00	79°3.91'N	4°11.30'E	2459.1	MUC	on ground/max depth
0149-1	08.07.10	22:34:00	79°3.90'N	4°11.27'E	2459.1	MUC	hoisting
0149-1	08.07.10	22:34:01	79°3.90'N	4°11.27'E	2459.1	MUC	offground
0149-1	08.07.10	23:22:59	79°3.90'N	4°11.21'E	2460.6	MUC	on deck
0149-2	08.07.10	23:33:00	79°3.93'N	4°11.02'E	2461.3	CTD/RO	in the water
0149-2	09.07.10	00:17:00	79°3.95'N	4°11.15'E	2459.1	CTD/RO	on ground/max depth
0149-2	09.07.10	00:18:00	79°3.95'N	4°11.14'E	2458.7	CTD/RO	hoisting

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0149-2	09.07.10	01:04:59	79°3.90'N	4°11.02'E	2462.0	CTD/RO	on deck
0150-1	09.07.10	01:41:00	79°5.01'N	3°58.48'E	2587.7	GKG	in the water
0150-1	09.07.10	02:16:00	79°5.00'N	3°59.00'E	2581.6	GKG	on ground/max depth
0150-1	09.07.10	02:16:01	79°5.00'N	3°59.00'E	2581.6	GKG	hoisting
0150-1	09.07.10	02:52:59	79°4.99'N	3°58.99'E	2582.2	GKG	on deck
0151-1	09.07.10	04:00:00	79°3.88'N	4°9.97'E	2476.0	LANDER	information
0151-1	09.07.10	04:42:00	79°3.90'N	4°11.01'E	2463.0	LANDER	action
0151-1	09.07.10	05:18:00	79°3.84'N	4°10.11'E	2476.3	LANDER	at surface
0151-1	09.07.10	05:26:00	79°3.76'N	4°10.35'E	2479.5	LANDER	action
0151-1	09.07.10	05:30:00	79°3.71'N	4°10.06'E	2488.6	LANDER	on deck
0151-1	09.07.10	05:32:00	79°3.72'N	4°9.87'E	2490.7	LANDER	on deck
0151-1	09.07.10	05:32:01	79°3.72'N	4°9.87'E	2490.7	LANDER	on ground/max depth
0151-1	09.07.10	05:32:59	79°3.72'N	4°9.87'E	2490.7	LANDER	information
0152-1	09.07.10	06:13:00	79°3.95'N	4°10.52'E	2465.4	LANDER	information
0152-1	09.07.10	06:13:01	79°3.95'N	4°10.52'E	2465.4	LANDER	action
0152-1	09.07.10	06:50:00	79°3.82'N	4°10.52'E	2472.3	LANDER	at surface
0152-1	09.07.10	07:10:00	79°3.77'N	4°10.05'E	2483.8	LANDER	action
0152-1	09.07.10	07:15:00	79°3.78'N	4°9.84'E	2486.6	LANDER	on deck
0152-1	09.07.10	07:16:59	79°3.80'N	4°9.83'E	2484.6	LANDER	on ground/max depth
0153-1	09.07.10	07:41:00	79°4.81'N	4°5.35'E	2508.8	LANDER	information
0153-1	09.07.10	07:46:00	79°4.83'N	4°5.40'E	2508.5	LANDER	in the water
0153-1	09.07.10	07:46:59	79°4.83'N	4°5.40'E	2508.5	LANDER	on ground/max depth
0154-1	09.07.10	11:28:00	78°48.02'N	5°49.95'E	2523.0	MOR	in the water
0154-1	09.07.10	11:31:00	78°48.01'N	5°49.96'E	2525.0	MOR	in the water
0154-1	09.07.10	11:34:00	78°48.01'N	5°49.91'E	2524.0	MOR	in the water
0154-1	09.07.10	12:37:00	78°48.01'N	5°49.90'E	2524.0	MOR	in the water
0154-1	09.07.10	12:40:00	78°48.00'N	5°49.92'E	2522.0	MOR	information
0154-1	09.07.10	12:41:00	0°0.00'N	0°0.00'E	0.0	MOR	on ground/max depth
0154-1	09.07.10	12:50:00	78°48.10'N	5°49.64'E	2527.0	MOR	in the water
0154-1	09.07.10	12:52:00	78°48.10'N	5°49.63'E	2528.0	MOR	action
0154-1	09.07.10	12:56:00	78°48.13'N	5°49.53'E	2527.0	MOR	at surface
0154-1	09.07.10	12:57:00	78°48.14'N	5°49.49'E	2527.0	MOR	on deck
0154-1	09.07.10	13:06:00	78°48.15'N	5°49.69'E	2529.0	MOR	action
0154-1	09.07.10	13:10:00	78°48.19'N	5°49.46'E	2529.0	MOR	on deck
0154-1	09.07.10	13:40:00	78°48.36'N	5°48.02'E	2540.0	MOR	on deck
0154-1	09.07.10	13:42:59	78°48.37'N	5°47.93'E	2540.0	MOR	on deck
0155-1	09.07.10	14:00:00	78°48.04'N	5°49.82'E	2526.0	MOR	information

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0155-1	09.07.10	14:01:00	78°48.03'N	5°49.89'E	2524.0	MOR	in the water
0155-1	09.07.10	14:04:00	78°48.02'N	5°49.96'E	2524.0	MOR	in the water
0155-1	09.07.10	15:06:00	78°48.01'N	5°49.93'E	2523.0	MOR	in the water
0155-1	09.07.10	15:20:00	78°48.03'N	5°50.06'E	2522.0	MOR	in the water
0155-1	09.07.10	15:30:00	78°48.14'N	5°49.74'E	2529.0	MOR	action
0155-1	09.07.10	15:31:00	78°48.14'N	5°49.73'E	2527.0	MOR	in the water
0155-1	09.07.10	15:32:00	78°48.14'N	5°49.71'E	2528.0	MOR	on deck
0155-1	09.07.10	15:36:00	78°48.19'N	5°49.79'E	2527.0	MOR	on deck
0155-1	09.07.10	15:40:00	78°48.23'N	5°49.80'E	2528.0	MOR	on deck
0155-1	09.07.10	15:40:59	78°48.23'N	5°49.80'E	2528.0	MOR	on ground/max depth
0156-1	09.07.10	16:02:00	78°50.03'N	5°49.58'E	2544.0	CTD/RO	in the water
0156-1	09.07.10	16:48:00	78°50.05'N	5°50.14'E	2538.0	CTD/RO	on ground/max depth
0156-1	09.07.10	17:34:59	78°50.00'N	5°50.06'E	2539.0	CTD/RO	on deck
0156-2	09.07.10	17:42:00	78°50.02'N	5°49.90'E	2541.0	MN	in the water
0156-2	09.07.10	17:50:00	78°50.04'N	5°49.77'E	2543.0	MN	on ground/max depth
0156-2	09.07.10	18:00:59	78°50.05'N	5°49.68'E	2541.0	MN	on deck
0157-1	09.07.10	18:41:00	78°49.98'N	5°29.70'E	2622.0	CTD/RO	in the water
0157-2	09.07.10	18:57:00	78°50.05'N	5°29.53'E	2624.0	SPR	in the water
0157-2	09.07.10	19:11:00	78°50.09'N	5°29.36'E	2624.0	SPR	on ground/max depth
0157-2	09.07.10	19:19:59	78°50.10'N	5°29.40'E	2625.0	SPR	on deck
0157-1	09.07.10	19:27:00	78°50.11'N	5°29.22'E	2624.0	CTD/RO	on ground/max depth
0157-1	09.07.10	20:17:59	78°50.14'N	5°28.70'E	2627.0	CTD/RO	on deck
0158-1	09.07.10	20:56:00	78°49.94'N	5°9.61'E	2655.0	CTD/RO	in the water
0158-2	09.07.10	21:10:00	78°49.92'N	5°9.38'E	2657.0	SPR	in the water
0158-2	09.07.10	21:26:00	78°49.86'N	5°8.91'E	2659.0	SPR	on ground/max depth
0158-2	09.07.10	21:30:59	78°49.83'N	5°8.70'E	2659.0	SPR	on deck
0158-1	09.07.10	21:44:00	78°49.82'N	5°8.69'E	2659.0	CTD/RO	on ground/max depth
0158-1	09.07.10	22:38:59	78°49.76'N	5°8.94'E	2657.0	CTD/RO	on deck
0159-1	10.07.10	00:11:00	78°48.00'N	5°59.82'E	2469.0	BONGO	in the water
0159-1	10.07.10	01:12:00	78°48.24'N	6°0.30'E	2470.0	BONGO	on ground/max depth
0159-1	10.07.10	01:13:00	78°48.25'N	6°0.31'E	2473.0	BONGO	hoisting
0159-1	10.07.10	01:48:59	78°48.37'N	6°0.31'E	2472.0	BONGO	on deck
0159-2	10.07.10	01:56:00	78°48.39'N	6°0.31'E	2472.0	CTD/RO	in the water
0159-2	10.07.10	02:40:00	78°48.34'N	6°0.55'E	2470.0	CTD/RO	on ground/max depth

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0159-2	10.07.10	03:26:59	78°48.20'N	6°0.77'E	2468.0	CTD/RO	on deck
0159-3	10.07.10	04:00:00	78°47.99'N	5°59.97'E	2465.0	MOR	information
0159-3	10.07.10	04:02:00	78°47.99'N	5°59.97'E	2468.0	MOR	in the water
0159-3	10.07.10	04:06:00	78°48.01'N	5°59.94'E	2466.0	MOR	in the water
0159-3	10.07.10	05:25:00	78°48.00'N	6°0.01'E	2468.0	MOR	in the water
0159-3	10.07.10	05:30:00	78°48.01'N	5°59.98'E	2467.0	MOR	in the water
0159-3	10.07.10	05:34:00	78°48.01'N	6°0.01'E	2467.0	MOR	action
0159-3	10.07.10	05:35:00	78°48.00'N	6°0.02'E	2468.0	MOR	in the water
0159-3	10.07.10	05:38:00	78°48.00'N	5°60.00'E	2467.0	MOR	action
0159-3	10.07.10	05:38:01	78°48.00'N	5°60.00'E	2467.0	MOR	on deck
0159-3	10.07.10	05:40:00	78°48.00'N	5°59.96'E	2467.0	MOR	on deck
0159-3	10.07.10	05:40:59	78°48.00'N	5°59.96'E	2467.0	MOR	on ground/max depth
0160-1	10.07.10	08:59:00	78°50.03'N	3°38.44'E	2318.0	MOR	information
0160-1	10.07.10	09:17:00	78°50.16'N	3°39.10'E	2316.0	MOR	action
0160-1	10.07.10	09:30:00	78°49.96'N	3°40.05'E	2310.0	MOR	action
0160-1	10.07.10	10:04:00	78°50.08'N	3°58.45'E	2335.0	MOR	on ground/max depth
0160-1	10.07.10	10:06:00	78°50.11'N	3°58.47'E	2334.0	MOR	at surface
0160-1	10.07.10	10:31:00	78°50.11'N	3°59.15'E	2340.0	MOR	action
0160-1	10.07.10	10:34:00	78°50.11'N	3°59.20'E	2341.0	MOR	on deck
0160-1	10.07.10	10:40:00	78°50.18'N	3°58.98'E	2339.0	MOR	on deck
0160-1	10.07.10	10:51:00	78°50.27'N	3°58.73'E	2339.0	MOR	on deck
0160-1	10.07.10	11:03:00	78°50.38'N	3°58.46'E	2340.0	MOR	on deck
0160-1	10.07.10	11:20:59	78°50.50'N	3°58.26'E	2340.0	MOR	on deck
0161-1	10.07.10	13:19:00	78°50.01'N	2°47.19'E	2508.0	MOR	on ground/max depth
0161-1	10.07.10	13:20:00	78°50.01'N	2°47.23'E	2504.0	MOR	at surface
0161-1	10.07.10	13:34:00	78°50.04'N	2°48.02'E	2501.0	MOR	action
0161-1	10.07.10	13:37:00	78°50.05'N	2°47.99'E	2502.0	MOR	on deck
0161-1	10.07.10	13:39:00	78°50.06'N	2°47.88'E	2502.0	MOR	on deck
0161-1	10.07.10	13:43:00	78°50.10'N	2°47.79'E	2502.0	MOR	on deck
0161-1	10.07.10	13:50:00	78°50.18'N	2°47.71'E	2502.0	MOR	on deck
0161-1	10.07.10	14:03:00	78°50.30'N	2°47.49'E	2500.0	MOR	on deck
0161-1	10.07.10	14:18:01	78°50.41'N	2°46.97'E	2502.0	MOR	on deck
0161-1	10.07.10	14:19:00	78°50.42'N	2°46.95'E	2502.0	MOR	information
0161-1	10.07.10	14:20:59	78°50.43'N	2°46.93'E	2501.0	MOR	on ground/max depth
0162-1	10.07.10	15:18:00	78°50.04'N	3°19.90'E	2398.0	CTD/RO	in the water
0162-2	10.07.10	15:28:00	78°50.06'N	3°20.09'E	2397.0	HN	in the water
0162-2	10.07.10	15:29:00	78°50.05'N	3°20.13'E	2397.0	HN	on ground/max depth

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0162-2	10.07.10	15:30:00	78°50.05'N	3°20.15'E	2397.0	HN	on deck
0162-2	10.07.10	15:32:00	78°50.05'N	3°20.17'E	2397.0	HN	in the water
0162-2	10.07.10	15:33:00	78°50.05'N	3°20.20'E	2397.0	HN	on ground/max depth
0162-2	10.07.10	15:34:59	78°50.05'N	3°20.23'E	2397.0	HN	on deck
0162-1	10.07.10	16:00:00	78°50.01'N	3°19.85'E	2398.0	CTD/RO	on ground/max depth
0162-3	10.07.10	16:02:00	78°50.02'N	3°19.81'E	2400.0	SPR	in the water
0162-3	10.07.10	16:22:00	78°50.00'N	3°19.96'E	2397.0	SPR	on ground/max depth
0162-3	10.07.10	16:26:59	78°50.01'N	3°19.91'E	2399.0	SPR	on deck
0162-1	10.07.10	16:46:59	78°49.97'N	3°19.85'E	2399.0	CTD/RO	on deck
0163-1	10.07.10	17:22:00	78°49.99'N	3°39.56'E	2313.0	CTD/RO	in the water
0163-1	10.07.10	18:05:00	78°49.97'N	3°39.75'E	2308.0	CTD/RO	on ground/max depth
0163-1	10.07.10	18:45:59	78°49.98'N	3°39.71'E	2309.0	CTD/RO	on deck
0164-1	10.07.10	19:45:00	78°49.96'N	4°19.86'E	2406.0	CTD/RO	in the water
0164-1	10.07.10	20:30:00	78°49.99'N	4°19.88'E	2407.0	CTD/RO	on ground/max depth
0164-1	10.07.10	21:12:59	78°50.00'N	4°19.69'E	2407.0	CTD/RO	on deck
0165-1	10.07.10	21:49:00	78°49.93'N	4°39.74'E	2581.0	CTD/RO	in the water
0165-1	10.07.10	22:38:00	78°49.87'N	4°39.75'E	2561.0	CTD/RO	on ground/max depth
0165-1	10.07.10	22:38:01	78°49.87'N	4°39.75'E	2561.0	CTD/RO	hoisting
0165-1	10.07.10	23:20:59	78°49.91'N	4°39.76'E	2573.0	CTD/RO	on deck
0166-1	11.07.10	00:34:00	78°50.04'N	3°59.70'E	2343.0	CTD/RO	in the water
0166-2	11.07.10	00:38:00	78°50.04'N	3°59.84'E	2349.0	SPR	in the water
0166-2	11.07.10	00:50:00	78°50.03'N	3°59.90'E	2347.0	SPR	on ground/max depth
0166-2	11.07.10	00:51:00	78°50.03'N	3°59.88'E	2345.0	SPR	hoisting
0166-2	11.07.10	00:55:59	78°50.04'N	3°59.82'E	2347.0	SPR	on deck
0166-1	11.07.10	01:16:00	78°50.01'N	3°59.84'E	2345.0	CTD/RO	on ground/max depth
0166-1	11.07.10	01:17:00	78°50.00'N	3°59.87'E	2347.0	CTD/RO	hoisting
0166-1	11.07.10	01:59:59	78°50.03'N	3°59.61'E	2342.0	CTD/RO	on deck
0166-3	11.07.10	04:00:00	78°49.99'N	3°59.81'E	2345.0	MOR	information
0166-3	11.07.10	04:01:00	78°49.99'N	3°59.81'E	2345.0	MOR	in the water
0166-3	11.07.10	04:03:00	78°49.99'N	3°59.83'E	2344.0	MOR	in the water
0166-3	11.07.10	04:10:00	78°49.99'N	3°59.86'E	2344.0	MOR	in the water
0166-3	11.07.10	04:37:00	78°50.01'N	4°0.02'E	2347.0	MOR	in the water
0166-3	11.07.10	04:37:01	78°50.01'N	4°0.02'E	2347.0	MOR	in the water
0166-3	11.07.10	05:01:00	78°50.01'N	3°59.95'E	2345.0	MOR	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0166-3	11.07.10	05:01:01	78°50.01'N	3°59.95'E	2345.0	MOR	in the water
0166-3	11.07.10	05:21:00	78°50.00'N	4°0.01'E	2346.0	MOR	in the water
0166-3	11.07.10	05:34:00	78°50.00'N	4°0.01'E	2345.0	MOR	in the water
0166-3	11.07.10	05:34:01	78°50.00'N	4°0.01'E	2345.0	MOR	in the water
0166-3	11.07.10	05:38:00	78°50.00'N	4°0.01'E	2345.0	MOR	in the water
0166-3	11.07.10	05:38:01	78°50.00'N	4°0.01'E	2345.0	MOR	action
0166-3	11.07.10	05:38:02	78°50.00'N	4°0.01'E	2345.0	MOR	on deck
0166-3	11.07.10	05:42:00	78°50.00'N	4°0.01'E	2346.0	MOR	on deck
0166-3	11.07.10	05:42:59	78°50.00'N	4°0.01'E	2346.0	MOR	on ground/max depth
0167-1	11.07.10	07:21:00	78°50.01'N	2°47.73'E	2503.0	CTD/RO	in the water
0167-2	11.07.10	07:23:00	78°50.01'N	2°47.78'E	2502.0	SPR	in the water
0167-2	11.07.10	07:44:00	78°50.02'N	2°47.83'E	2504.0	SPR	on ground/max depth
0167-2	11.07.10	07:49:59	78°50.01'N	2°47.78'E	2503.0	SPR	on deck
0167-1	11.07.10	08:07:00	78°50.01'N	2°47.78'E	2501.0	CTD/RO	on ground/max depth
0167-1	11.07.10	08:52:59	78°49.99'N	2°47.83'E	2503.0	CTD/RO	on deck
0167-3	11.07.10	08:59:00	78°49.99'N	2°47.94'E	2507.0	MOR	information
0167-3	11.07.10	09:01:00	78°49.99'N	2°47.97'E	2504.0	MOR	in the water
0167-3	11.07.10	09:03:00	78°50.00'N	2°47.96'E	2503.0	MOR	in the water
0167-3	11.07.10	09:12:00	78°50.01'N	2°47.93'E	2509.0	MOR	in the water
0167-3	11.07.10	09:37:00	78°50.01'N	2°48.00'E	2503.0	MOR	in the water
0167-3	11.07.10	09:59:00	78°50.02'N	2°47.85'E	2501.0	MOR	in the water
0167-3	11.07.10	10:15:00	78°50.00'N	2°47.91'E	2502.0	MOR	in the water
0167-3	11.07.10	10:27:00	78°49.99'N	2°47.94'E	2503.0	MOR	in the water
0167-3	11.07.10	10:29:00	78°49.98'N	2°48.00'E	2503.0	MOR	in the water
0167-3	11.07.10	10:29:01	78°49.98'N	2°48.00'E	2503.0	MOR	in the water
0167-3	11.07.10	10:35:00	78°49.99'N	2°47.92'E	2502.0	MOR	on ground/max depth
0167-3	11.07.10	10:38:59	78°49.99'N	2°47.92'E	2502.0	MOR	on deck
0167-4	11.07.10	10:59:00	78°50.00'N	2°49.65'E	2497.0	PIES	on ground/max depth
0167-4	11.07.10	11:10:00	78°50.09'N	2°49.45'E	2496.0	PIES	in the water
0167-4	11.07.10	11:21:00	78°50.09'N	2°49.11'E	2498.0	PIES	action
0167-4	11.07.10	11:24:00	78°50.07'N	2°49.07'E	2498.0	PIES	action
0167-4	11.07.10	11:27:00	78°50.07'N	2°49.01'E	2499.0	PIES	on deck
0167-4	11.07.10	11:52:00	78°50.26'N	2°47.86'E	2502.0	PIES	information
0167-4	11.07.10	11:56:00	78°50.30'N	2°47.66'E	2502.0	PIES	action
0167-4	11.07.10	12:36:00	78°50.12'N	2°48.43'E	2499.0	PIES	at surface
0167-4	11.07.10	12:39:00	78°50.07'N	2°48.49'E	2499.0	PIES	in the water
0167-4	11.07.10	12:41:00	78°50.06'N	2°48.43'E	2500.0	PIES	action

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0167-4	11.07.10	12:43:59	78°50.06'N	2°48.35'E	2501.0	PIES	on deck
0167-5	11.07.10	13:00:00	78°49.98'N	2°49.76'E	2496.0	CTD/RO	in the water
0167-5	11.07.10	13:45:00	78°49.97'N	2°49.87'E	2495.0	CTD/RO	on ground/max depth
0167-5	11.07.10	13:46:00	78°49.98'N	2°49.83'E	2496.0	CTD/RO	hoisting
0167-5	11.07.10	14:24:59	78°49.96'N	2°49.96'E	2498.0	CTD/RO	on deck
0168-1	11.07.10	14:48:00	78°49.98'N	2°59.86'E	2470.0	CTD/RO	in the water
0168-2	11.07.10	14:54:00	78°50.00'N	2°59.88'E	2469.0	HN	in the water
0168-2	11.07.10	14:55:00	78°50.00'N	2°59.89'E	2471.0	HN	on ground/max depth
0168-2	11.07.10	14:56:00	78°50.00'N	2°59.89'E	2470.0	HN	on deck
0168-2	11.07.10	14:57:00	78°50.00'N	2°59.90'E	2470.0	HN	on ground/max depth
0168-2	11.07.10	14:58:59	78°49.99'N	2°59.91'E	2470.0	HN	on deck
0168-1	11.07.10	15:35:00	78°50.04'N	2°59.65'E	2469.0	CTD/RO	on ground/max depth
0168-1	11.07.10	15:36:00	78°50.04'N	2°59.69'E	2470.0	CTD/RO	hoisting
0168-1	11.07.10	16:16:59	78°50.03'N	2°59.87'E	2467.0	CTD/RO	on deck
0168-3	11.07.10	16:22:00	78°50.03'N	2°59.80'E	2469.0	MN	in the water
0168-3	11.07.10	16:31:00	78°50.00'N	2°59.93'E	2469.0	MN	on ground/max depth
0168-3	11.07.10	16:42:59	78°50.01'N	2°59.78'E	2469.0	MN	on deck
0169-1	11.07.10	18:05:00	79°0.01'N	2°59.97'E	2573.0	GKG	in the water
0169-1	11.07.10	18:41:00	79°0.00'N	3°0.37'E	2581.0	GKG	on ground/max depth
0169-1	11.07.10	18:41:01	79°0.00'N	3°0.37'E	2581.0	GKG	hoisting
0169-1	11.07.10	19:19:00	78°59.97'N	3°0.75'E	2562.0	GKG	on deck
0169-1	11.07.10	19:22:00	78°59.98'N	3°0.72'E	2566.0	GKG	in the water
0169-1	11.07.10	19:55:00	78°60.00'N	3°0.77'E	2575.0	GKG	on ground/max depth
0169-1	11.07.10	19:57:00	79°0.00'N	3°0.76'E	2583.0	GKG	hoisting
0169-1	11.07.10	20:32:59	78°60.00'N	3°0.97'E	2569.0	GKG	on deck
0170-1	11.07.10	21:42:00	79°8.59'N	2°45.36'E	5592.0	BONGO	in the water
0170-1	11.07.10	21:58:00	79°8.59'N	2°45.67'E	5597.0	BONGO	on ground/max depth
0170-1	11.07.10	22:08:59	79°8.57'N	2°45.89'E	5597.0	BONGO	on deck
0170-2	11.07.10	22:18:00	79°8.62'N	2°45.63'E	5596.0	CTD/RO	in the water
0170-2	11.07.10	23:49:00	79°8.84'N	2°45.03'E	5587.0	CTD/RO	on ground/max depth
0170-2	11.07.10	23:50:00	79°8.84'N	2°45.05'E	5589.0	CTD/RO	hoisting
0170-2	12.07.10	01:37:59	79°9.30'N	2°43.60'E	5532.0	CTD/RO	on deck
0170-3	12.07.10	02:06:00	79°8.54'N	2°45.80'E	5596.0	MUC	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0170-3	12.07.10	03:50:00	79°8.55'N	2°45.61'E	5596.0	MUC	on ground/max depth
0170-3	12.07.10	03:50:01	79°8.55'N	2°45.61'E	5596.0	MUC	hoisting
0170-3	12.07.10	05:06:59	79°8.58'N	2°45.56'E	5597.0	MUC	on deck
0170-4	12.07.10	05:22:00	79°8.56'N	2°45.62'E	5601.0	LANDER	information
0170-4	12.07.10	05:24:00	79°8.57'N	2°45.63'E	5596.0	LANDER	in the water
0170-4	12.07.10	05:26:59	79°8.58'N	2°45.61'E	5596.0	LANDER	on ground/max depth
0170-5	12.07.10	05:50:00	79°8.58'N	2°45.68'E	5596.0	LANDER	information
0170-5	12.07.10	05:51:00	79°8.58'N	2°45.66'E	5595.0	LANDER	in the water
0170-5	12.07.10	05:52:59	79°8.58'N	2°45.61'E	5598.0	LANDER	on ground/max depth
0171-1	12.07.10	07:57:00	79°4.79'N	4°4.56'E	2528.0	LANDER	information
0171-1	12.07.10	07:57:01	79°4.79'N	4°4.56'E	2528.0	LANDER	action
0171-2	12.07.10	08:14:00	79°4.79'N	4°4.11'E	2533.0	HN	in the water
0171-2	12.07.10	08:19:00	79°4.79'N	4°4.02'E	2534.0	HN	on ground/max depth
0171-2	12.07.10	08:21:59	79°4.79'N	4°3.95'E	2535.0	HN	on deck
0171-1	12.07.10	08:40:00	79°4.75'N	4°4.47'E	2530.0	LANDER	at surface
0171-1	12.07.10	08:57:00	79°4.66'N	4°5.17'E	2525.0	LANDER	action
0171-1	12.07.10	08:58:00	79°4.65'N	4°5.13'E	2525.0	LANDER	on ground/max depth
0171-1	12.07.10	08:58:59	79°4.65'N	4°5.13'E	2525.0	LANDER	on deck
0172-1	12.07.10	09:36:00	79°1.96'N	4°10.18'E	2637.0	OFOS	in the water
0172-1	12.07.10	10:23:00	79°2.03'N	4°10.40'E	2633.0	OFOS	profilestart
0172-1	12.07.10	11:37:00	79°2.47'N	4°12.24'E	2585.0	OFOS	profileend
0172-1	12.07.10	11:38:00	79°2.48'N	4°12.28'E	2585.0	OFOS	hoisting
0172-1	12.07.10	12:15:59	79°2.57'N	4°12.51'E	2575.0	OFOS	on deck
0173-1	12.07.10	12:45:00	79°0.12'N	4°18.12'E	2634.0	CTD/RO	action
0173-2	12.07.10	12:47:00	79°0.13'N	4°18.13'E	2632.0	SPR	in the water
0173-1	12.07.10	13:02:00	79°0.16'N	4°17.97'E	2635.0	CTD/RO	on ground/max depth
0173-1	12.07.10	13:02:01	79°0.16'N	4°17.97'E	2635.0	CTD/RO	hoisting
0173-2	12.07.10	13:10:00	79°0.16'N	4°17.82'E	2635.0	SPR	on ground/max depth
0173-2	12.07.10	13:14:59	79°0.18'N	4°17.78'E	2635.0	SPR	on deck
0173-1	12.07.10	13:17:59	79°0.21'N	4°17.75'E	2633.0	CTD/RO	on deck
0174-1	12.07.10	14:34:00	79°3.23'N	3°44.53'E	2864.0	CTD/RO	in the water
0174-1	12.07.10	15:25:00	79°3.23'N	3°44.70'E	2858.0	CTD/RO	on ground/max depth
0174-1	12.07.10	16:18:59	79°3.21'N	3°44.78'E	2854.0	CTD/RO	on deck
0174-2	12.07.10	16:24:00	79°3.20'N	3°44.63'E	2858.0	GKG	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0174-2	12.07.10	17:03:00	79°3.21'N	3°44.71'E	2856.0	GKG	on ground/max depth
0174-2	12.07.10	17:44:59	79°3.21'N	3°44.77'E	2855.0	GKG	on deck
0174-3	12.07.10	17:54:00	79°3.21'N	3°44.67'E	2857.0	MUC	in the water
0174-3	12.07.10	18:46:00	79°3.18'N	3°44.68'E	2860.0	MUC	on ground/max depth
0174-3	12.07.10	19:39:59	79°3.13'N	3°44.52'E	2863.0	MUC	on deck
0175-1	12.07.10	20:03:00	79°2.74'N	3°35.61'E	3462.0	CTD	in the water
0175-1	12.07.10	21:05:00	79°2.79'N	3°35.16'E	3488.0	CTD	on ground/max depth
0175-1	12.07.10	22:09:59	79°2.89'N	3°34.73'E	3519.0	CTD	on deck
0175-2	12.07.10	22:27:00	79°2.83'N	3°35.77'E	3456.0	GKG	in the water
0175-2	12.07.10	23:11:00	79°2.79'N	3°35.95'E	3443.0	GKG	on ground/max depth
0175-2	12.07.10	23:11:01	79°2.79'N	3°35.95'E	3443.0	GKG	hoisting
0175-2	12.07.10	23:58:59	79°2.81'N	3°35.98'E	3436.0	GKG	on deck
0175-3	13.07.10	00:07:00	79°2.80'N	3°36.05'E	3440.0	MUC	in the water
0175-3	13.07.10	01:12:00	79°2.79'N	3°36.05'E	3442.0	MUC	on ground/max depth
0175-3	13.07.10	01:12:01	79°2.79'N	3°36.05'E	3442.0	MUC	hoisting
0175-3	13.07.10	02:14:59	79°3.23'N	3°33.55'E	3646.0	MUC	on deck
0176-1	13.07.10	02:32:00	79°3.58'N	3°28.71'E	4077.0	CTD/RO	in the water
0176-1	13.07.10	03:43:00	79°3.65'N	3°28.67'E	4091.0	CTD/RO	on ground/max depth
0176-1	13.07.10	03:44:00	79°3.65'N	3°28.66'E	4089.0	CTD/RO	hoisting
0176-1	13.07.10	04:56:59	79°3.69'N	3°27.80'E	4137.0	CTD/RO	on deck
0176-2	13.07.10	05:14:00	79°3.44'N	3°29.55'E	4006.0	GKG	in the water
0176-2	13.07.10	06:12:00	79°3.48'N	3°28.76'E	4061.0	GKG	on ground/max depth
0176-2	13.07.10	06:14:00	79°3.48'N	3°28.77'E	4065.0	GKG	hoisting
0176-2	13.07.10	07:08:59	79°3.50'N	3°28.47'E	4116.0	GKG	on deck
0176-3	13.07.10	07:18:00	79°3.51'N	3°28.86'E	4056.0	MUC	in the water
0176-3	13.07.10	08:35:00	79°3.51'N	3°28.81'E	4085.0	MUC	on ground/max depth
0176-3	13.07.10	08:36:00	79°3.50'N	3°28.77'E	4079.0	MUC	hoisting
0176-3	13.07.10	09:52:59	79°3.61'N	3°28.49'E	4093.0	MUC	on deck
0177-1	13.07.10	11:06:00	79°8.33'N	2°47.46'E	5595.0	GKG	in the water
0177-2	13.07.10	11:35:00	79°8.36'N	2°47.06'E	5602.0	HN	in the water
0177-2	13.07.10	11:42:00	79°8.35'N	2°46.99'E	5600.0	HN	on ground/max depth
0177-2	13.07.10	11:46:59	79°8.37'N	2°46.93'E	5601.0	HN	on deck
0177-1	13.07.10	12:20:00	79°8.31'N	2°46.50'E	5599.0	GKG	on ground/max depth

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0177-1	13.07.10	12:20:01	79°8.31'N	2°46.50'E	5599.0	GKG	hoisting
0177-1	13.07.10	13:39:59	79°8.58'N	2°45.69'E	5597.0	GKG	on deck
0177-3	13.07.10	13:50:00	79°8.57'N	2°45.41'E	5590.0	LANDER	information
0177-3	13.07.10	13:59:00	79°8.55'N	2°45.04'E	5591.0	LANDER	action
0177-3	13.07.10	15:14:00	79°8.32'N	2°45.52'E	5588.0	LANDER	at surface
0177-4	13.07.10	15:20:00	79°8.31'N	2°44.96'E	5587.0	LANDER	information
0177-3	13.07.10	15:26:00	79°8.35'N	2°44.64'E	5584.0	LANDER	action
0177-3	13.07.10	15:27:00	79°8.35'N	2°44.64'E	5582.0	LANDER	on deck
0177-3	13.07.10	15:27:01	79°8.35'N	2°44.64'E	5582.0	LANDER	on deck
0177-3	13.07.10	15:28:59	79°8.36'N	2°44.63'E	5580.0	LANDER	on ground/max depth
0177-4	13.07.10	15:48:00	79°8.53'N	2°45.96'E	5601.0	LANDER	action
0177-4	13.07.10	16:05:00	79°8.53'N	2°45.68'E	5593.0	LANDER	in the water
0177-4	13.07.10	16:07:00	79°8.53'N	2°45.66'E	5594.0	LANDER	action
0177-4	13.07.10	16:09:00	79°8.54'N	2°45.63'E	5596.0	LANDER	on deck
0177-4	13.07.10	17:48:00	79°8.25'N	2°45.04'E	5579.0	LANDER	at surface
0177-4	13.07.10	17:57:00	79°8.38'N	2°45.04'E	5583.0	LANDER	action
0177-4	13.07.10	17:57:01	79°8.38'N	2°45.04'E	5583.0	LANDER	on deck
0177-4	13.07.10	18:01:59	79°8.38'N	2°45.00'E	5586.0	LANDER	on ground/max depth
0178-1	13.07.10	19:20:00	79°3.77'N	3°18.63'E	5144.0	CTD/RO	in the water
0178-2	13.07.10	19:23:00	79°3.76'N	3°18.71'E	5143.0	SPR	in the water
0178-2	13.07.10	19:42:00	79°3.76'N	3°18.82'E	5144.0	SPR	on ground/max depth
0178-2	13.07.10	19:44:59	79°3.76'N	3°18.84'E	5144.0	SPR	on deck
0178-1	13.07.10	20:48:00	79°3.76'N	3°18.87'E	5142.0	CTD/RO	on ground/max depth
0178-1	13.07.10	22:30:59	79°4.03'N	3°18.51'E	5183.0	CTD/RO	on deck
0178-3	13.07.10	22:45:00	79°3.79'N	3°18.84'E	5140.0	GKG	in the water
0178-3	13.07.10	23:55:00	79°3.80'N	3°18.89'E	5141.0	GKG	on ground/max depth
0178-3	13.07.10	23:56:00	79°3.80'N	3°18.88'E	5138.0	GKG	hoisting
0178-3	14.07.10	01:04:59	79°3.81'N	3°18.75'E	5150.0	GKG	on deck
0178-4	14.07.10	01:12:00	79°3.78'N	3°18.79'E	5135.0	MUC	in the water
0178-4	14.07.10	02:50:00	79°3.79'N	3°18.81'E	5141.0	MUC	on ground/max depth
0178-4	14.07.10	04:00:59	79°3.89'N	3°18.16'E	5166.0	MUC	on deck
0179-1	14.07.10	10:09:00	79°43.99'N	4°29.10'E	2728.0	LANDER	in the water
0179-1	14.07.10	10:12:59	79°43.90'N	4°29.06'E	2731.0	LANDER	on ground/max depth
0179-2	14.07.10	10:23:00	79°44.07'N	4°28.83'E	2702.0	LANDER	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0179-2	14.07.10	10:24:59	79°44.08'N	4°28.83'E	2703.0	LANDER	on ground/max depth
0179-3	14.07.10	10:34:00	79°44.09'N	4°28.67'E	2692.0	CTD/RO	in the water
0179-4	14.07.10	10:39:00	79°44.06'N	4°28.51'E	2690.0	SPR	in the water
0179-3	14.07.10	10:45:00	79°44.01'N	4°28.36'E	2690.0	CTD/RO	on ground/max depth
0179-3	14.07.10	10:45:01	79°44.01'N	4°28.36'E	2690.0	CTD/RO	hoisting
0179-4	14.07.10	10:56:00	79°44.00'N	4°28.07'E	2686.0	SPR	on ground/max depth
0179-3	14.07.10	10:56:59	79°44.00'N	4°28.07'E	2686.0	CTD/RO	on deck
0179-4	14.07.10	11:00:59	79°43.99'N	4°27.95'E	2685.0	SPR	on deck
0179-5	14.07.10	11:19:00	79°43.99'N	4°27.85'E	2684.0	AUV	in the water
0179-5	14.07.10	11:25:00	79°44.01'N	4°28.22'E	2691.0	AUV	profilestart
0179-5	14.07.10	11:43:00	79°44.02'N	4°27.60'E	2679.0	AUV	profileend
0179-5	14.07.10	11:46:00	79°44.02'N	4°27.36'E	2673.0	AUV	action
0179-5	14.07.10	11:48:00	79°44.02'N	4°27.29'E	2673.0	AUV	action
0179-5	14.07.10	11:51:59	79°44.02'N	4°27.31'E	2673.0	AUV	on deck
0179-6	14.07.10	12:15:00	79°44.36'N	4°30.25'E	2720.0	MOR	in the water
0179-6	14.07.10	12:18:00	79°44.36'N	4°30.32'E	2722.0	MOR	in the water
0179-6	14.07.10	12:20:00	79°44.36'N	4°30.30'E	2725.0	MOR	in the water
0179-6	14.07.10	12:32:00	79°44.38'N	4°30.52'E	2729.0	MOR	in the water
0179-6	14.07.10	12:33:00	79°44.37'N	4°30.52'E	2726.0	MOR	in the water
0179-6	14.07.10	12:42:00	79°44.36'N	4°30.50'E	2730.0	MOR	in the water
0179-6	14.07.10	12:57:00	79°44.35'N	4°30.43'E	2730.0	MOR	in the water
0179-6	14.07.10	13:13:00	79°44.36'N	4°30.31'E	2720.0	MOR	in the water
0179-6	14.07.10	13:42:00	79°44.36'N	4°30.22'E	2717.0	MOR	in the water
0179-6	14.07.10	13:54:00	79°44.31'N	4°30.15'E	2722.0	MOR	in the water
0179-6	14.07.10	14:05:00	79°44.34'N	4°30.15'E	2719.0	MOR	in the water
0179-6	14.07.10	14:06:00	79°44.35'N	4°30.17'E	2717.0	MOR	in the water
0179-6	14.07.10	14:07:00	79°44.35'N	4°30.19'E	2717.0	MOR	in the water
0179-6	14.07.10	14:09:00	79°44.35'N	4°30.23'E	2719.0	MOR	action
0179-6	14.07.10	14:11:00	79°44.35'N	4°30.24'E	2719.0	MOR	hoisting
0179-6	14.07.10	14:27:00	79°44.32'N	4°30.22'E	2723.0	MOR	on deck
0179-6	14.07.10	14:38:00	79°44.32'N	4°30.14'E	2720.0	MOR	on deck
0179-6	14.07.10	14:56:00	79°44.32'N	4°30.16'E	2721.0	MOR	in the water
0179-6	14.07.10	14:58:00	79°44.33'N	4°30.24'E	2725.0	MOR	in the water
0179-6	14.07.10	15:05:00	79°44.34'N	4°30.24'E	2727.0	MOR	in the water
0179-6	14.07.10	15:05:01	79°44.34'N	4°30.24'E	2727.0	MOR	in the water
0179-6	14.07.10	15:06:00	79°44.34'N	4°30.24'E	2728.0	MOR	in the water
0179-6	14.07.10	15:13:00	79°44.36'N	4°30.31'E	2727.0	MOR	on ground/max depth
0179-6	14.07.10	15:13:01	79°44.36'N	4°30.31'E	2727.0	MOR	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0179-6	14.07.10	15:14:00	79°44.36'N	4°30.32'E	2726.0	MOR	action
0179-6	14.07.10	15:14:01	79°44.36'N	4°30.32'E	2726.0	MOR	on deck
0179-6	14.07.10	15:20:59	79°44.35'N	4°30.22'E	2723.0	MOR	on deck
0179-7	14.07.10	15:47:00	79°44.44'N	4°23.37'E	2673.0	AUV	information
0179-7	14.07.10	15:48:00	79°44.44'N	4°23.38'E	2673.0	AUV	in the water
0179-7	14.07.10	15:51:00	79°44.41'N	4°23.29'E	2676.0	AUV	in the water
0179-7	14.07.10	15:52:00	79°44.41'N	4°23.27'E	2676.0	AUV	action
0179-7	14.07.10	15:56:00	79°44.41'N	4°23.33'E	2675.0	AUV	profilestart
0179-7	14.07.10	16:04:00	79°44.38'N	4°23.33'E	2674.0	AUV	on deck
0179-7	14.07.10	16:44:00	79°44.60'N	4°23.55'E	2672.0	AUV	profileend
0179-7	14.07.10	16:49:00	79°44.57'N	4°23.83'E	2660.0	AUV	in the water
0179-7	14.07.10	16:56:00	79°44.57'N	4°23.78'E	2661.0	AUV	action
0179-7	14.07.10	17:00:00	79°44.57'N	4°23.90'E	2656.0	AUV	on deck
0179-7	14.07.10	17:02:59	79°44.56'N	4°23.92'E	2655.0	AUV	on deck
0180-1	14.07.10	17:59:00	79°44.15'N	4°29.36'E	2727.0	MN	in the water
0180-1	14.07.10	18:08:00	79°44.13'N	4°29.33'E	2729.0	MN	on ground/max depth
0180-1	14.07.10	18:18:59	79°44.11'N	4°29.28'E	2724.0	MN	on deck
0180-2	14.07.10	18:25:00	79°44.10'N	4°29.34'E	2739.0	BONGO	in the water
0180-2	14.07.10	18:38:00	79°44.09'N	4°29.32'E	2727.0	BONGO	on ground/max depth
0180-2	14.07.10	18:47:59	79°44.09'N	4°29.29'E	2728.0	BONGO	on deck
0180-3	14.07.10	18:57:00	79°44.09'N	4°29.35'E	2734.0	CTD/RO	in the water
0180-3	14.07.10	19:45:00	79°44.15'N	4°29.21'E	2714.0	CTD/RO	on ground/max depth
0180-3	14.07.10	20:36:59	79°44.13'N	4°29.24'E	2721.0	CTD/RO	on deck
0180-4	14.07.10	20:47:00	79°44.11'N	4°29.25'E	2723.0	MUC	in the water
0180-4	14.07.10	21:40:00	79°44.06'N	4°29.17'E	2722.0	MUC	on ground/max depth
0180-4	14.07.10	21:41:00	79°44.06'N	4°29.16'E	2722.0	MUC	hoisting
0180-4	14.07.10	22:26:59	79°43.82'N	4°29.21'E	2745.0	MUC	on deck
0181-1	14.07.10	23:57:00	79°35.63'N	5°12.83'E	2773.0	CTD/RO	in the water
0181-1	15.07.10	00:47:00	79°36.10'N	5°14.61'E	2746.0	CTD/RO	on ground/max depth
0181-1	15.07.10	00:48:00	79°36.10'N	5°14.70'E	2747.0	CTD/RO	hoisting
0181-1	15.07.10	01:39:59	79°36.57'N	5°15.81'E	2722.0	CTD/RO	on deck
0181-2	15.07.10	02:06:00	79°35.92'N	5°13.16'E	2767.0	MUC	in the water
0181-2	15.07.10	03:01:00	79°35.69'N	5°13.24'E	2768.0	MUC	on ground/max depth
0181-2	15.07.10	03:46:59	79°35.55'N	5°12.91'E	2772.0	MUC	on deck
0182-1	15.07.10	07:52:00	79°55.69'N	3°4.40'E	2608.0	CTD/RO	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0182-1	15.07.10	08:41:00	79°56.03'N	3°5.49'E	2598.0	CTD/RO	on ground/max depth
0182-1	15.07.10	09:47:59	79°56.36'N	3°7.11'E	2581.0	CTD/RO	on deck
0182-2	15.07.10	09:54:00	79°56.37'N	3°7.10'E	2580.0	MUC	in the water
0182-2	15.07.10	10:46:00	79°56.35'N	3°6.05'E	2587.0	MUC	on ground/max depth
0182-2	15.07.10	10:47:00	79°56.35'N	3°6.03'E	2586.0	MUC	hoisting
0182-2	15.07.10	10:47:01	79°56.35'N	3°6.03'E	2586.0	MUC	offground
0182-2	15.07.10	11:30:59	79°56.28'N	3°4.86'E	2595.0	MUC	on deck
0183-1	15.07.10	13:58:00	79°44.09'N	4°29.12'E	2705.0	LANDER	on ground/max depth
0183-1	15.07.10	13:59:00	79°44.09'N	4°29.12'E	2709.0	LANDER	action
0183-1	15.07.10	14:07:00	79°44.06'N	4°29.09'E	2715.0	LANDER	in the water
0183-1	15.07.10	14:10:00	79°44.05'N	4°29.10'E	2715.0	LANDER	action
0183-1	15.07.10	14:28:00	79°43.99'N	4°28.96'E	2712.0	LANDER	on deck
0183-1	15.07.10	14:49:00	79°43.96'N	4°28.84'E	2713.0	LANDER	at surface
0183-1	15.07.10	15:50:00	79°43.84'N	4°28.91'E	2733.0	LANDER	action
0183-1	15.07.10	15:59:00	79°43.75'N	4°29.54'E	2766.0	LANDER	action
0183-1	15.07.10	15:59:01	79°43.75'N	4°29.54'E	2766.0	LANDER	on deck
0183-2	15.07.10	16:00:00	79°43.75'N	4°29.54'E	2766.0	LANDER	information
0183-2	15.07.10	16:01:00	79°43.76'N	4°29.51'E	2766.0	LANDER	action
0183-1	15.07.10	16:03:59	79°43.77'N	4°29.45'E	2764.0	LANDER	on deck
0183-2	15.07.10	16:50:00	79°43.84'N	4°29.39'E	2747.0	LANDER	at surface
0183-2	15.07.10	16:56:00	79°43.82'N	4°28.91'E	2738.0	LANDER	action
0183-2	15.07.10	17:05:00	79°43.66'N	4°28.63'E	2748.0	LANDER	action
0183-2	15.07.10	17:06:00	79°43.64'N	4°28.61'E	2748.0	LANDER	on deck
0183-2	15.07.10	17:08:00	79°43.63'N	4°28.64'E	2749.0	LANDER	on deck
0183-2	15.07.10	17:08:59	79°43.63'N	4°28.64'E	2749.0	LANDER	on ground/max depth
0184-2	15.07.10	20:22:00	79°25.62'N	4°44.79'E	2601.0	HN	in the water
0184-1	15.07.10	20:24:00	79°25.63'N	4°44.90'E	2601.0	CTD/RO	in the water
0184-2	15.07.10	20:39:00	79°25.62'N	4°44.92'E	2600.0	HN	on ground/max depth
0184-2	15.07.10	20:41:59	79°25.62'N	4°44.90'E	5299.0	HN	on deck
0184-1	15.07.10	21:11:00	79°25.60'N	4°44.82'E	2598.0	CTD/RO	on ground/max depth
0184-1	15.07.10	21:59:59	79°25.57'N	4°44.78'E	2596.0	CTD/RO	on deck
0184-3	15.07.10	22:06:00	79°25.55'N	4°44.77'E	5222.0	MUC	in the water
0184-3	15.07.10	22:57:00	79°25.61'N	4°44.58'E	2601.0	MUC	on ground/max depth
0184-3	15.07.10	23:09:00	79°25.61'N	4°44.56'E	2602.0	MUC	hoisting
0184-3	15.07.10	23:49:59	79°25.36'N	4°45.47'E	2572.0	MUC	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0185-1	16.07.10	01:04:00	79°16.86'N	4°19.76'E	2394.0	CTD/RO	in the water
0185-1	16.07.10	01:48:00	79°16.79'N	4°19.72'E	2393.0	CTD/RO	on ground/max depth
0185-1	16.07.10	01:48:01	79°16.79'N	4°19.72'E	2393.0	CTD/RO	hoisting
0185-1	16.07.10	02:48:59	79°16.77'N	4°19.88'E	2392.0	CTD/RO	on deck
0186-1	16.07.10	03:12:00	79°18.03'N	4°19.15'E	2454.0	GKG	in the water
0186-1	16.07.10	03:49:00	79°18.00'N	4°19.04'E	2454.0	GKG	on ground/max depth
0186-1	16.07.10	04:24:59	79°17.99'N	4°19.06'E	2443.0	GKG	on deck
0187-1	16.07.10	04:44:00	79°16.80'N	4°19.50'E	2395.0	MUC	in the water
0187-1	16.07.10	05:32:00	79°16.81'N	4°19.77'E	2393.8	MUC	on ground/max depth
0187-1	16.07.10	05:51:00	79°16.70'N	4°19.16'E	2395.0	MUC	hoisting
0187-1	16.07.10	06:29:00	79°16.68'N	4°18.63'E	2399.0	MUC	at surface
0187-1	16.07.10	06:33:59	79°16.68'N	4°18.55'E	2399.5	MUC	on deck
0188-1	16.07.10	20:49:00	79°4.81'N	4°5.60'E	2504.7	LANDER	in the water
0188-1	16.07.10	20:53:00	79°4.82'N	4°5.79'E	2502.5	LANDER	on ground/max depth
0188-1	16.07.10	20:53:59	79°4.82'N	4°5.79'E	2502.5	LANDER	action
0189-1	16.07.10	22:13:00	78°59.96'N	3°0.32'E	2468.7	GKG	in the water
0189-1	16.07.10	22:49:00	79°0.02'N	2°59.91'E	2532.7	GKG	on ground/max depth
0189-1	16.07.10	22:50:00	79°0.02'N	2°59.90'E	2539.5	GKG	hoisting
0189-1	16.07.10	23:28:59	78°59.85'N	2°59.04'E	2434.5	GKG	on deck
0190-1	17.07.10	00:39:00	78°50.10'N	2°34.86'E	2522.2	CTD/RO	in the water
0190-1	17.07.10	01:24:00	78°50.15'N	2°33.48'E	2523.0	CTD/RO	on ground/max depth
0190-1	17.07.10	01:25:00	78°50.15'N	2°33.45'E	2523.2	CTD/RO	hoisting
0190-1	17.07.10	02:22:59	78°50.06'N	2°32.85'E	2526.2	CTD/RO	on deck
0191-1	17.07.10	03:00:00	78°49.99'N	2°15.07'E	2542.7	CTD/RO	in the water
0191-1	17.07.10	03:43:00	78°50.01'N	2°15.15'E	2542.0	CTD/RO	on ground/max depth
0191-1	17.07.10	03:46:00	78°50.00'N	2°15.02'E	2542.5	CTD/RO	hoisting
0191-1	17.07.10	04:30:59	78°49.98'N	2°14.09'E	2542.7	CTD/RO	on deck
0192-1	17.07.10	05:20:00	78°50.33'N	1°36.74'E	2547.2	MOR	information
0192-1	17.07.10	05:20:01	78°50.33'N	1°36.74'E	2547.2	MOR	on ground/max depth
0192-1	17.07.10	05:37:00	78°50.18'N	1°37.18'E	2547.3	MOR	in the water
0192-1	17.07.10	05:52:00	78°50.12'N	1°37.00'E	2547.5	MOR	action
0192-1	17.07.10	05:56:00	78°50.11'N	1°37.15'E	2493.0	MOR	at surface
0192-1	17.07.10	05:57:00	78°50.10'N	1°37.14'E	2547.5	MOR	on deck
0192-1	17.07.10	06:22:00	78°49.82'N	1°35.06'E	2547.3	MOR	action

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0192-1	17.07.10	06:24:00	78°49.82'N	1°35.17'E	2547.3	MOR	on deck
0192-1	17.07.10	06:28:00	78°49.81'N	1°35.46'E	2547.2	MOR	on deck
0192-1	17.07.10	06:31:00	78°49.80'N	1°35.51'E	2547.5	MOR	on deck
0192-1	17.07.10	06:41:00	78°49.74'N	1°35.45'E	2547.5	MOR	on deck
0192-1	17.07.10	06:55:00	78°49.65'N	1°35.20'E	2547.7	MOR	on deck
0192-1	17.07.10	07:06:59	78°49.54'N	1°34.91'E	2548.0	MOR	on deck
0193-1	17.07.10	08:44:00	78°49.62'N	0°24.20'E	2572.8	MOR	information
0193-1	17.07.10	08:45:00	78°49.61'N	0°24.13'E	2573.0	MOR	on ground/max depth
0193-1	17.07.10	08:54:00	78°49.58'N	0°24.37'E	2572.0	MOR	in the water
0193-1	17.07.10	08:57:00	78°49.57'N	0°24.25'E	2572.0	MOR	action
0193-1	17.07.10	08:58:00	78°49.56'N	0°24.22'E	2572.0	MOR	at surface
0193-1	17.07.10	09:00:00	78°49.56'N	0°24.20'E	2572.0	MOR	on deck
0193-1	17.07.10	09:15:00	78°49.60'N	0°22.11'E	2580.3	MOR	action
0193-1	17.07.10	09:17:00	78°49.60'N	0°21.96'E	2580.8	MOR	on deck
0193-1	17.07.10	09:19:00	78°49.59'N	0°21.85'E	2580.9	MOR	on deck
0193-1	17.07.10	09:24:00	78°49.56'N	0°21.74'E	2580.5	MOR	on deck
0193-1	17.07.10	09:34:00	78°49.44'N	0°21.57'E	2578.5	MOR	on deck
0193-1	17.07.10	09:46:00	78°49.34'N	0°20.77'E	2577.5	MOR	on deck
0193-1	17.07.10	10:10:59	78°49.15'N	0°19.75'E	2573.0	MOR	on deck
0194-1	17.07.10	10:34:00	78°50.03'N	0°23.48'E	2581.0	CTD/RO	in the water
0194-2	17.07.10	10:37:00	78°50.04'N	0°23.28'E	2581.7	HN	in the water
0194-3	17.07.10	10:47:00	78°50.03'N	0°23.29'E	2581.8	SPR	in the water
0194-2	17.07.10	10:50:00	78°50.04'N	0°23.39'E	2581.5	HN	on ground/max depth
0194-2	17.07.10	10:53:59	78°50.03'N	0°23.40'E	2581.5	HN	on deck
0194-3	17.07.10	11:05:00	78°50.02'N	0°23.15'E	2582.3	SPR	on ground/max depth
0194-3	17.07.10	11:10:59	78°50.04'N	0°23.20'E	2582.3	SPR	on deck
0194-1	17.07.10	11:21:00	78°50.04'N	0°23.61'E	2581.0	CTD/RO	on ground/max depth
0194-1	17.07.10	11:21:01	78°50.04'N	0°23.61'E	2581.0	CTD/RO	hoisting
0194-1	17.07.10	12:07:59	78°49.99'N	0°24.07'E	2579.5	CTD/RO	on deck
0195-1	17.07.10	12:10:00	78°49.99'N	0°24.10'E	2579.8	MOR	in the water
0195-1	17.07.10	12:13:00	78°49.99'N	0°24.07'E	2579.5	MOR	in the water
0195-1	17.07.10	12:23:00	78°49.98'N	0°23.92'E	2580.0	MOR	in the water
0195-1	17.07.10	12:47:00	78°49.99'N	0°23.92'E	2580.0	MOR	in the water
0195-1	17.07.10	13:09:00	78°49.98'N	0°24.03'E	2579.8	MOR	in the water
0195-1	17.07.10	13:23:00	78°50.00'N	0°24.06'E	2580.0	MOR	in the water
0195-1	17.07.10	13:35:00	78°50.00'N	0°24.03'E	2580.0	MOR	in the water
0195-1	17.07.10	13:38:00	78°49.99'N	0°24.06'E	2579.7	MOR	in the water
0195-1	17.07.10	13:38:01	78°49.99'N	0°24.06'E	2579.7	MOR	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0195-1	17.07.10	13:41:00	78°49.99'N	0°24.05'E	2579.7	MOR	on ground/max depth
0195-1	17.07.10	13:41:01	78°49.99'N	0°24.05'E	2579.7	MOR	action
0195-1	17.07.10	13:44:59	78°49.99'N	0°24.05'E	2579.8	MOR	on deck
0196-1	17.07.10	14:28:00	78°50.01'N	0°5.82'E	2625.2	CTD/RO	in the water
0196-1	17.07.10	15:15:00	78°50.04'N	0°5.89'E	2625.3	CTD/RO	on ground/max depth
0196-1	17.07.10	15:16:00	78°50.05'N	0°5.88'E	2625.2	CTD/RO	hoisting
0196-1	17.07.10	16:04:59	78°50.02'N	0°6.65'E	2622.0	CTD/RO	on deck
0197-1	17.07.10	17:04:00	78°49.98'N	0°41.88'E	2470.7	MN	in the water
0197-1	17.07.10	17:11:00	78°49.96'N	0°41.89'E	2470.0	MN	on ground/max depth
0197-1	17.07.10	17:12:00	78°49.96'N	0°41.89'E	2470.3	MN	hoisting
0197-1	17.07.10	17:24:59	78°49.94'N	0°42.08'E	2468.0	MN	on deck
0197-2	17.07.10	17:34:00	78°50.00'N	0°42.10'E	2467.0	BONGO	in the water
0197-2	17.07.10	17:45:00	78°49.97'N	0°42.11'E	2467.0	BONGO	on ground/max depth
0197-2	17.07.10	17:54:59	78°49.95'N	0°42.00'E	2468.7	BONGO	on deck
0197-3	17.07.10	18:04:00	78°49.96'N	0°42.16'E	2466.8	CTD/RO	in the water
0197-3	17.07.10	18:50:00	78°49.90'N	0°42.15'E	2467.5	CTD/RO	on ground/max depth
0197-3	17.07.10	19:33:59	78°49.82'N	0°41.76'E	2473.7	CTD/RO	on deck
0198-1	17.07.10	20:09:00	78°49.96'N	0°59.76'E	2484.0	CTD/RO	in the water
0198-1	17.07.10	20:53:00	78°49.93'N	0°59.99'E	2484.8	CTD/RO	on ground/max depth
0198-1	17.07.10	21:39:59	78°49.93'N	0°59.89'E	2484.0	CTD/RO	on deck
0199-1	17.07.10	22:20:00	78°49.96'N	1°17.69'E	2524.7	CTD/RO	in the water
0199-1	17.07.10	23:05:00	78°49.98'N	1°17.58'E	2525.2	CTD/RO	on ground/max depth
0199-1	17.07.10	23:06:00	78°49.98'N	1°17.60'E	2525.3	CTD/RO	hoisting
0199-1	17.07.10	23:47:59	78°49.78'N	1°17.91'E	2524.3	CTD/RO	on deck
0200-1	18.07.10	00:54:00	78°49.96'N	1°54.62'E	2557.8	CTD/RO	in the water
0200-1	18.07.10	01:36:00	78°49.93'N	1°53.97'E	2558.0	CTD/RO	on ground/max depth
0200-1	18.07.10	01:37:00	78°49.93'N	1°54.03'E	2558.1	CTD/RO	hoisting
0200-1	18.07.10	02:26:59	78°49.97'N	1°53.87'E	2558.2	CTD/RO	on deck
0201-1	18.07.10	03:06:00	78°49.94'N	1°35.75'E	2547.8	CTD/RO	in the water
0201-1	18.07.10	03:51:00	78°49.95'N	1°35.93'E	2548.0	CTD/RO	on ground/max depth
0201-1	18.07.10	03:52:00	78°49.95'N	1°35.92'E	2548.0	CTD/RO	hoisting
0201-1	18.07.10	04:40:59	78°49.91'N	1°35.96'E	2547.9	CTD/RO	on deck
0201-2	18.07.10	06:20:00	78°49.97'N	1°36.07'E	2547.7	MOR	information
0201-2	18.07.10	06:23:00	78°49.98'N	1°36.15'E	2548.0	MOR	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0201-2	18.07.10	06:24:00	78°49.98'N	1°36.16'E	2548.0	MOR	in the water
0201-2	18.07.10	06:25:00	78°49.98'N	1°36.17'E	2548.0	MOR	in the water
0201-2	18.07.10	06:53:00	78°50.00'N	1°36.05'E	2547.8	MOR	in the water
0201-2	18.07.10	07:16:00	78°49.96'N	1°35.90'E	2547.7	MOR	in the water
0201-2	18.07.10	07:30:00	78°49.98'N	1°36.06'E	2547.7	MOR	in the water
0201-2	18.07.10	07:44:00	78°49.98'N	1°36.05'E	2547.5	MOR	in the water
0201-2	18.07.10	07:45:00	78°49.98'N	1°36.08'E	2521.5	MOR	in the water
0201-2	18.07.10	07:52:00	78°49.96'N	1°35.90'E	2547.5	MOR	in the water
0201-2	18.07.10	07:52:01	78°49.96'N	1°35.90'E	2547.5	MOR	action
0201-2	18.07.10	07:55:00	78°49.95'N	1°35.83'E	2547.5	MOR	on deck
0201-2	18.07.10	07:57:59	78°49.95'N	1°35.76'E	2547.5	MOR	on ground/max depth
0202-1	18.07.10	10:27:00	78°50.12'N	0°43.67'W	2680.3	MOR	on ground/max depth
0202-1	18.07.10	10:41:00	78°50.17'N	0°45.87'W	2669.0	MOR	action
0202-1	18.07.10	10:45:00	78°50.15'N	0°45.81'W	2669.0	MOR	at surface
0202-1	18.07.10	11:03:00	78°50.18'N	0°47.52'W	2662.2	MOR	action
0202-1	18.07.10	11:03:01	78°50.18'N	0°47.52'W	2662.2	MOR	on deck
0202-1	18.07.10	11:07:00	78°50.17'N	0°47.74'W	2662.0	MOR	on deck
0202-1	18.07.10	11:13:00	78°50.10'N	0°47.76'W	2661.8	MOR	on deck
0202-1	18.07.10	11:18:00	78°50.08'N	0°47.96'W	2661.2	MOR	on deck
0202-1	18.07.10	11:33:00	78°50.09'N	0°48.98'W	2659.2	MOR	on deck
0202-1	18.07.10	11:56:59	78°49.89'N	0°49.90'W	2656.3	MOR	on deck
0203-1	18.07.10	12:12:00	78°49.99'N	0°48.16'W	2660.0	CTD/RO	in the water
0203-1	18.07.10	13:00:00	78°49.99'N	0°48.11'W	2660.2	CTD/RO	on ground/max depth
0203-1	18.07.10	13:00:01	78°49.99'N	0°48.11'W	2660.2	CTD/RO	hoisting
0203-1	18.07.10	13:54:59	78°49.99'N	0°48.09'W	2660.8	CTD/RO	on deck
0203-2	18.07.10	13:59:00	78°50.00'N	0°47.86'W	2661.2	MOR	in the water
0203-2	18.07.10	14:01:00	78°50.00'N	0°47.86'W	2661.3	MOR	in the water
0203-2	18.07.10	14:08:00	78°50.00'N	0°47.92'W	2661.5	MOR	in the water
0203-2	18.07.10	14:31:00	78°50.00'N	0°47.95'W	2661.0	MOR	in the water
0203-2	18.07.10	14:54:00	78°49.99'N	0°47.93'W	2661.0	MOR	in the water
0203-2	18.07.10	15:08:00	78°50.00'N	0°48.07'W	2661.2	MOR	in the water
0203-2	18.07.10	15:20:00	78°49.98'N	0°48.02'W	2661.0	MOR	in the water
0203-2	18.07.10	15:23:00	78°49.99'N	0°48.00'W	2661.3	MOR	in the water
0203-2	18.07.10	15:24:00	78°49.99'N	0°47.98'W	2661.3	MOR	in the water
0203-2	18.07.10	15:25:00	78°50.00'N	0°47.96'W	2661.2	MOR	in the water
0203-2	18.07.10	15:28:01	78°50.00'N	0°47.98'W	2661.2	MOR	in the water
0203-2	18.07.10	15:29:00	78°50.00'N	0°48.00'W	2661.3	MOR	on ground/max depth
0203-2	18.07.10	15:30:59	78°50.00'N	0°48.01'W	2661.3	MOR	on deck

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0203-2	18.07.10	15:31:59	78°50.00'N	0°48.00'W	2661.2	MOR	on deck
0204-1	18.07.10	16:06:00	78°50.00'N	0°30.01'W	2687.7	CTD/RO	in the water
0204-1	18.07.10	16:54:00	78°50.00'N	0°30.50'W	2688.0	CTD/RO	on ground/max depth
0204-1	18.07.10	16:55:00	78°50.00'N	0°30.52'W	2688.0	CTD/RO	hoisting
0204-1	18.07.10	17:42:59	78°49.93'N	0°31.01'W	2686.8	CTD/RO	on deck
0205-1	18.07.10	18:20:00	78°50.01'N	0°11.99'W	2641.5	CTD/RO	in the water
0205-1	18.07.10	19:10:00	78°49.99'N	0°12.11'W	2641.2	CTD/RO	on ground/max depth
0205-1	18.07.10	19:56:59	78°49.93'N	0°12.01'W	2640.2	CTD/RO	on deck
0206-1	18.07.10	21:22:00	78°49.98'N	1°5.23'W	2525.0	CTD/RO	in the water
0206-1	18.07.10	22:11:00	78°49.92'N	1°6.59'W	2584.0	CTD/RO	on ground/max depth
0206-1	18.07.10	23:03:59	78°50.02'N	1°8.25'W	2639.0	CTD/RO	on deck
0207-1	19.07.10	07:10:00	79°39.11'N	0°13.81'W	2823.8	MOR	on ground/max depth
0207-1	19.07.10	07:14:00	79°39.11'N	0°13.93'W	2823.8	MOR	in the water
0207-1	19.07.10	07:25:00	79°39.07'N	0°14.65'W	2823.3	MOR	on deck
0207-1	19.07.10	08:29:00	79°39.01'N	0°13.69'W	2823.8	MOR	in the water
0207-1	19.07.10	08:30:00	79°39.01'N	0°13.74'W	2823.8	MOR	action
0207-1	19.07.10	08:34:00	79°39.02'N	0°13.86'W	2823.7	MOR	on deck
0207-1	19.07.10	08:53:00	79°38.84'N	0°14.02'W	2823.8	MOR	at surface
0207-1	19.07.10	10:11:00	79°38.98'N	0°18.02'W	2823.0	MOR	action
0207-1	19.07.10	10:13:00	79°38.97'N	0°18.11'W	2823.0	MOR	on deck
0207-1	19.07.10	10:15:00	79°38.96'N	0°18.25'W	2823.0	MOR	on deck
0207-1	19.07.10	10:19:00	79°38.93'N	0°18.48'W	2823.0	MOR	on deck
0207-1	19.07.10	11:12:59	79°38.77'N	0°20.29'W	2822.3	MOR	on deck
0208-1	19.07.10	16:10:00	79°39.91'N	3°1.62'W	2468.0	MOR	information
0208-1	19.07.10	16:13:00	79°39.85'N	3°1.66'W	2469.3	MOR	in the water
0208-1	19.07.10	16:15:00	79°39.82'N	3°1.65'W	2470.1	MOR	in the water
0208-1	19.07.10	16:32:00	79°39.52'N	3°1.47'W	2474.2	MOR	in the water
0208-1	19.07.10	17:15:00	79°38.75'N	3°0.92'W	2470.3	MOR	in the water
0208-1	19.07.10	17:22:00	79°38.64'N	3°0.88'W	2469.6	MOR	in the water
0208-1	19.07.10	17:26:00	79°38.57'N	3°0.84'W	2469.5	MOR	in the water
0208-1	19.07.10	17:27:59	79°38.55'N	3°0.84'W	2469.5	MOR	on ground/max depth
0208-2	19.07.10	17:40:00	79°38.32'N	3°0.68'W	2476.0	MN	in the water
0208-2	19.07.10	17:48:00	79°38.17'N	3°0.57'W	2472.5	MN	on ground/max depth
0208-2	19.07.10	18:02:59	79°37.91'N	3°0.39'W	2475.0	MN	on deck
0208-3	19.07.10	18:14:00	79°37.74'N	3°0.39'W	2479.8	BONGO	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0208-3	19.07.10	18:25:00	79°37.53'N	3°0.31'W	2484.2	BONGO	on ground/max depth
0208-3	19.07.10	18:34:59	79°37.37'N	3°0.23'W	2490.8	BONGO	on deck
0208-4	19.07.10	18:38:00	79°37.30'N	3°0.16'W	2491.3	HN	in the water
0208-4	19.07.10	18:39:00	79°37.28'N	3°0.16'W	2491.3	HN	on ground/max depth
0208-4	19.07.10	18:41:00	79°37.25'N	3°0.16'W	2491.7	HN	on deck
0208-4	19.07.10	18:42:00	79°37.23'N	3°0.15'W	2492.0	HN	in the water
0208-4	19.07.10	18:43:00	79°37.22'N	3°0.15'W	2491.7	HN	on ground/max depth
0208-4	19.07.10	18:45:59	79°37.18'N	3°0.13'W	2491.5	HN	on deck
0208-5	19.07.10	18:50:00	79°37.09'N	3°0.07'W	2491.3	CTD/RO	in the water
0208-5	19.07.10	18:58:00	79°36.94'N	2°60.00'W	2493.0	CTD/RO	on ground/max depth
0208-5	19.07.10	19:05:59	79°36.80'N	2°59.96'W	2494.5	CTD/RO	on deck
0209-1	20.07.10	02:30:00	78°49.89'N	2°20.16'W	2673.0	CTD/RO	in the water
0209-1	20.07.10	03:20:00	78°49.77'N	2°23.05'W	2664.3	CTD/RO	on ground/max depth
0209-1	20.07.10	04:12:59	78°49.93'N	2°25.72'W	2641.0	CTD/RO	on deck
0210-1	20.07.10	05:00:00	78°49.41'N	2°7.66'W	2710.2	MOR	information
0210-1	20.07.10	05:09:00	78°49.47'N	2°7.87'W	2709.3	MOR	on ground/max depth
0210-1	20.07.10	05:10:00	78°49.48'N	2°7.85'W	2709.2	MOR	action
0210-1	20.07.10	05:11:00	78°49.48'N	2°7.85'W	2709.2	MOR	at surface
0210-1	20.07.10	05:37:00	78°49.61'N	2°7.96'W	2708.2	MOR	action
0210-1	20.07.10	05:40:00	78°49.58'N	2°8.22'W	2708.0	MOR	on deck
0210-1	20.07.10	05:41:00	78°49.57'N	2°8.30'W	2708.0	MOR	on deck
0210-1	20.07.10	05:46:00	78°49.61'N	2°8.69'W	2706.8	MOR	on deck
0210-1	20.07.10	05:58:00	78°49.68'N	2°9.47'W	2703.7	MOR	on deck
0210-1	20.07.10	06:15:00	78°49.68'N	2°10.51'W	2702.5	MOR	on deck
0210-1	20.07.10	06:46:00	78°49.84'N	2°12.54'W	2696.7	MOR	on deck
0210-1	20.07.10	06:46:59	78°49.84'N	2°12.54'W	2696.7	MOR	information
0210-2	20.07.10	07:09:00	78°49.64'N	2°7.03'W	2710.7	CTD/RO	in the water
0210-2	20.07.10	07:56:00	78°49.68'N	2°7.19'W	2710.5	CTD/RO	on ground/max depth
0210-2	20.07.10	08:46:59	78°49.73'N	2°7.38'W	2709.8	CTD/RO	on deck
0210-3	20.07.10	09:08:00	78°49.99'N	2°0.08'W	2716.8	MOR	information
0210-3	20.07.10	09:10:00	78°50.00'N	2°0.06'W	2716.8	MOR	in the water
0210-3	20.07.10	09:12:00	78°50.01'N	2°0.03'W	2716.8	MOR	in the water
0210-3	20.07.10	09:19:00	78°50.01'N	2°0.03'W	2716.7	MOR	in the water
0210-4	20.07.10	09:21:00	78°50.02'N	1°59.99'W	2716.8	HN	in the water

Station PS 76/	Date	Time	Position Latitude	Position Longitude	Depth [m]	Gear Abbreviation	Action
0210-4	20.07.10	09:22:00	78°50.02'N	1°59.99'W	2717.0	HN	on ground/max depth
0210-4	20.07.10	09:23:59	78°50.02'N	1°59.99'W	2717.1	HN	on deck
0210-5	20.07.10	09:25:00	78°50.02'N	2°0.03'W	2697.6	HN	in the water
0210-5	20.07.10	09:26:00	78°50.02'N	2°0.05'W	2716.7	HN	on ground/max depth
0210-5	20.07.10	09:27:59	78°50.02'N	2°0.07'W	2716.7	HN	on deck
0210-3	20.07.10	09:46:00	78°50.01'N	2°0.03'W	2716.5	MOR	in the water
0210-3	20.07.10	10:08:00	78°50.01'N	2°0.03'W	2716.5	MOR	in the water
0210-3	20.07.10	10:31:00	78°50.00'N	2°0.02'W	2716.5	MOR	in the water
0210-3	20.07.10	10:47:00	78°50.00'N	1°59.99'W	2716.5	MOR	in the water
0210-3	20.07.10	10:49:00	78°50.01'N	1°59.99'W	2716.5	MOR	in the water
0210-3	20.07.10	10:51:00	78°50.01'N	1°59.97'W	2716.5	MOR	in the water
0210-3	20.07.10	10:51:01	78°50.01'N	1°59.97'W	2716.5	MOR	action
0210-3	20.07.10	10:52:00	78°50.01'N	1°59.97'W	2716.6	MOR	on deck
0210-3	20.07.10	10:53:00	78°50.01'N	1°59.97'W	2716.5	MOR	on deck
0210-3	20.07.10	10:53:59	78°50.01'N	1°59.97'W	2716.5	MOR	on ground/max depth
0211-1	20.07.10	12:06:00	78°50.12'N	1°25.59'W	2686.0	CTD/RO	in the water
0211-1	20.07.10	12:54:00	78°50.11'N	1°26.57'W	2686.2	CTD/RO	on ground/max depth
0211-1	20.07.10	12:54:01	78°50.11'N	1°26.57'W	2686.2	CTD/RO	hoisting
0211-1	20.07.10	13:51:59	78°50.07'N	1°28.11'W	2688.0	CTD/RO	on deck
0212-1	20.07.10	14:28:00	78°49.98'N	1°45.20'W	2711.5	CTD/RO	in the water
0212-1	20.07.10	15:17:00	78°50.12'N	1°47.19'W	2709.1	CTD/RO	on ground/max depth
0212-1	20.07.10	16:10:59	78°50.07'N	1°48.72'W	2708.8	CTD/RO	on deck
0213-1	20.07.10	17:36:00	78°50.43'N	2°0.88'W	2713.8	AUV	information
0213-1	20.07.10	17:37:00	78°50.43'N	2°0.86'W	2713.8	AUV	in the water
0213-1	20.07.10	17:41:00	78°50.44'N	2°0.88'W	2713.2	AUV	in the water
0213-1	20.07.10	18:00:00	78°50.42'N	2°1.05'W	2713.2	AUV	profilestart
0213-1	20.07.10	18:06:00	78°50.39'N	2°1.11'W	2713.3	AUV	on deck
0213-1	20.07.10	18:44:00	78°50.33'N	2°0.75'W	2714.2	AUV	profileend
0213-1	20.07.10	18:50:00	78°50.31'N	2°0.92'W	2714.3	AUV	in the water
0213-1	20.07.10	19:02:00	78°50.31'N	2°1.19'W	2713.8	AUV	action
0213-1	20.07.10	19:07:00	78°50.32'N	2°1.09'W	2713.8	AUV	on deck
0213-1	20.07.10	19:09:59	78°50.32'N	2°1.01'W	2714.1	AUV	on deck
0214-1	20.07.10	20:00:00	78°51.46'N	2°15.36'W	2680.8	AUV	in the water
0214-1	20.07.10	20:04:00	78°51.46'N	2°15.34'W	2681.2	AUV	in the water
0214-1	20.07.10	20:21:00	78°51.38'N	2°15.93'W	2680.5	AUV	profilestart
0214-1	20.07.10	20:25:00	78°51.36'N	2°16.17'W	2680.0	AUV	on deck
0214-1	20.07.10	21:05:00	78°51.29'N	2°16.34'W	2680.7	AUV	profileend

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