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Cruise Report
RV PELAGIA Cruise 64PE426

Reykjavík – Reykjavík
11. September – 26. September 2017
Chief Scientist: Kerstin Jochumsen

1. Objectives

Denmark Strait Overflow Water (DSOW), which is monitored as it enters the North Atlantic via Denmark Strait, contributes to the large scale ocean circulation and spreads into the whole Atlantic. The dense gravity plume immediately downstream of Denmark Strait is associated with rapid water mass modification due to vigorous mixing and entrainment of ambient water. The entrainment of ambient water into the Denmark Strait Overflow has been found to be most effective within the first 200 km downstream of the Strait, where warm Atlantic Water and cold East Greenland shelf water are mixed into the plume. Using new observations from this cruise and recent years on small spatial and temporal scales we aim to understand the pathways and processes by which kinetic energy is transferred from the mesoscale eddy field to dissipative turbulent scales within the DSOW plume. Our goals for the cruise were (I) obtaining data in the region of intense mixing and (II) continuing the monitoring of the Denmark Strait Overflow transports at the sill of Denmark Strait. We have conducted ship-borne measurements (CTD, ADCP) and deployed short term moorings, as well as serviced existing moorings. The cruise was funded from and contributed to the project RACE II (subproject TP 1.3, funded by the German ministry of Education and Research BMBF) and to TRR181 (subproject T3), funded by the German Science Foundation (DFG).

Goal 1: *Station work / short term moorings at entrainment hot spots*
Earlier studies have shown, that enhanced dissipation in the overflow plume can be induced either by passing eddies or due to topographic obstacles. During cruise POS503 in August 2016 a multibeam survey was carried out south of Dohrn Bank. Surprisingly, no large hills were identified in the data and thus topographic features could not be targeted in the follow-up cruise with R/V Pelagia. However, a study of the distribution of dissipation along the DSOW pathway using Thorpe Scales from CTD measurements revealed regions of enhanced turbulence. These were chosen now for short term moorings, a Yoyo station of hydrography and current measurements, and CTD sections. Altogether five moorings were deployed for duration of one week.

Goal 2: *Servicing the overflow moorings at the sill of Denmark Strait*
The other objective of the cruise was to secure mooring data from instruments deployed in summer 2016 during cruise POS503 at the sill of Denmark Strait and to continue the measurement programm. The data are needed to maintain the time series of DSOW volume transport established in 1996. Additionally, we spatially high resolution hydrographic and current data (CTD/lowered ADCP and vm-ADCP) at a repeat section covering the sill of Denmark Strait from Iceland to Greenland was obtained. In combination with data from recent and historic cruises these data provide information on the different conditions in Denmark Strait, featuring either strong or weak overflows. Due to its variable nature only an extensive data collection allows the identification of the mean conditions at Denmark Strait and of modes of variability and trends. Finally, three moorings were deployed about 30 km downstream of the sill of Denmark Strait to cover spatial variability of the flow. These moorings will be recovered in 2018.

2. Cruise participants and crew

Scientific cruise participants

Kerstin Jochumsen	IFM-CEN	Chief scientist
Ryan Peter North	IFM-CEN	Scientist, vm-ADCP
Martin Moritz	IFM-CEN	Scientist, CTD
Hossein Mashayekh Poul	IFM-CEN	Scientist, LADCP
Thomas Wasilewski	IFM-CEN	Technician, CTD and salinometer
Ulrich Drübbisch	IFM-CEN	Technician, moorings and salinometer
Deniz Can Aydin	AWI	Phd student, CTD watch
Stylianos Kritsotalakis	AWI	Phd student, moorings
Carolyne Marita Chercham	IFM-CEN	BSc student, CTD watch
Mara Muchow	IFM-CEN	BSc student, CTD watch
Julius Lauber	IFM-CEN	BSc student, CTD watch
Kevin Niklas Wiegand	IFM-CEN	MSc student, CTD watch

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Crew list

Johnny C. Ellen	Master
Engbert A. Puijman	Chief Officer
Hendrik J. Katwijk	2nd Officer
Jacob Seepma	Chief Engineer
Inno Meijer	2nd Engineer
Roelof van der Heide	Bosun
Willem Jan Boon	Able Seaman
Robin Dijkhuizen	Able Seaman
Martien de Vries	Able Seaman
Alexander Asjes	Electrician
Lorendz Boom	Technician
Iwan den Breejen	Cook
Vitali Maksimovs	Steward

3. Narrative

RV Pelagia left the port of Reykjavík (Iceland) on September 11th at 19:30 UTC. The departure was delayed for a few hours due to the missing luggage of the chief scientist. After leaving the harbor area, underway measurements were started on the same evening. Furthermore, mooring preparations were ongoing all day, since the deployment of moorings was planned as the second station of the cruise. Preparations were continued during the next day, but some cruise participants suffered from sea sickness and needed to spend the day in bed. Transit time to the working area was expected to be around 24 hours.

Accordingly, RV Pelagia reached the first station at 19:00 UTC on 12th of September. A CTD-Yoyo station was started here, planned to be continued during the night until mooring work could be started in the next morning. The third yoyo cast was interrupted at 21:10 UTC for about 1.5 hours due to problems with the winch. Furthermore, the station was aborted after 11 casts at 5:30 UCT on 13th of September due to an accident. Mrs D. Aydin injured her hand at the heavy door leading to the outside, next to the CTD lab. It was decided to bring her back to Reykjavík to visit a hospital. RV Pelagia therefore spent the next 38 hours travelling. Mrs Aydin was picked up by the agency at the pilot station off Reykjavík on 14th of September at 00:30 UTC. On the evening of the same day, we were back at the working region and started a CTD transect of 8 casts towards the Greenland shelf break (stations 2-9).

The first mooring position (DS-M 3) was reached on 15th of September at 08:30 UTC. During the day, five moorings were deployed along the CTD section conducted during the night before (DS-M 3, DS-M 2, DS-M 1, DS-M 5, DS-M 4). Here, overflow water is found as a dense bottom layer below the Atlantic Water. The height of the dense layer changes on timescales of a few days as eddies pass by. Their effect on the entrainment will be studies with our moorings. Mooring deployments went smoothly, also due to the extended preparation time. In total, five short term moorings were deployed, sampling at high frequencies.

At 20:00 UTC a new CTD section was started, covering the southern exit of Denmark Strait (stations 15-25). On 16th of September at 11:30 UTC RV Pelagia reached the position of mooring DS 2-16, which had been deployed during cruise POS503 with RV Poseidon in 2016. Fog persistently lingered on our position and sight was limited to about 200 m. Therefore the recovery of the mooring was postponed; and a transit to the first station of a section covering the sill of Denmark Strait was conducted. Meanwhile, the plugs of the CTD sensors were cleaned, as salinity profiles showed enhanced noise. The first station of the section (#26) was started on 18:01 UTC. Weather conditions became rough during the evening and the CTD frame sometimes hit the vessel’s side before recovery. However, station work was continued during the night and the next day, when the waves were damped. The position of mooring DS 25-16 (also deployed during POS503) was reached on 17th of September at 11:26 UTC. Still, fog was limiting our sight, but it occasionally drifted away and allowed a reasonable mooring lookout. We therefore decided to try the recovery, which was successfully completed at 11:47 UTC. RV Pelagia then went back to the position of DS 2-16, where now the sun was seen occasionally. The recovery of the mooring was finished at 13:36 UCT.

CTD station work was continued at 15:07 UTC with station #43. During the night and following day CTD cast were performed every 5 nm, slowly approaching Greenland. Surface water temperatures stayed above 3°C and no ice was seen. Only at our last station of the section (#65), close the coast of Greenland, a grounded iceberg reminded us of the proximity to Greenland. The panorama was spectacular as the iceberg emerged from the fog and we could hear the waves breaking at its shore. When the CTD cast was finished and RV Pelagia turned to transit back to central Denmark Strait, the fog lifted enough for us to see the coast of Greenland with its impressive mountains.

On 19th of September at 08:31 UTC mooring DS 2 was redeployed at its established position (called DS 2-17 now). Furthermore, an RCM mooring was added to the sill mooring array in Denmark Strait, for the purpose of covering the front between polar waters and Atlantic waters at the Icelandic side of the strait. Mooring DS 23-17 was placed at 11:09 UTC. RV Pelagia then travelled to the southern exit of Denmark Strait, where the second CTD section had been conducted. Along the section three moorings were deployed (DS 26-17, DS 27-17, DS 28-17). After finishing the mooring work at 19:06 UTC RV Pelagia headed towards Iceland, in order to avoid the upcoming storm. The forecast predicted wind force 10 and high waves, which are conditions neither suited for station nor computer work. The 20th of September was therefore spend sheltered in Armarfjordur; a bay at the northwestern coast of Iceland. The quiet time in the fjord was used for scientific discussions, producing plots of the newly acquired data and operating the salinometer.

We left the fjord on 21st of September at 14:30 UTC, heading back to the positions of the short term moorings. Weather conditions were still rough and we experienced again a bumpy night. On 22nd of September at 07:30 UTC the position of mooring DS-M 1 was reached. The wind was still above 20 m/s and swell led RV Pelagia to roll occasionally, but conditions were sufficient to attempt a mooring recovery. The procedure went smoothly and the mooring was on deck at 08:57 UTC. In short succession, moorings DS-M 2 and DS-M 3 were recovered as well. After lunch break the two final moorings DS-M 4 and DS-M 5 were recovered on 13:51 UTC and 14:51 UTC, respectively. Weather conditions had improved during the day and in the afternoon the vessel was rolling only slightly. Stations work of cruise 64PE426 was finished with the last recovery, as the weather forecast predicted an upcoming storm for Saturday afternoon. RV Pelagia thus set course towards Reykjavik, which was reached on 23rd of September at 13:59 UTC.

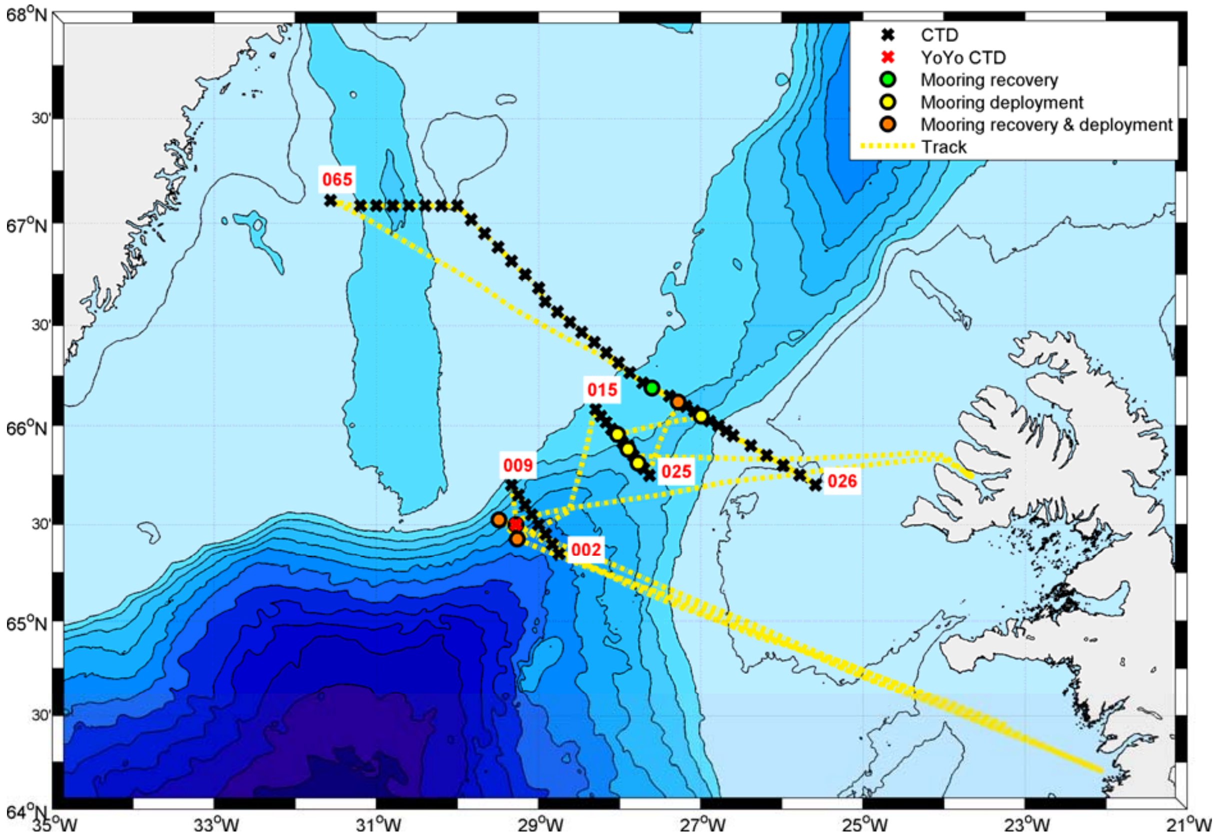

Figure 1: Cruise track of RV Pelagia cruise 64PE426 from Reykjavík to Reykjavík (Iceland). Black crosses mark CTD station positions (red: yoyo station), circles mooring recoveries and deployments, and yellow dashed lines the ship´s track.

4. Technical Information

CTD/Rosette and water samples

Conductivity-temperature-depth (CTD) profiles were obtained with a Sea-Bird Electronics (SBE; USA) 9plus instrument, integrating a pressure sensor with a digiquarz unit. For temperature and conductivity measurements, a double sensor pack was used. Additionally, a dissolved oxygen sensor was attached to the CTD. The instrument distance above the sea floor was derived from a Benthos altimeter working at a frequency of 200 kHz, which was lowered with the CTD. Furthermore, a high precision temperature recorder (RT35) was installed on top the CTD body, recording the temperature at the times when bottles were closed. All operating devices of the CTD-system are listed in Table 1. The CTD/O instrument was attached to a metal rosette frame, holding a 12-bottle-carousel water sampling system with 5l Niskin bottles. A configuration with 3-7 bottles was used to obtain water samples from selected depth levels, as bottles were removed to attach a lowered ADCP system. The secondary sensor pack was attached at the top of the rosette frame, which is used to lower the CTD into the water. In this configuration, the secondary sensors derive undisturbed measurements when the frame is on its way up.

Table 1. CTD devices used during cruise 64PE426.

Instrument/Sensor	Serial Number
SBE 911plus (SBE 1)	09P6395-0285
Temperature 1, SBE3	1294
Conductivity 1, SBE4	1106
Pressure, SBE9plus	0285
Temperature 2, SBE3	5456
Conductivity 2, SBE4	3960
Altimeter, (Benthos PSA-916, 200 kHz)	885
Oxygen 1, SBE43	1761
Pump	050749
RT35	57045-0067

In the laboratory, data from the CTD casts were converted by an SBE 11 plus deckunit (SN 11p6470-0256), and recorded with a standard "MS Windows 10" PC, using the Seasave software (V 7.21d). The deckunit and data acquisition computer were provided by R/V Pelagia. The processing and conversion of the raw data was done with the SBE Data Processing program package (V 7.22.5). The CTD-water sampler system was used for 58 casts, which were generally conducted from the surface to 12 m above the bottom. Produced were final datasets for the up and down casts using the primary and secondary sensor packs, respectively.

At all stations three water samples were taken from selected depth levels within the water column for conductivity calibration. The samples were analysed regarding their salinity using a Guildline Autosal Salinometer (SN 51.381). The measurements were performed by Ulrich Drübbisch and Thomas Wasilewski. Calibration of the salinometer during operation was done using IAPSO Standard Seawater (batch: P159, K15=0.99988, S=34.995), which was measured at the beginning of the salinometer use, as well as at the end the session. The salinometer was found to operate very stable. After comparison with the CTD data, a correction of the CTD conductivity sensors was found to be necessary for the primary sensor only (C1_new = C1_CTD +(-4.99221264e-04*T1_CTD-1.30113341e-03)).

Furthermore, water samples from up to seven bottles were taken at stations on the Greenland shelf for analysis regarding their δ^{18}O isotope ratio. Bottles were closed at standard depths of 5 m, 25 m, 50 m, 75 m, 100 m, 150 m and 250 m with a focus on stations where the salinity was below 34.9. Laboratory analysis of the 108 water samples will be performed after the cruise at NIOZ on Texel.

Current measurements

Vertical profiles of horizontal currents were obtained by a Lowered Acoustic Doppler Current Profiler (LADCP) system attached to the rosette water sampler. The system consisted of two ADCPs of the Workhorse type (WHM300) manufactured by RD instruments and operating at a frequency of 300 kHz. They were operated in a synchronized master-slave configuration in which the downward looking master device (SN 22763) triggers the upward looking slave device (SN 22762). Both instruments were used with a ping rate of 1 Hz and 8 m cell size. The power for both devices was supplied from an external pressure housing (SN 69000). As the LADCPs lack an internal pressure gauge, CTD pressure profiles were incorporated during the LADCP data processing to obtain the exact depth information of the instruments during the cast. LADCP data were recorded on all CTD stations, but data from stations 8 and 9 were bad due to large tilts of the instruments during the cast. This was an effect of the movement of the ship in strong winds and waves. All data was processed on board using the GEOMAR/LDEO LADCP processing routines Version 10.22 for Matlab, which include both shear and inversion methods to derive an absolute velocity profile (Thurnherr, 2010). In the processing, the respective pre-processed CTD data and navigation data are used for corrections. For stations 8 and 9 the standard threshold allowing a maximum tilt of 22 degrees was set to 25 degrees.

Reference: Thurnherr, A. M., (2010): A Practical Assessment of the Errors Associated with Full-Depth LADCP Profiles Obtained Using Teledyne RDI Workhorse Acoustic Doppler Current Profilers. Am. Met. Soc. DOI:10.1175/2010JTECHO708.1

Underway measurements

Underway temperature and salinity measurements were made with a SeaBird thermosalinograph (SBE21 plus) installed in the ship's port well. Additional water samples were taken for salinity calibration purposes, which were analysed with the same Autosal Salinometer as the CTD water samples (see above). Two outliers were removed from the 28 samples. The final offset between the salinometer and thermosalinograph was determined to be +0.01. Due to power breakdowns in the pump system the flow was interrupted occasionally. Measurements during these periods were removed manually from the data record.

Underway current measurements were obtained from a vessel-mounted 75 kHz ADCP (R & D Hull mounted), covering approximately the top 600 m of the water column. The bin size was set to 16 m, the ADCP run in narrowband mode. The instrument was controlled by computers using the conventional VMDAS software under a MS Windows system. Pinging was set as fast as possible. ADCP data was processed using the software package CODAS (version 2016.06.26, see Firing et al., 1995, or http://currents.soest.hawaii.edu/docs/adcp_doc/index.html), developed by the University of Hawaii. The processing corrected for the velocity of the vessel and the misalignment angle. The movement of the ship and rough sea conditions frequently prohibited the acquisition of current data in high quality. Some data thus cover only the upper 200 m of the water column.

Reference: Firing, E., F. Bahr, P. Caldwell, J. Ranada, and W. Zhu. (1995): Processing ADCP Data with the CODAS Software System. Version 3.1., JIMAR, University of Hawaii, Honolulu, Hawaii, USA.

5. Moorings

Mooring deployments (short term moorings, for the duration of the cruise only):

name	deployment	type	latitude	longitude	depth
DS-M 1	15.09.17 11:33	Sensor	65°31.2632’ N	29°29.5361’ W	885 m
DS-M 2	15.09.17 10:44	ADCP	65°31.4727’ N	29°29.3193’ W	880 m
DS-M 3	15.09.17 09:41	Sensor	65°29.9950’ N	29°16.9198’ W	1120 m
DS-M 4	15.09.17 14:08	Sensor	65°25.2997’ N	29°15.8302’ W	1292 m
DS-M 5	15.09.17 13:21	ADCP	65°25.5029’ N	29°15.7214’ W	1288 m

Mooring recoveries (deployed during POS503 in 2016):

name	recovery	type	latitude	longitude	depth
DS2-16	17.09.17 13:34	ADCP	66°07.1120’ N	27°16.7860’ W	570 m
DS25-16	17.09.17 11:42	TRBM	66°11.3710’ N	27°36.1460’ W	500 m

Mooring deployments (to stay in the water until MSM76 in 2018):

name	deployment	type	latitude	longitude	depth
DS2-17	19.09.17 08:30	ADCP	66°07.2572’ N	27°16.7383’ W	589 m
DS23-17	19.09.17 11:09	RCM	66°02.8732’ N	26°59.6657’ W	531 m
DS26-17	19.09.17 15:02	RCM	65°57.3773’ N	28°01.7305’ W	543 m
DS27-17	19.09.17 17:06	TRBM	65°52.9301’ N	27°53.8775’ W	630 m
DS28-17	19.09.17 18:53	TRBM	65°50.9572’ N	27°49.8037’ W	686 m

Mooring recoveries (deployed at the beginning of cruise 64PE426):

name	recovery	type	latitude	longitude	depth
DS-M 1	22.09.17 08:57	Sensor	65°31.2632’ N	29°29.5361’ W	885 m
DS-M 2	22.09.17 09:51	ADCP	65°31.4727’ N	29°29.3193’ W	880 m
DS-M 3	22.09.17 11:36	Sensor	65°29.9950’ N	29°16.9198’ W	1120 m
DS-M 4	22.09.17 13:51	Sensor	65°25.2997’ N	29°15.8302’ W	1292 m
DS-M 5	22.09.17 14:51	ADCP	65°25.5029’ N	29°15.7214’ W	1288 m

Sensor: Several Microcats, Seacats and Temperature Recorders on a rope.
ADCP: One 150 kHz or 75 kHz ADCP in a buoyancy sphere.
RCM: One current meter (RCM-11).
TRBM: One 75 kHz ADCP with a pumped Microcat in a bottom frame.

6. Preliminary Results

The measurement program of RV Pelagia cruise 64PE426 focused on the region of strong mixing of the overflow water with surrounding water masses downstream of Denmark Strait and on the Denmark Strait sill region. The first measurements were performed on a yoyo-CTD station in the mixing area (Fig. 2). The records indicate an overflow layer of 150 – 250 m thickness, with strong gradients to the overlying water mass in temperature and velocity. Near-bottom temperatures were close to zero degrees (about 0.3°C) and the southward flow reached up to 1 m/s. The location of the station was also similar to mooring position DS-M 3 and used to confirm the height of the overflow layer and the appropriate mooring design to capture it.

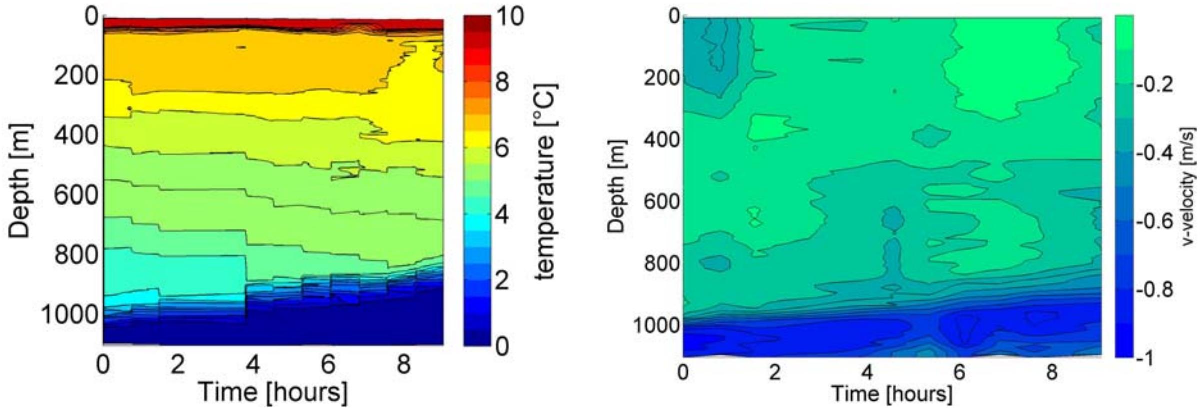

Figure 2: Vertical temperature (left) and northward velocity (right) evolution from CTD/LADCP measurements at the yoyo station south of Dohrn Bank. With time, the cold and southward flowing overflow layer increases in thickness.

The mooring records (Fig. 3) show alternating phases of cold, dense waters and warmer, lighter waters at the occupied location. This indicates the passage of overflow eddies, which are assumed to contribute significantly to the entrainment occurring in the overflow layer. Another process contributing to mixing and captured by the moored instruments are internal waves. Further data analysis will focus on these processes and assess their impact on entrainment.

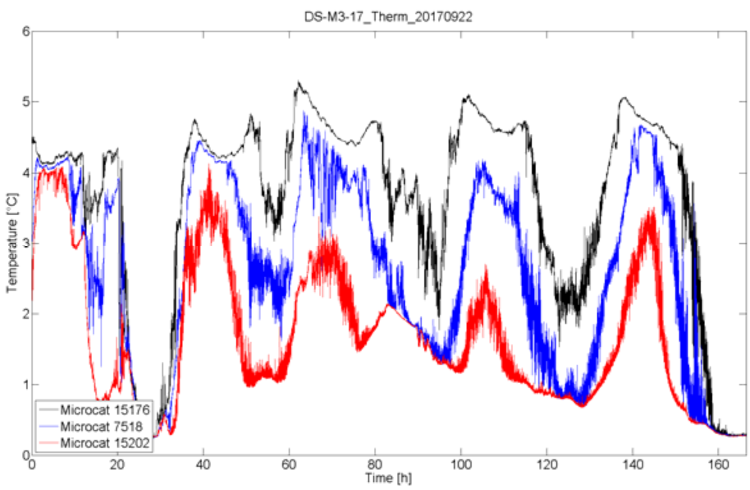

Figure 3: Temperature time series obtained from sensors (SBE-37 Microcats) of mooring DS-M 3. The instruments were at nominal depths of 150 m (SN 15176), 100 m (SN 7518) and 50 m (SN 15202) above the bottom, which is at 1120 m at this location. Measured near-bottom temperatures vary between 0.3°C and 4°C.

The CTD section from the sill of Denmark Strait (Fig. 4) indicates the presence of Arctic water in the upper layer, close to the deepest part of the section. Temperatures are below -1°C here. The feature might be connected to a current branch of the East Greenland Current. A strong gradient occurs towards the Icelandic shelf, where warm Atlantic water dominates. Except for the Icelandic side of the section, near-surface salinities are below 34.7, with a minimum of about 30.5. However, lowest salinities do not appear together with lowest temperatures (Fig. 5). This indicates mixing between Artic and Atlantic sources along the pathway of the East Greenland Current.

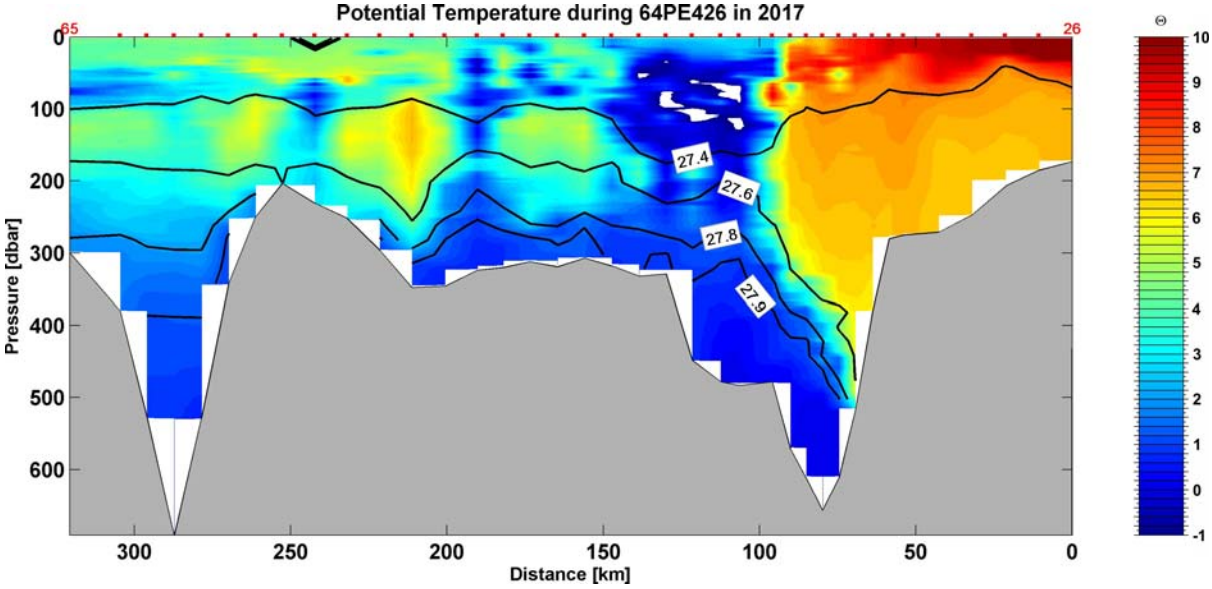

Figure 4: Temperature distribution from CTD measurements at the sill of Denmark Strait. The section begins at the continental shelf near Iceland (right side of the figure) and covers most of the Greenland shelf and the Kangerdlussuaq Trough. Specific isopycnals are drawn in black.

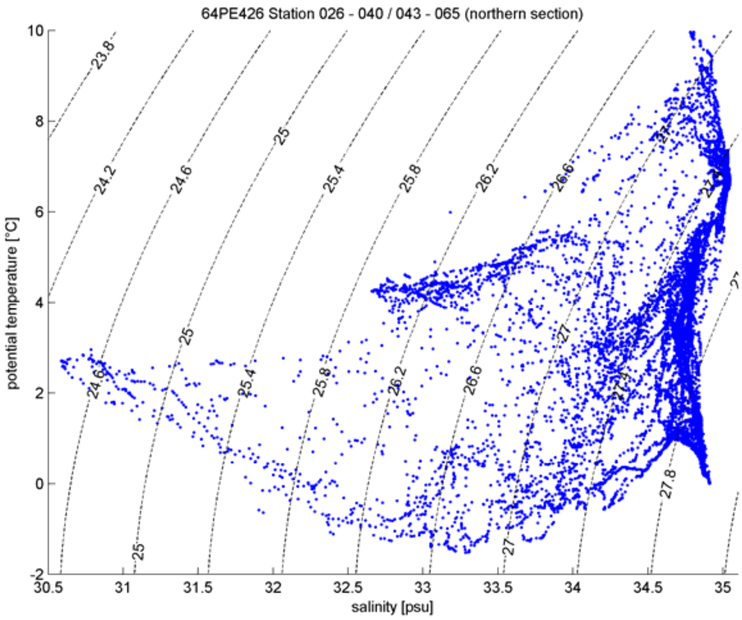

Figure 5: Temperature/Salinity diagram for the CTD section at the sill of Denmark Strait.

Overflow water is found at all depth levels > 250 m, except on the Icelandic slope and shelf. However, no strong southwestward current is observed in the dense water layer during cruise 64PE426, but several eddy structures and re-circulations (Fig. 6). The exceptionally cold surface water is associated with an anticyclonic feature in the flow field.

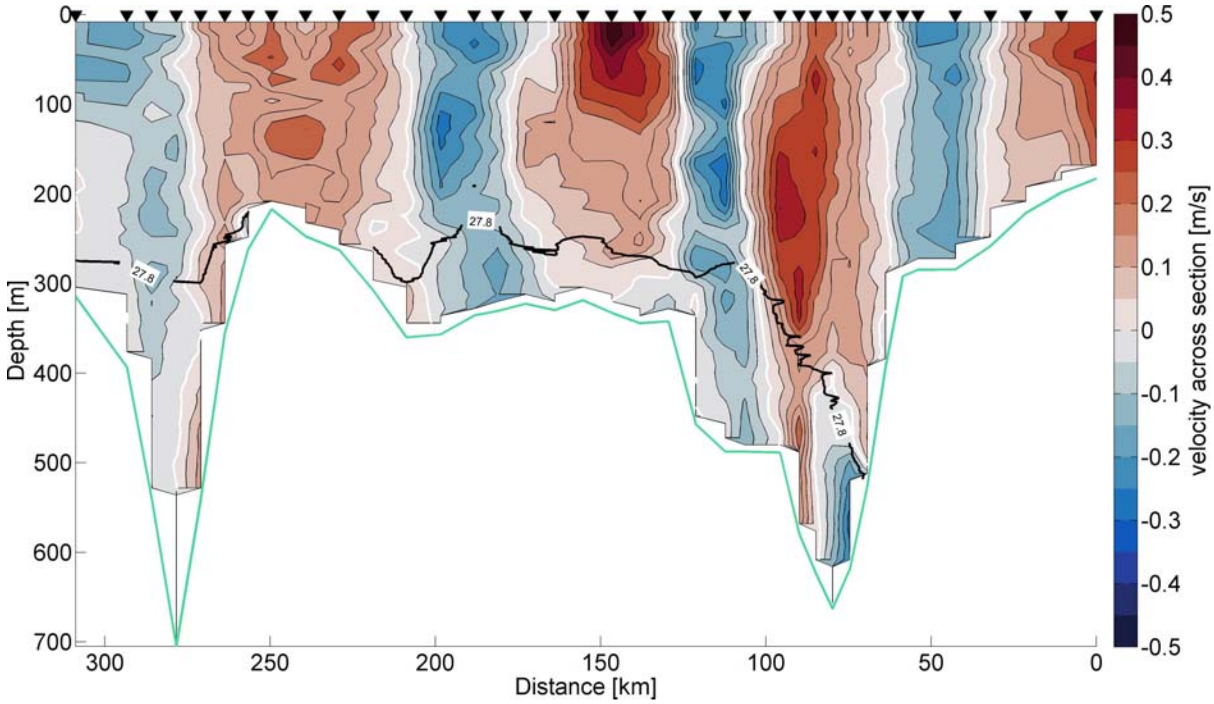

Figure 6: Across-section velocity distribution from LADCP measurements at the sill of Denmark Strait. Southwestward flow (towards the Atlantic) is depicted in blue. The section begins at the continental shelf near Iceland (right side of the figure) and covers most of the Greenland shelf and the Kangerdlussuaq Trough. The upper boundary of the overflow layer (isopycnal 27.8 kgm^{-3}) is drawn in black.

Nevertheless, the dominance of flow towards the Atlantic (southwestward) is illustrated in the mean profiles from our long-term moorings, as shown in Fig. 7.

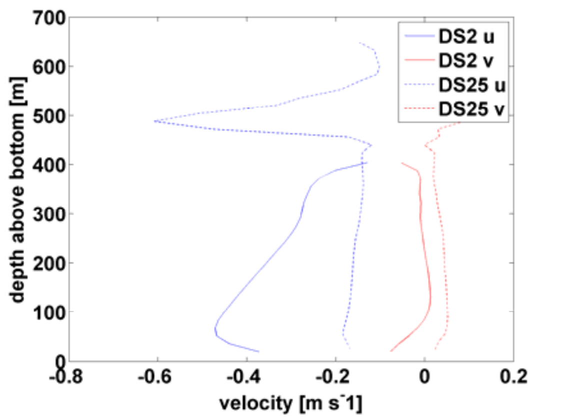

Figure 7: Mean velocity profiles for the period 5th of August 2016 to 17th of September 2017 as measured with ADCPs in moorings DS2-16 and DS25-16.

At mooring DS2, which is located in the deep channel of the Denmark Strait, negative velocities prevail. Further on the shelf at the location of DS25, the flow is weaker and often has a northward component. This is in agreement with previous measurements from vessel-mounted ADCPs. Currents on the East Greenland shelf were found to be weak with alternating flows towards the Atlantic and the Nordic Seas. The major portion of the Denmark Strait Overflow thus occurs in the deep channel.

7. Acknowledgements

We thank Captain Ellen, his officers and the crew of RV PELAGIA for their competent and friendly help. The support in organizing the cruise from Erica Koning (NIOZ) was much appreciated. Furthermore, we thank Klas Lackschewitz (GEOMAR) for providing the opportunity for this BARTER cruise.
The cruise was funded through the BMBF project RACE II (Regional Atlantic Circulation and Global Change, 03F0729B), TP 1.3, “Variabilität der Overflows am Grönland-Schottland Rücken und entlang ihrer Ausbreitungspfade im Nordatlantik”. Furthermore, the cruise was a contribution to the project T3 (title of project) of the Collaborative Research Centre TRR 181 "Energy transfers in gravity plumes" funded by the German Research Foundation (DFG).

8. List of Stations

The stations listed in the table below were numbered according to the ships’ station numbers. Stations I and II were conducted during the transit from Texel to Reykjavik, before the cruise 64PE426 officially started, and are for calibration purposes.

Abbreviations:

CTD/LADCP	Conductivity-Temperature-Depth and lowered ADCP profile
Mooring Depl.	Mooring Deployment
BE	Begin station
EN	End station

Station list

EXPO CODE	Statn-No.	Cast	Type	Date	Time (UTC)	Code	POSITION				Bottom depth [m]	max. pres. [dbar]	Comments
							Latitude		Longitude				
64PE426	I	1	CTD / LADCP	08.09.2017	14:21:00	BE	59° 30.473	N	16° 29.291	W	1252	1218	calibration
64PE426	II	1	CTD / LADCP	09.09.2017	09:10:00	BE	61° 05.893	N	18° 43.258	W	2510	1219	calibration
64PE426	1	1	CTD / LADCP	12.09.2017	19:08:00	BE	65° 30.008	N	29° 16.922	W	1120	1099	begin yoyo
64PE426	1	10	CTD / LADCP	13.09.2017	04:12:00	EN	65° 30.008	N	29° 16.940	W	1120	1103	end yoyo
64PE426	2	1	CTD / LADCP	14.09.2017	19:49:00	BE	65° 20.960	N	28° 44.930	W	1355	1334	
64PE426	3	1	CTD / LADCP	14.09.2017	21:34:00	BE	65° 23.956	N	28° 49.886	W	1334	1312	
64PE426	4	1	CTD / LADCP	14.09.2017	23:07:29	BE	65° 27.060	N	28° 54.760	W	1301	1281	
64PE426	5	1	CTD / LADCP	15.09.2017	00:46:00	BE	65° 29.930	N	29° 00.080	W	1220	1222	
64PE426	6	1	CTD / LADCP	15.09.2017	02:21:00	BE	65° 32.976	N	29° 05.170	W	1095	1051	
64PE426	7	1	CTD / LADCP	15.09.2017	03:49:00	BE	65° 36.002	N	29° 10.034	W	937	915	
64PE426	8	1	CTD / LADCP	15.09.2017	05:23:00	BE	65° 38.999	N	29° 14.869	W	777	739	
64PE426	9	1	CTD / LADCP	15.09.2017	06:41:00	BE	65° 42.037	N	29° 20.104	W	521	493	
64PE426	10	-	Mooring Depl.	15.09.2017	09:41:00	EN	65° 29.995	N	29° 16.920	W	1120	-	DS-M3-17
64PE426	11	-	Mooring Depl.	15.09.2017	10:44:00	EN	65° 31.473	N	29° 29.319	W	880	-	DS-M2-17
64PE426	12	-	Mooring Depl.	15.09.2017	11:32:00	EN	65° 31.263	N	29° 29.536	W	885	-	DS-M1-17
64PE426	13	-	Mooring Depl.	15.09.2017	13:20:00	EN	65° 25.503	N	29° 15.721	W	1288	-	DS-M5-17
64PE426	14	-	Mooring Depl.	15.09.2017	14:07:00	EN	65° 25.300	N	29° 15.830	W	1292	-	DS-M4-17
64PE426	15	1	CTD / LADCP	15.09.2017	20:09:00	BE	66° 04.981	N	28° 17.824	W	472	452	
64PE426	16	1	CTD / LADCP	15.09.2017	21:12:00	BE	66° 02.977	N	28° 13.961	W	472	452	
64PE426	17	1	CTD / LADCP	15.09.2017	22:24:00	BE	66° 01.088	N	28° 10.066	W	480	460	
64PE426	18	1	CTD / LADCP	15.09.2017	23:33:00	BE	65° 58.963	N	28° 06.047	W	487	462	
64PE426	19	1	CTD / LADCP	16.09.2017	00:51:00	BE	65° 56.950	N	28° 01.890	W	535	522	
64PE426	20	1	CTD / LADCP	16.09.2017	02:02:00	BE	65°54.970	N	27° 57.890	W	581	567	
64PE426	21	1	CTD / LADCP	16.09.2017	03:14:00	BE	65° 53.970	N	27° 53.820	W	627	625	
64PE426	22	1	CTD / LADCP	16.09.2017	04:32:00	BE	65° 50.953	N	27° 49.805	W	694	681	
64PE426	23	1	CTD / LADCP	16.09.2017	05:44:00	BE	65° 48.971	N	27° 45.870	W	739	721	
64PE426	24	1	CTD / LADCP	16.09.2017	06:55:00	BE	65° 47.010	N	27° 41.933	W	717	701	
64PE426	25	1	CTD / LADCP	16.09.2017	08:04:00	BE	65° 44.999	N	27° 37.972	W	669	651	

64PE426	26	1	CTD / LADCP	17.09.2017	18:03:00	BE	65° 42.065	N	25° 35.035	W	186	172	
64PE426	27	1	CTD / LADCP	17.09.2017	19:14:00	BE	65° 45.068	N	25° 46.778	W	182	185	
64PE426	28	1	CTD / LADCP	17.09.2017	20:26:00	BE	65° 47.996	N	25° 59.008	W	226	204	
64PE426	29	1	CTD / LADCP	17.09.2017	21:41:00	BE	65° 51.028	N	26° 11.117	W	262	244	
64PE426	30	1	CTD / LADCP	17.09.2017	22:57:00	BE	65° 54.034	N	26° 22.979	W	290	270	
64PE426	31	1	CTD / LADCP	17.09.2017	00:22:00	BE	65° 57.008	N	26° 36.019	W	285	272	
64PE426	32	1	CTD / LADCP	17.09.2017	01:19:00	BE	65° 58.463	N	26° 41.009	W	290	279	
64PE426	33	1	CTD / LADCP	17.09.2017	02:28:00	BE	66° 00.005	N	26° 46.864	W	393	379	
64PE426	34	1	CTD / LADCP	17.09.2017	03:39:00	BE	66° 01.453	N	26° 53.254	W	525	515	
64PE426	35	1	CTD / LADCP	17.09.2017	04:43:00	BE	66° 02.986	N	26° 59.165	W	629	610	
64PE426	36	1	CTD / LADCP	17.09.2017	05:54:00	BE	66° 04.540	N	27° 04.958	W	675	652	
64PE426	37	1	CTD / LADCP	17.09.2017	07:05:00	BE	66° 05.941	N	27° 10.796	W	636	611	
64PE426	38	1	CTD / LADCP	17.09.2017	08:17:00	BE	66° 07.254	N	27° 16.728	W	583	569	
64PE426	39	1	CTD / LADCP	17.09.2017	09:25:00	BE	66° 09.017	N	27° 23.184	W	502	479	
64PE426	40	1	CTD / LADCP	17.09.2017	10:53:00	BE	66° 11.460	N	27° 35.962	W	505	480	
64PE426	41	-	Mooring Recovery	17.09.2017	11:42:17	EN	66° 11.371	N	27° 36.146	W	500	-	DS25-16
64PE426	42	-	Mooring Recovery	17.09.2017	13:33:43	EN	66° 07.112	N	27° 16.786	W	570	-	DS2-16
64PE426	43	1	CTD / LADCP	17.09.2017	15:08:00	BE	66° 12.967	N	27° 42.954	W	496	476	
64PE426	44	1	CTD / LADCP	17.09.2017	16:31:00	BE	66° 15.998	N	27° 52.520	W	466	446	
64PE426	45	1	CTD / LADCP	17.09.2017	17:44:00	BE	66° 18.978	N	28° 00.962	W	348	330	
64PE426	46	1	CTD / LADCP	17.09.2017	18:53:00	BE	66° 21.930	N	28° 09.970	W	357	331	
64PE426	47	1	CTD / LADCP	17.09.2017	20:02:00	BE	66° 24.995	N	28° 18.854	W	342	319	
64PE426	48	1	CTD / LADCP	17.09.2017	21:10:00	BE	66° 27.972	N	28° 28.094	W	328	307	
64PE426	49	1	CTD / LADCP	17.09.2017	22:13:00	BE	66° 30.976	N	28° 36.929	W	338	320	
64PE426	50	1	CTD / LADCP	17.09.2017	23:23:00	BE	66° 34.064	N	28° 46.120	W	334	310	
64PE426	51	1	CTD / LADCP	18.09.2017	00:24:00	BE	66° 37.014	N	28° 55.061	W	333	321	
64PE426	52	1	CTD / LADCP	18.09.2017	01:35:00	BE	66° 41.014	N	28° 59.984	W	341	323	
64PE426	53	1	CTD / LADCP	18.09.2017	02:45:00	BE	66° 44.974	N	29° 09.997	W	358	346	
64PE426	54	1	CTD / LADCP	18.09.2017	04:04:00	BE	66° 48.996	N	29° 20.152	W	368	347	
64PE426	55	1	CTD / LADCP	18.09.2017	05:19:00	BE	66° 52.993	N	29° 29.962	W	319	297	
64PE426	56	1	CTD / LADCP	18.09.2017	06:36:00	BE	66° 57.001	N	29° 39.995	W	269	251	
64PE426	57	1	CTD / LADCP	18.09.2017	07:44:00	BE	67° 00.995	N	29° 49.937	W	258	230	
64PE426	58	1	CTD / LADCP	18.09.2017	08:53:00	BE	67° 05.009	N	30° 00.104	W	224	198	

64PE426	59	1	CTD / LADCP	18.09.2017	09:51:00	BE	67° 04.987	N	30° 12.053	W	269	248	
64PE426	60	1	CTD / LADCP	18.09.2017	10:55:00	BE	67° 04.999	N	30° 23.993	W	364	342	
64PE426	61	1	CTD / LADCP	18.09.2017	12:04:00	BE	67° 04.994	N	30° 35.993	W	542	529	
64PE426	62	1	CTD / LADCP	18.09.2017	13:55:00	BE	67° 04.964	N	30° 48.068	W	709	690	
64PE426	63	1	CTD / LADCP	18.09.2017	15:19:00	BE	67° 05.005	N	31° 00.071	W	541	527	
64PE426	64	1	CTD / LADCP	18.09.2017	16:28:00	BE	67° 05.002	N	31° 11.995	W	404	379	
64PE426	65	1	CTD / LADCP	18.09.2017	18:37:00	BE	67° 06.546	N	31° 34.062	W	324	299	
64PE426	66	-	Mooring Depl.	19.09.2017	08:30:00	EN	66° 07.257	N	27° 16.738	W	589	-	DS2-17
64PE426	67	-	Mooring Depl.	19.09.2017	11:09:00	EN	66° 02.873	N	26° 59.666	W	531	-	DS23-17
64PE426	68	-	Mooring Depl.	19.09.2017	15:02:00	EN	65° 57.377	N	28° 01.731	W	543	-	DS26-17
64PE426	69	-	Mooring Depl.	19.09.2017	17:06:00	EN	65° 52.930	N	27° 53.878	W	630	-	DS27-17
64PE426	70	-	Mooring Depl.	19.09.2017	18:53:00	EN	65° 50.957	N	27° 49.804	W	686	-	DS28-17
64PE426	71	-	Mooring Recovery	22.09.2017	08:57:00	EN	65° 31.263	N	29° 29.536	W	885	-	DS-M1-17
64PE426	72	-	Mooring Recovery	22.09.2017	09:51:00	EN	65° 31.473	N	29° 29.319	W	880	-	DS-M2-17
64PE426	73	-	Mooring Recovery	22.09.2017	11:36:00	EN	65° 29.995	N	29° 16.920	W	1120	-	DS-M3-17
64PE426	74	-	Mooring Recovery	22.09.2017	13:51:00	EN	65° 25.300	N	29° 15.830	W	1292	-	DS-M4-17
64PE426	75	-	Mooring Recovery	22.09.2017	14:51:00	EN	65° 25.503	N	29° 15.721	W	1288	-	DS-M5-17