Universität Hamburg

UHH · ZMAW · IfM · Bundesstraße 53 · D-20146 Hamburg

Zentrum für Marine und
Atmosphärische Wissenschaften
Institut für Meereskunde
Regional
Dr. John Mortensen

November 29. 2004

Cruise Report LANCE 2004/15

Ship:	RV LANCE
Cruise:	no. 15/2004
Dates:	September 20th – October 12th 2004
Port Calls:	Tromsø/Norway and Tromsø/Norway
Institute:	Institut für Meereskunde, Universität Hamburg
Scientific crew:	10
Chief Scientist:	John Mortensen
Principal Project:	SFB 512 E2 (The East Greenland Current, an indicator of the low frequency variability of the outflow of the Arctic Ocean/Nordic Seas system)
Research area:	Greenland Sea
Working Time Zone:	UTC
Master:	Frits R. Johansen

Participants:

Name	Speciality	Institute
Mortensen, John, Dr.	Chief Scientist	IfM HH
Drübbisch, Ulrich	Mooring	IfM HH
Glessmer, Mirjam	CTD	IfM HH
Karlsen, Tor Ivan	CTD	NPI
Majer, Claudia	CTD	IfM HH
Rolle, Kirstin	CTD	IfM HH
Rousset, Clément	CTD	LODYC
Verch, Norbert	CTD	IfM HH
Welsch, Andreas	Mooring	IfM HH
Yemenis, Theodoros, Dr.	CTD	IfM HH

IfM HH
Institut für Meereskunde Hamburg, Universität Hamburg, Bundesstr. 53, D-20146 Hamburg, Germany, e-mail: meincke@ifm.uni-hamburg.de, mortense@ifm.uni-hamburg.de

LODYC
Laboratoire d'Oceanographie Dynamicque et de Climatologie, UMR CNRS/IRD/UNIVER-SITET PIERRE ET MARIE CURIE, Universite Paris 6, Tour 45 5eme etage, Case 100, 4 place Jussieu, 75252 Paris CEDEX 05, France, email: Marie-Noelle.Houssais@lodyc.jussieu.fr, crlod@lodyc.jussieu.fr

NPI
Norsk Polarinstitut, Polarmiljøsenteret, N-9296 Tromsø, Norway, Email: mikelborg@npolar.no

Scientific Objectives

The RV LANCE 15/2004 cruise (The East Greenland Current, an indicator of the low frequency variability of the outflow of the system Arctic Ocean/Nordic Seas) was conducted by the *Institut für Meereskunde, Universität Hamburg* with the main objective of collecting hydrographic observations on the East Greenland continental shelf and slope in the Greenland Sea as part of the German project SFB 512, E2. The main goal of SFB 512, E2, is to understand how changes in the outflows of the Arctic Ocean/Nordic Seas system correlate with measured changes in the East Greenland Current. The LANCE 15/2004 cruise had the following aims:

1. to carry out hydrographic investigations on the East Greenland continental shelf and slope in the Greenland Sea. The investigation included CTD-casts (a Sea-Bird 911 plus CTD, titanium, was used during the cruise in combination with a SeaBird carousel 12 bottle water sampler).

2. to search for 3 deep sea moorings (HH1, HH3 and HH5) on the 74°N mooring section which were deployed in 2002 and not recovered in 2003.

3. to service two tube moorings (in Tube10 and Tube14; out Tube18 and Tube19) and an ADCP (Acoustic Doppler Current Profiler) mooring on the East Greenland shelf.

4. to deploy two new deep sea moorings (HH3 and HH5) as a replacement for the deep sea moorings (HH1, HH3 and HH5) deployed in 2002 and not found in 2003.

5. to collect underway ship-borne ADCP data (150kHz) along hydrographic transects.

6. to deploy 5 APEX-floats in the central part of the Greenland Sea.

Narrative of the cruise

The scientific parties from Germany and France arrived according to schedule at Tromsø, Norway, in the afternoon of Sunday September 19th. The scientific equipment was loaded, installed and made sea safe by late Monday afternoon, September 20th. RV Lance left the port of Tromsø Monday evening, September 20th at 1800 UTC (2000 hours local time). Course was set for the site where the Tube and ADCP moorings were located on the East Greenland continental shelf. Estimated time of arrival (ETA) was set to Thursday morning, September 23rd.

The working site was first reached Friday afternoon, September 24th, due to unfavourable weather. The ADCP-2003 mooring was successfully brought on deck that day in late afternoon by dredging taking place in a treacherous double swell. Further mooring work was postponed to the next morning due to the progressing darkness and heavy swells. During the evening a test and a microcat calibration CTD station were successfully occupied. Mooring work was commenced the next morning, Saturday September 25th, with the deployment of the ADCP-2004 mooring at 1126 UTC. In the critical phase of the deployment of the ADCP-2004 releaser problems were experienced, so the ADCP had to be brought down to the bottom twice. In the afternoon Tube 14 was recovered without problem at 1348 UTC and its replacement Tube 19 was deployed at 1657 UTC. The evening was used for a microcat calibration CTD station and a sonar search for Tube 10 which was deployed in 2002 and not recovered in 2003. The result of the search turned out negative. A search for a usable deployment site for Tube 18 was finished just before midnight when weather stopped further work.

Work was first resumed Monday morning, September 27th, with the assembly of Tube 18 on deck, which then was subsequently successfully deployed at 1408 UTC. A sonar search on Tube 18 revealed that the noise from the surface layer overrides return signals from the Tube completely. Opposite by passing directly over the Tube it was clearly seen on the echosounder. Course was now set for the deep sea mooring site HH5 where a combined sonar/releaser search was performed later that afternoon and in the early evening without any contact. During the night an echosounder/depth search was performed on the new HH5 mooring site. The morning of Tuesday September 28th was used to prepare the equipment for the deployment of two new deep sea moorings HH5 and HH3 in the afternoon. During the same time a CTD station was occupied to check the performance of the echosounder. The weight of the HH5-04 mooring was sent off at 1431 UTC and the first floats were observed to go down. After having waited for some time for the last float/instrument package on the line to sink it became obvious that it would not sink. Somewhere in the working process different rope lengths had been mixed up. Three floating instrument/float packages were taken in before tension on the rope was experienced and the rope cut leaving one instrument package in the abyss. Consulting the ship for spare weight parts it was decided to recover and redeploy the HH5-04 mooring the next day. The approaching darkness made further mooring work impossible and the evening was used for a sonar search for the HH3-02 mooring, an echosounder calibration CTD station and a search for a proper site to deploy the new HH3-04 mooring. As with the search for HH5-02 the outcome of the search for HH3-02 had the same negative result.

Wednesday September 29th started with the deployment of mooring HH3-04, and the operation ended at 1152 UTC. Mooring HH5-04 was then recovered at 1448 UTC in order to be redeployed at around 1900 UTC in the growing dark. The mooring was clearly seen in a subsequent sonar search, confirming the ability of sonar to detect conventional moorings. After finishing up almost all planned mooring work during the cruise, course was set for the first CTD station on the 74°N section (74°N; 10°W). ETA was set to 0400 UTC the next morning.

CTD work started at 0410 UTC Thursday morning, September 30th, and continued through the entire day. In the night between Thursday and Friday a combined sonar/releaser search for the HH1-02 mooring was performed without result. After the search, CTD work along the 74°N section was commenced and the section was ended near Greenland at 0912 UTC Saturday morning October 2nd.

With an approaching low-pressure system (a former tropical storm) and with less good ice conditions at the coast, course was set for weather shelter in Young Sound near Daneborg. When the elements were fighting at the coast a short unofficial visit to Daneborg was made Saturday afternoon. Not until Monday afternoon, October 4th, had the weather conditions improved enough that it was decided to leave the weather shelter at 1600 UTC. With a reasonable weather forecast RV Lance left the Young Sound and Daneborg at 1545 UTC saying good bye and good frost to the station. During the steam to the first CTD station on the 74°30'N section it was observed that locally formed sea ice had started to build, not observed two days before. The freezing season had started. The first CTD station (74°30'N; 18°17'W) on the 74°30'N section was started at 2135 UTC and ice was observed on the two first stations of the section. Loosing the damping effect of the ice cover and heading into stronger wind made the wave field grow so work had to be stopped at 0400 UTC Tuesday morning October 5th.

The rest of Tuesday October 5th was used for heading into the wind/sea. CTD work was not resumed until just after midnight at 0015 UTC Wednesday October 6th. Though swells were a disturbing factor in the beginning of the day work continued and the 74°30'N section was finished at 0705 UTC Thursday morning October 7th. The cruise was now running short of time and with the unstable weather conditions experienced up to now, course was set for the APEX floats deployment site in the central part of the Greenland Sea. After a steam of about 12 hours the first float of five was deployed without problem at 2145 UTC following a preceding CTD station. The last float was deployed Friday afternoon October 8th at 1718 UTC. Course was then set for Tromsø which was arrived after a rolling transit Sunday evening October 10th at 1900 CET (1700 UTC).

CTD (SBE 911plus CTD system) Sensor Status

Sensor	Serial no.	Calibration date
Temperature	4022	31.Mar. 2004
Conductivity	2433	08.Apr. 2004
Pressure	86555	17.Jul. 2001

For the control of the temperature and pressure SIS GmbH digital reversing thermometers and pressure sensor, RTM4002X and RPM6000X were applied. Additionally a Benthos Altimeter Model PSA-916 was mounted on the carousel.

Preliminary Results

CTD (Conductivity, Temperature and Depth) profiles were obtained along two east-west sections along 74°N and 74°30'N. Both sections had end points near the coast of East Greenland and in the deep part of the Greenland Sea Gyre, thus crossing the East Greenland Current. For the locations of sections and stations see Figure 1 and the list of stations below. Weather and limited cruise time made it impossible to occupy the 75°N section as in year 2002 and 2003. The evaluation of the hydrographic data given below is based on a preliminary data set. Therefore, post-cruise calibration might result in minor changes.

Potential temperature and salinity sections for 74°N and 74°30'N are shown below in Figure 2 and Figure 3, respectively. In the lower Figure of Figure 2 a water mass classification has been introduced to illustrate the distribution of water masses along these sections. The classification is also used in Figure 4 and Figure 5 and is an adjusted form of the classification suggested by Rudels et al. (2002).

The changes we have made with respect to the water mass classification of Rudels et al. (2002) are the following:

We distinguish between two types of Polar water, which mainly are found over the East Greenland continental shelf and upper part of the slope in the area in question. Polar Water (PW) is associated with water found in the temperature minimum layer observed clearly in Figure 5. Above we usually find a fresher and warmer water mass, which we refer to as the Polar Surface Water (PSW). One important result from the deployment of the Tube moorings is that these two water masses merge during winter (see Figure 6); by doing so the way is open for the creation of the coldest and most saline PW to leave the Polar and East Greenland Current area. An example of this extreme PW was observed in year 2002 (Figure 5). Weaker evidence of its presence was also observed in years 2003 and 2004.

At the surface in the deeper part of the Greenland Sea we find a warm and relatively saline water mass in September which we will refer to as Greenland Sea Arctic Surface Water (GS-ASW), and not as in the case of Rudels et al. (2002) as Polar Surface Water warm. We here stress that GS-ASW is found to the east of the Polar Front and therefore lies in the Arctic domain according to Swift and Aagaard (1981). Immediately below the cold PW is not found, but rather a more saline water mass of Atlantic or Arctic origin. The difference between PSW and GS-ASW is shown in Figure 5 where the 5 m properties (coloured points) are observed to fall into two distinct groups.

Below the PW and overlying the bottom of the East Greenland continental shelf we find another water mass, which we will refer to as East Greenland Shelf Bottom Water (EGS-BW) (Figure 4). The water mass is observed as a near bottom temperature maximum with salinity very similar to those observed in the lower part of the Re-circulating Atlantic Water (RAW) observed over the slope. The observations from this year suggest that the major contributor to this water mass is RAW which has entered the shelf further to the north of the 74°N section (see Figure 3). At 74°N the EGS-BW is in the process of getting mixed with the above lying PW. With decreasing bottom depth the bottom water becomes increasingly influenced by PW and with water properties observed to lie on the mixing line between PW and EGS-BW. Water with these properties has by Rudels et al. (2002) been categorized as Polar Intermediate Water (PIW). We will here point out that the so-called PIW not only derives from the colder parts of the Arctic Ocean thermocline as suggested by Rudels et al. (2002) but is also formed over the East Greenland continental shelf. Or more broadly just where PW overlies a warmer water mass.

We have replaced Arctic Intermediate Water (AIW) with Greenland Sea – AIW (GS-AIW) to avoid a mix up with similar water masses introduced in the Iceland Sea.

The last water mass to be introduce here is termed upper Greenland Sea Arctic Intermediate Water (uGS-AIW) and is similar to the one introduced in the Iceland Sea by Swift (1980) and Swift and Aagaard (1981) (see Figure 4), a convectively formed water mass limited to the near surface layer by salinity and underlying density gradients in the area and observed as a near surface temperature minimum.

Other preliminary findings are the following:

The winter cooling of the surface layer was in an early stage and the low temperatures in the surface layer of the inner stations on section 74°N were likely accomplished by transport of ice from the North Pole (Figure 5). In the deeper part of the research area the surface layer was still observed to be warm and even more saline than the two previous years. Also shown in Figure 5 is the condition observed in 2002 and 2003.

The core values of the RAW were very high (S>35.00 and T>3°C) this year and found over the upper reach of the continental slope at the 74°N section and outer reach of the continental slope at the 74°30'N section. In 2003 the core of the RAW was found at the outer reach of the continental slope at the 74°N section.

To state how much the share of a section occupied by a certain water mass had changed during a certain time span is not straightforward in this area and can often give rise to a lot of confusion. Let us give an example using a water mass found in Fram Strait, Atlantic Water (AW) (defined with T>2°C and S>34.92). We find that the share of the 74°N section occupied by AW in 2004 is 400% greater than measured in 2002. If the temperature and salinity limits are used on their own we find 119% and 25% respectively. This is huge difference we leave the readers to speculate over.

The share of PW over the continental shelf along the 74°N section seems to have decreased between 2002 and 2004.

The general temperature trend in the upper 500 m on the 74°N stations outside the RAW core between 2002 and 2004 was towards higher temperatures on the station nearest to Greenland and towards lower temperatures on the station in the interior of the Greenland Sea. In between there were hardly any observed changes.

Ice was observed in a few instances during the cruise and then near to the coast of East Greenland. On the 74°N section multi year ice was met in a narrow belt near the coast of East Greenland; its approximate location can be deduced from Figure 5 by the very low surface temperatures at a few stations. Inside the belt almost ice free conditions were met with: only a few scattered and likely grounded icebergs were observed. There were no signs of newly formed ice. A few days later on the 74°30'N section a mixture of new ice and ice of northern origin was observed in a belt from the coast and out to a position between the second and third CTD station. The remaining working area was ice free and only very few icebergs were encountered here.

Figure 6 shows TS-diagrams showing the property changes experienced by the upper instrument of Tube 14 in the depth range 16m to 30m (based on a preliminary data set). The undisturbed measuring depth was app. 16m and excursions to greater depths can be mainly related to increased currents. Some statistics are given in Table 1 and 2. At the time of the deployment of Tube 14 winter cooling had already started and temperatures were observed near to the freezing point; however, salinities were near to those observed during the end of the warm summer months. We believe that the subsequent increase in salinity along the freezing point curve is caused by the new ice formation, though changes related to frontal movements cannot be ruled out, but are likely of minor importance. More obvious horizontal/frontal movements were observed as increases in both the temperature and salinity at the same time as observed in April and May 2004 (Figure 6). At the same time the number of observations with depth greater than 30m were observed to increase.

In the period January to March 2004 we observed very small property changes. The water mass present in this period is the coldest and most saline version of PW briefly mentioned above. The beginning of the summer heating season was first observed in the end of May where temperatures start to leave near freezing conditions. As mentioned above, the high temperatures observed in April and May are likely connected to horizontal movements. Maximum temperature was found in September (2.11°C).

Table 1 shows that the percentage of excursion to depths greater than 30m were significant lower in the three summer months June to August 2004 than rest of the year and that significantly higher values were found in November 2003 and April 2004. Table 2 shows that for the deployment period of Tube 14 positive temperatures were only found in 5 out of 12 months and of all observations greater than 0°C, 58.23% of them were found in September.

Table 3 shows that there is a general increase in the percentage of observations observed in depths greater than 30m over the years. If this reflects a general increase of the mean current or an eventual decrease in buoyancy of the flotation still remains to be checked against the ADCP measurements made during two periods (Sep01-Sep02 and Oct03-Sep04). Related to this issue are the findings of Table 4 which shows a decrease of the numbers of positive temperature observations during the years.

Table 1. Percentage of depth observations greater than 30 dbar (~m) observed in a month by the upper instrument in Tube 14 (October 5^{th} 2003 to September 25^{th} 2004).

Oct03	Nov03	Dec03	Jan04	Feb04	Mar04
18.28	53.24	17.65	25.85	33.19	22.18
Apr04	May04	Jun04	Jul04	Aug04	Sep04
59.44	31.59	7.36	0.78	5.51	29.03

Table 2. Percentage of temperature observations greater than 0°C in the depth range 16m to 30m observer in a month by the upper instrument in Tube 14 (October 5^{th} 2003 to September 25^{th} 2004).

May04	Jun04	Jul04	Aug04	Sep04
3.5	10.4	6.8	5.7	59.1

Table 3. Percentage of depth observations greater than 30 dbar observed by the upper instrument during three different Tube deployments (deployments and recoveries usually took place in late September) in the same location.

Tube 6	2001/2002	8.50%
Tube 9	2002/2003	12.86%
Tube14	2003/2004	25.20%

Table 4. Percentage (or hours) of temperature observations greater than 0°C in water shallower than 30 dbar observed by the upper instrument during three different Tube deployments (deployments and recoveries usually took place in late September) in the same location.

Tube 6	2001/2002	7.89%	647 hours
Tube 9	2002/2003	6.24%	493 hours
Tube 14	2003/2004	6.64%	424 hours

References

Rudels. B., E. Fahrbach, J. Meincke, G. Budéus and P. Eriksson, The East Greenland Current and its contribution to the Denmark Strait overflow, ICES J. Mar. Sci., 59, 1133-1154, 2002.

Swift, J.H., Seasonal processes in the Iceland Sea, Ph.D. Thesis, University of Washington, 296 pp, 1980.

Swift, J.H., and K. Aagaard, Seasonal transitions and water mass formation in the Iceland and Greenland Seas, Deep-Sea Res., 20A(10): 1107-1129, 1981.

Further Remarks

We would like to thank Captain Johansen and his crew of RV Lance for good seamanship and co-operation during the cruise. We also send our regards to the personnel at the Greenland Commando and those we meet at Daneborg. Financial support came from the Deutsche Forschungsgemein-schaft (SFB 512), Bonn.

Figures

Figure 1. Position of the RV Lance sections and stations occupied in September/October 2004.

Figure 2. Potential temperature (upper) and salinity (lower) distribution along the 74°N section in September/October 2004. The water mass distribution is schematic shown in the lower Figure. Polar Surface Water/Polar Water (PSW/PW), East Greenland Shelf Bottom Water (EGS-BW), Re-circulating Atlantic Water (RAW), upper Polar Deep Water (uPDW), Greenland Sea Arctic

Intermediate Water (GS-AIW), Canadian Basin Deep Water (CBDW), Euasian Basin Deep Water (EBDW) and Greenland Sea Deep Water (GSDW).

Figure 3. Potential temperature (upper) and salinity (lower) distribution along the 74°30'N section in October 2004.

Figure 4. TS-diagrams for the 74°N section, September/October 2004 (upper and lower). The water mass distribution is schematic shown in the both Figures. Polar Water (PW) ,Greenland Sea Arctic Surface Water (GS-ASW), East Greenland Shelf Bottom Water (EGS-BW), Re-circulating Atlantic Water (RAW), upper Greenland Sea Arctic Intermediate Water (uGS-AIW), upper Polar Deep Water (uPDW), Greenland Sea Arctic Intermediate Water (GS-AIW), Canadian Basin Deep Water (CBDW), Euasian Basin Deep Water (EBDW) and Greenland Sea Deep Water (GSDW). Only every third data point are shown. Blue and red curve are the profile of st. 21 (74°N, 10°W) and st. 79 (75°N, 1°W) respectively. For values of isopycnals used see Rudels et al. (2002).

Figure 5. TS-diagrams for the 74°N section, September/October 2004 (30/9-2/10) (upper left), October 2003 (5/10-7/10 and 12/10-13/10) (upper right) and September 2002 (19.9-24.9) (lower left). Also shown is the five meter values of each station (green points for 2002, 2004, red points for (5/10-7/10) 2003 and blue points for (12/10-13/10) 2003. The surface water mass distribution is schematic shown. Polar Surface Water (PSW), Polar Water (PW) and Greenland Sea Arctic Surface Water (GS-ASW). Only every third data point are shown. Also shown is the freezing point curve.

Figure 6. TS-diagrams showing the property changes experienced by the upper instrument (microcat) of Tube 14 in the depth range 16m to 30m. The undisturbed measuring depth was app. 16 m. The microcat time series have been divided into a monthly colour coding. Also shown is the freezing point curve.

Table 5. Mooring recoveries during Lance 2004/15

Mooring	Latitude Longitude	Water depth (m)	Date and time of first record	Instrument Type	Serial Number	Instr. Depth (m)	Record Length (days)
HH1	74°04.565N 12°46.893W	2771	02.10.02	RCM 4 SBE 16 SBE 37 RCM 5 SBE 37 SBE 37 RCM 8 SBE 37 RCM 8 SBE 16 RT 161 BS	2022 2411 1390 8414 1391 1395 9876 1597 9875 3023 874	109 110 165 241 242 455 667 668 1195 1196 1723	1)
HH3	74°00.791N 13°53.523W	2190	01.10.02	RCM 7 SBE 16 SBE 37 RCM 8 SBE 37 RCM 5 SBE 37 RCM 5 SBE 37 RCM 8 SBE 16 RT 661 B1S	11286 2410 1396 9841 1392 6855 1394 8416 1397 9221 2409 376	74 75 131 187 188 401 402 615 616 1142 1143 1670	1)
HH5	74°01.950N 14°39.215W	1350	01.10.02	RCM 4 SBE 16 THM-R THM-CH SBE 37 RCM 4 SBE 37 SBE 37 RCM 7 SBE 37 RCM 5 SBE 37 P RCM 8 SBE 37 RT 661 B1S	209 2408 1334 1277 1914 204 0066 1885 11271 1594 8415 1400 9203 1393 372	65 66 67- -118 121 176 177 232 339 340 552 553 818 819 1339	1)
Tube10	74°03.93N 15°45.05W	202	21.09.02	SBE 37 P SBE 37 AR 661 B1S	1690 1598 613	15 55 198	1)

1) Mooring or Tube could not be recovered during the RV Lance 2004 cruise.

Table 5. Continued

Mooring	Latitude Longitude	Water depth (m)	Date and time of first record	Instrument Type	Serial Number	Instr. Depth (m)	Record Length (days)
ADCP	74°02.782N 15°38.290W	199	08.10.03	RDI ADCP 153 kHz	585	199	355
Tube 14	74°01.660N 15°31.366W	346	05.10.03	SBE37 P SBE 37 AR 861 B1S	2803 2935 207	16 56 341	357

Table 6. Mooring deployments during Lance 2004/15

Mooring	Latitude Longitude	Water depth (m)	Date and time of first record	Instrument Type	Serial Number	Instr. Depth (m)	Record Length (days)
ADCP	74°02.645N 15°38.127W	202	25.09.04	RDI ADCP 153 kHz	603	202	
Tube 19	74°01.648N 15°31.513W	341.5	25.09.04	SBE 37 P SBE 37 AR 861 B1S	2967 2942 209	20 60 337	
Tube 18	74°04.339N 15°47.315W	200	27.09.04	SBE 37 P SBE 37 AR 861 B1S	1399 2937 210	20 60 197	
HH3-04	73°59.979N 14°02.463W	2088	29.09.04	SBE 16 RCM 8 SBE 37 P RCM 7 SBE 37 RCM 8 SBE 37 P RCM 11 SBE 16 RCM 11 RT 661 B1S	2407 12301 2804 11297 2940 9815 1401 81 3024 171 200	100 100 250 250 500 500 750 750 1000 1000 1600	
HH5-04	73°59.891N 15°00.240W	1188	29.09.04	SBE 16 RCM 8 SBE 37 P RCM 7 SBE 37 RCM 7 SBE 16 RCM 9 OP AR 861 B1S	2412 12303 2863 11294 2941 11295 3025 1025 206	100 100 250 250 500 500 750 750 980	

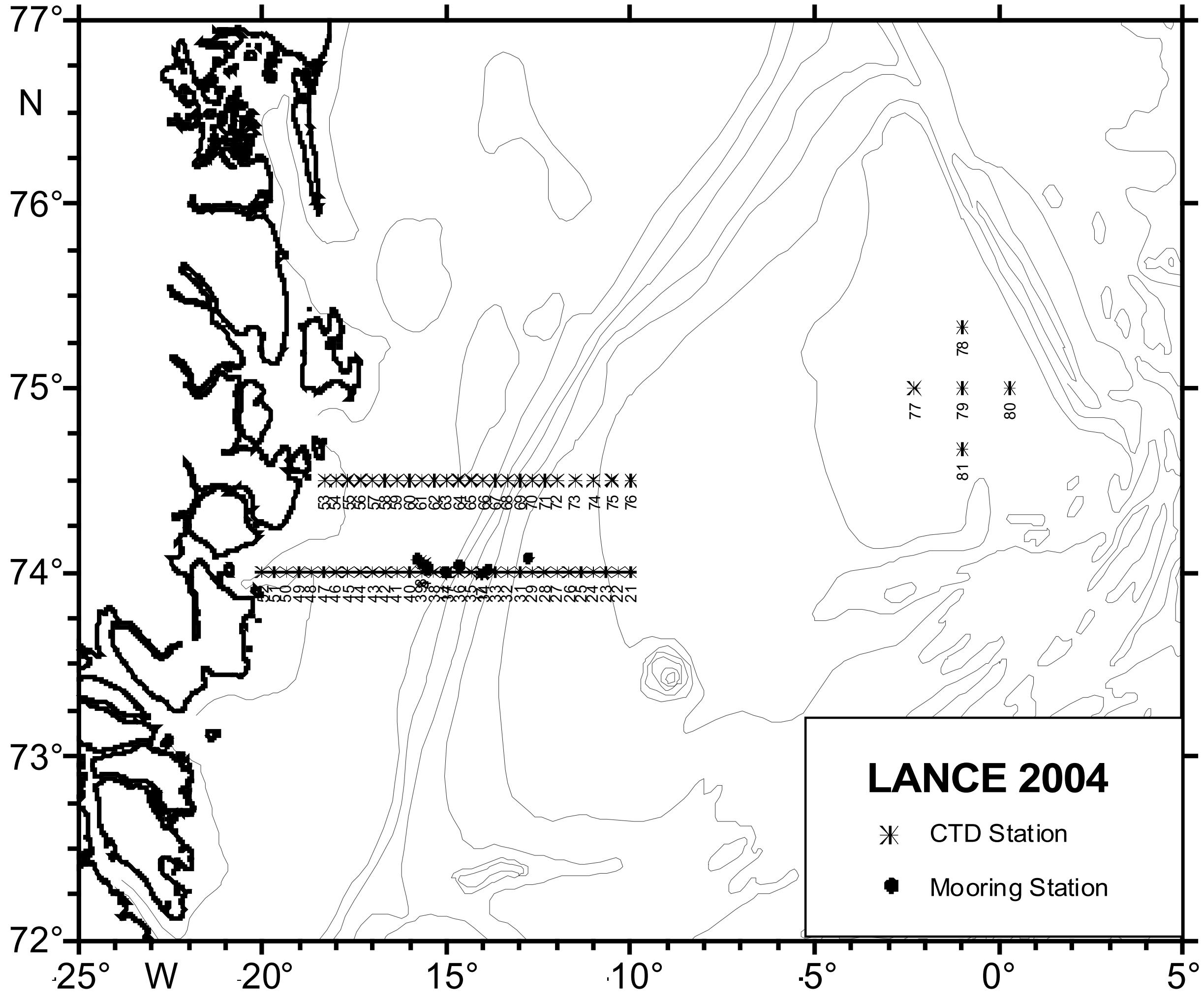

Figure 1. Position of the "Lance" sections and stations taken in September/October 2004.

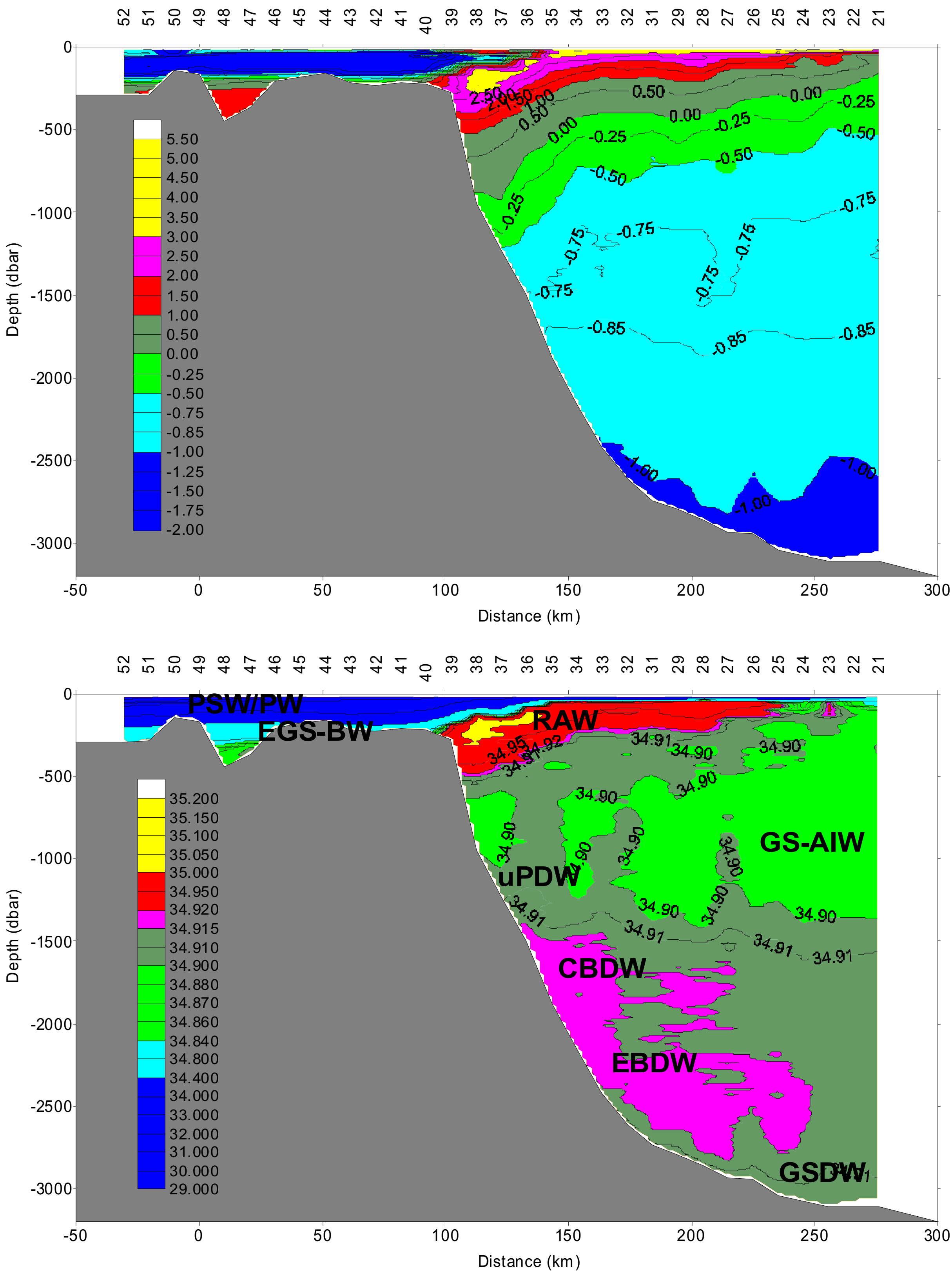

Figure 2. Potential temperature (upper) and salinity (lower) distribution along the 74°N section in September/October 2004. The water mass distribution is schematic shown in the lower Figure. Polar Surface Water/Polar Water (PSW/PW), East Greenland Shelf Bottom Water (EGS-BW), Re-circulating Atlantic Water (RAW), upper Polar Deep Water (uPDW), Greenland Sea Arctic Intermediate Water (GS-AIW), Canadian Basin Deep Water (CBDW), Euasian Basin Deep Water (EBDW) and Greenland Sea Deep Water (GSDW).

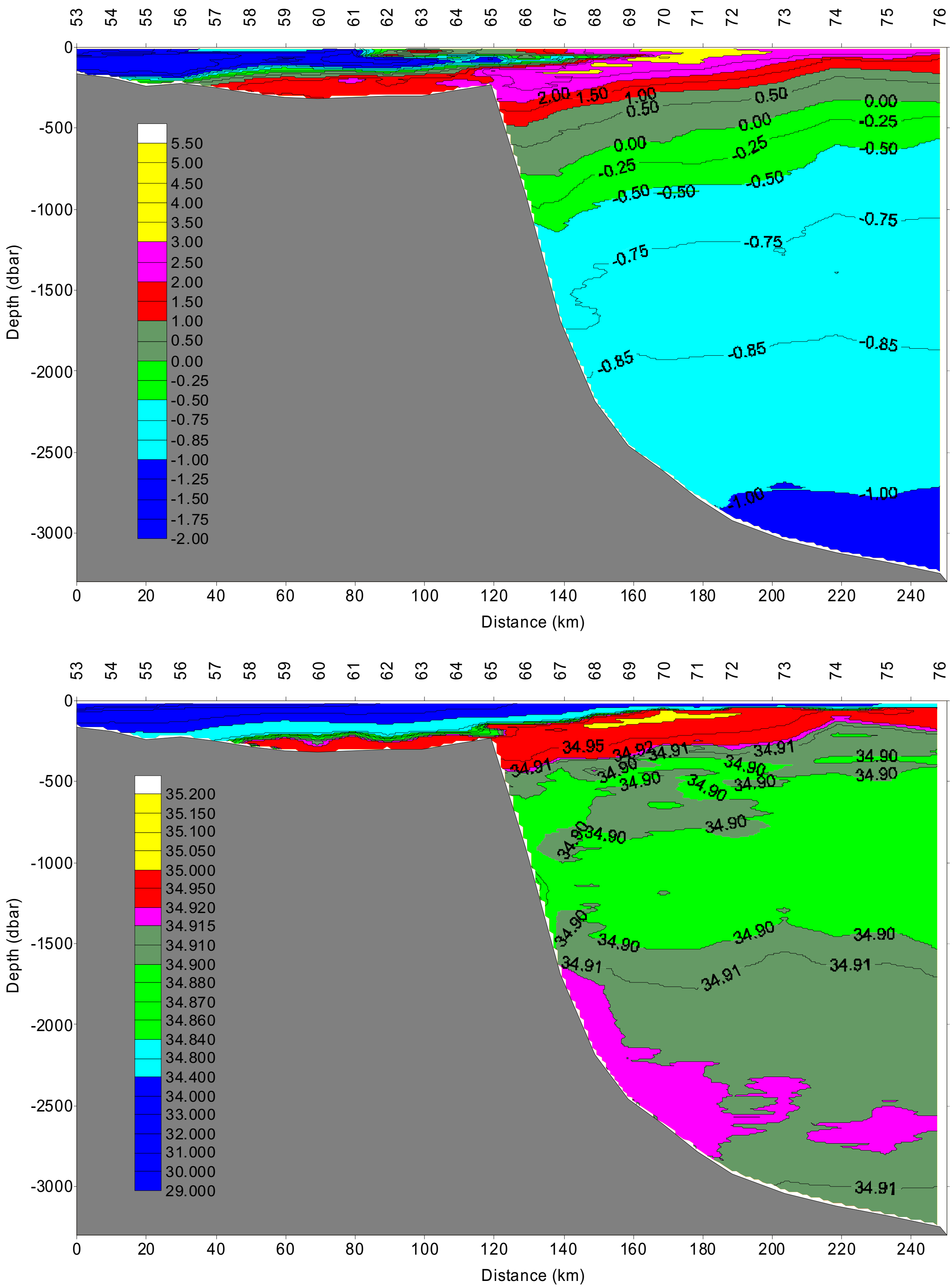

Figure 3. Potential temperature (upper) and salinity (lower) distribution along the 74°30'N section in October 2004.

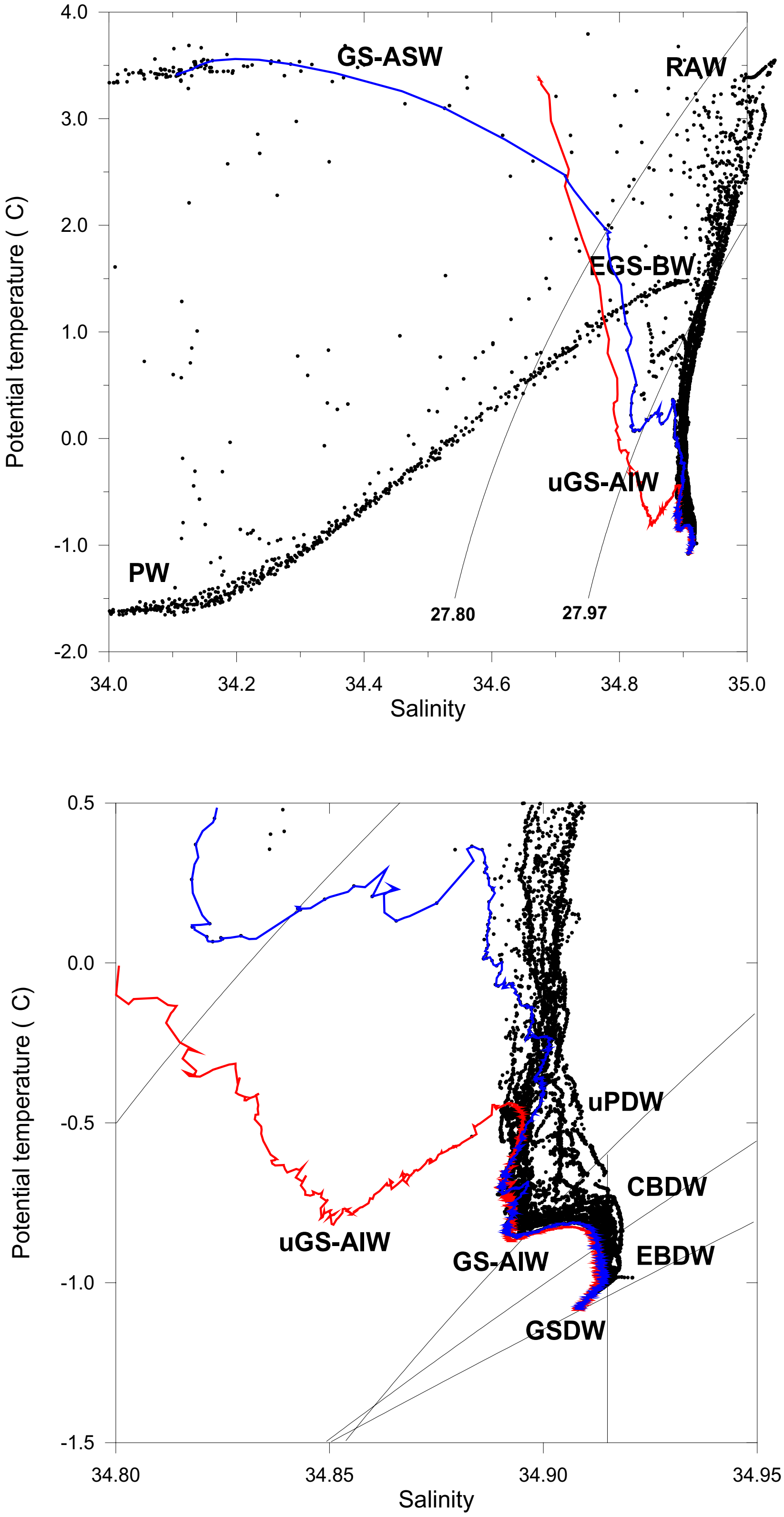

Figure 4. TS-diagrams for the 74°N section, September/October 2004 (upper and lower). The water mass distribution is schematic shown in the both Figures. Polar Water (PW), Greenland Sea Arctic Surface Water (GS-ASW), East Greenland Shelf Bottom Water (EGS-BW), Re-circulating Atlantic Water (RAW), upper Greenland Sea Arctic Intermediate Water (uGS-AIW), upper Polar Deep Water (uPDW), Greenland Sea Arctic Intermediate Water (GS-AIW), Canadian Basin Deep Water (CBDW), Euasian Basin Deep Water (EBDW) and Greenland Sea Deep Water (GSDW). Only every third data point are shown. Blue and red curve are the profile of st. 21 (74°N, 10°W) and st. 79 (75°N, 1°W) respectively. For values of isopycnals used see Rudels et al. (2002).

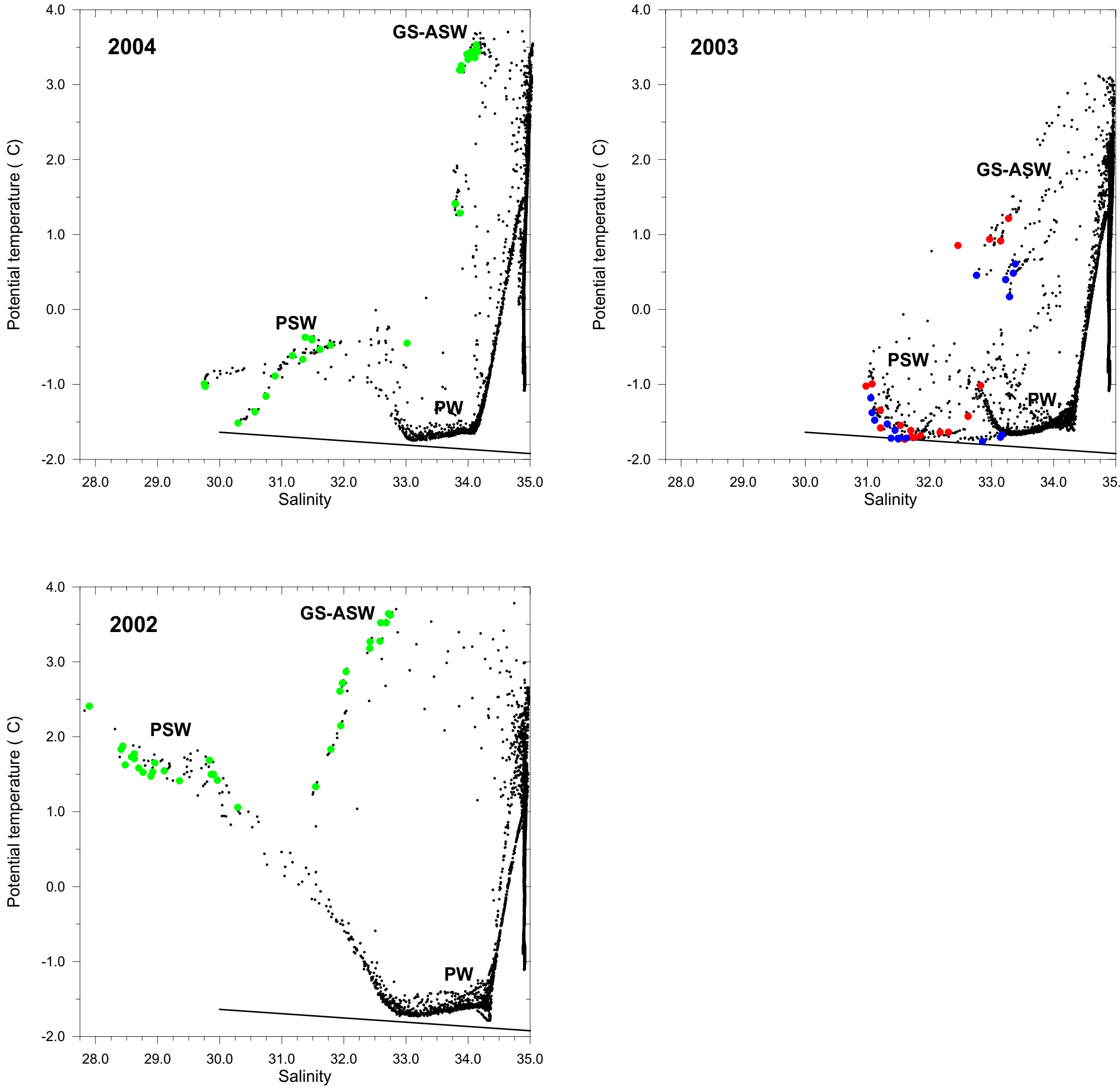

Figure 5. TS-diagrams for the 74°N section, September/October 2004 (30/9-2/10) (upper left), October 2003 (5/10-7/10 and 12/10-13/10) (upper right) and September 2002 (19.9-24.9) (lower left). Also shown is the five meter values of each station (green points for 2002, 2004, red points for (5/10-7/10) 2003 and blue points for (12/10-13/10) 2003. The surface water mass distribution is schematic shown. Polar Surface Water (PSW), Polar Water (PW) and Greenland Sea Arctic Surface Water (GS-ASW). Only every third data point are shown. Also shown is the freezing point curve.

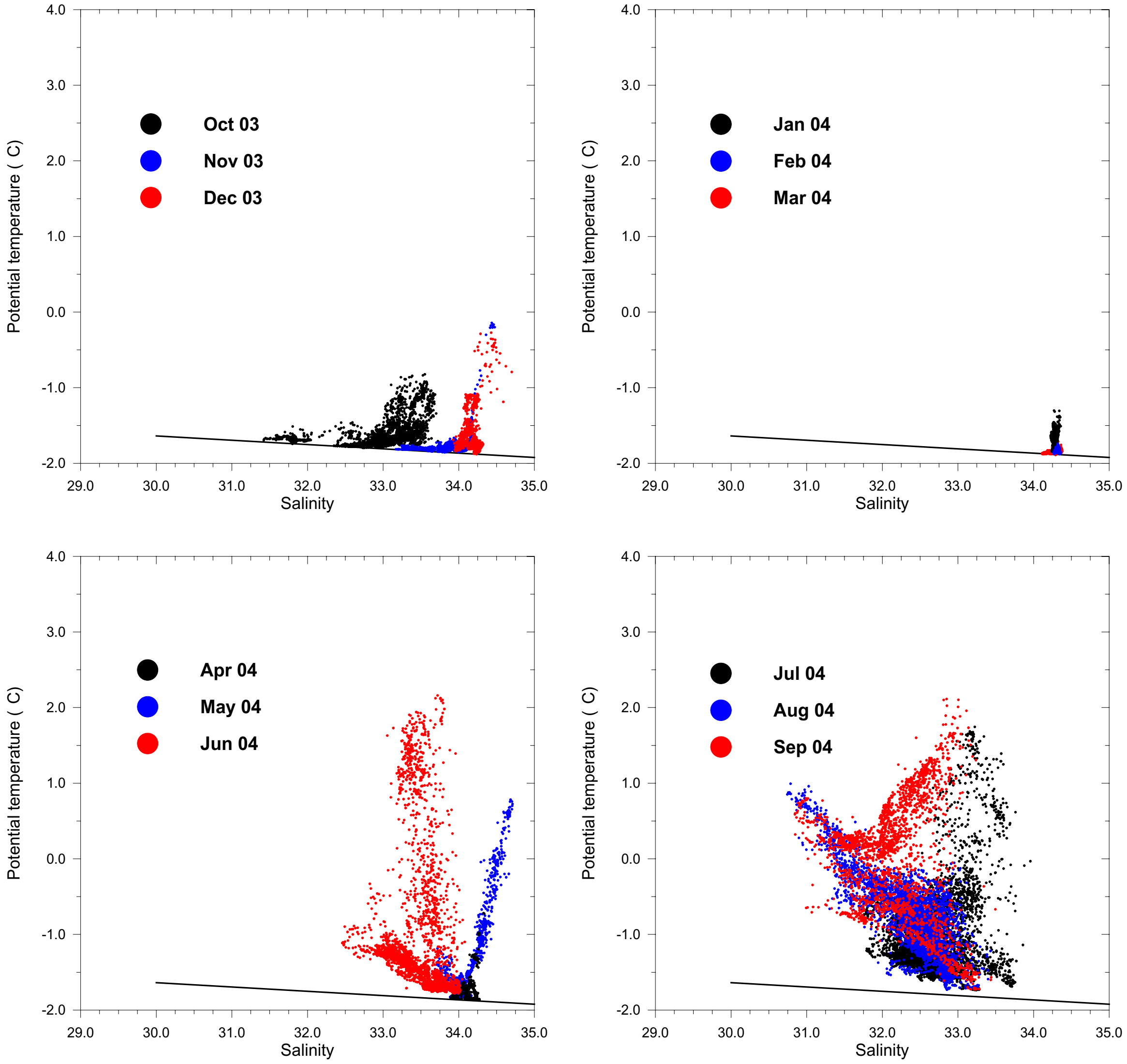

Figure 6. TS-diagrams showing the property changes experienced by the upper instrument (microcat) of Tube 14 in the depth range 16m to 30m. The undisturbed measuring depth was app. 16 m. The microcat time series have been divided into a monthly colour coding. Also shown is the freezing point curve.

List of stations

EXPO-CODE	Stat. No.	Cast No.	Cast Type	Date mmddyy	Time UTC	Code	Position Latitude	Longitude	Code	Bottom depth	Max Press.	Bottom Dist.	Comments
58LA1504	001	01	MOR	092404	1530	BE	74 00.73 N	15 30.55 W	GPS	528			Listening for Tube 14
58LA1504	001	01	MOR	092404	1533	EN	74 00.74 N	15 30.64 W	GPS	524			contact
58LA1504	002	01	MOR	092404	1553	BE	74 02.66 N	15 37.10 W	GPS	207			Recovery of ADCP mooring 03
58LA1504	002	01	MOR	092404	1813	EN	74 02.21 N	15 40.15 W	GPS	189			
58LA1504	003	01	ROS/CTD	092404	1921	BE	74 03.01 N	15 36.49 W	GPS	219			
58LA1504	003	01	ROS/CTD	092404	1933	BO	74 02.96 N	15 36.99 W	GPS	211	205	7	Teststation
58LA1504	003	01	ROS/CTD	092404	1940	EN	74 02.92 N	15 37.10 W	GPS	211			
58LA1504	004	01	ROS/CTD	092404	2024	BE	74 02.97 N	15 35.36 W	GPS	222			
58LA1504	004	01	ROS/CTD	092404	2031	BO	74 02.97 N	15 35.12 W	GPS	226	103	126	Calibration of MICROCATS
58LA1504	004	01	ROS/CTD	092404	2057	EN	74 02.99 N	15 34.52 W	GPS	231			
58LA1504	005	01	MOR	092504	1040	BE	74 02.55 N	15 39.56 W	GPS	200			Deployment of ADCP mooring 04
58LA1504	005	01	MOR	092504	1126	EN	74 02.65 N	15 38.17 W	GPS	201			
58LA1504	006	01	MOR	092504	1248	BE	74 01.75 N	15 31.47 W	GPS	325			Recovery of Tube 14
58LA1504	006	01	MOR	092504	1348	EN	74 01.49 N	15 31.74 W	GPS	362			
58LA1504	007	01	MOR	092504	1631	BE	74 01.53 N	15 32.56 W	GPS	315			Deployment of Tube 19
58LA1504	007	01	MOR	092504	1657	EN	74 01.65 N	15 31.51 W	GPS	342			
58LA1504	008	01	ROS/CTD	092504	1900	BE	74 03.70 N	15 41.60 W	GPS	197	102		Calibration of MICROCATS
58LA1504	008	01	ROS/CTD	092504	1938	EN	74 05.50 N	15 40.90 W	GPS	202			
58LA1504	009	01	MOR	092504	1940	BE	74 03.93 N	15 45.05 W	GPS	202			Sonar search for Tube 10
58LA1504	009	01	MOR	092504	2100	EN	74 03.93 N	15 45.05 W	GPS	202			negative
58LA1504	010	01	MOR	092704	1356	BE	74 04.23 N	15 47.66 W	GPS	199			Deployment of Tube 18
58LA1504	010	01	MOR	092704	1408	EN	74 04.34 N	15 47.32 W	GPS	200			
58LA1504	011	01	MOR	092704	1424	BE	74 04.34 N	15 47.32 W	GPS	200			Sonar search for Tube 18
58LA1504	011	01	MOR	092704	1439	EN	74 04.34 N	15 47.32 W	GPS	200			Seen on Echo sounder
58LA1504	012	01	MOR	092704	1659	BE	74 01.89 N	14 38.70 W	GPS	1365			Sonar search for Mooring HH5-02
58LA1504	012	01	MOR	092704	1805	EN	74 02.00 N	14 39.15 W	GPS	1356			negative
58LA1504	013	01	MOR	092704	1839	BE	74 02.36 N	14 38.72 W	GPS	1344			Listening for Releaser of HH5-02
58LA1504	013	01	MOR	092704	1847	EN	74 02.17 N	14 38.89 W	GPS	1354			negative
58LA1504	014	01	ROS/CTD	092804	0923	BE	73 59.99 N	15 00.37 W	GPS	1185			Calibration of Echo sounder
58LA1504	014	01	ROS/CTD	092804	0947	BO	74 00.05 N	15 00.70 W	GPS	1176	1187	9	
58LA1504	014	01	ROS/CTD	092804	1012	EN	74 00.06 N	15 00.54 W	GPS	1174			
58LA1504	015	01	MOR	092804	1330	BE	74 01.84 N	14 56.99 W	GPS	1068			Deployment of Mooring HH5-04
58LA1504	015	01	MOR	092804	1547	EN	73 59.78 N	15 00.08 W	GPS	1210			partly failed
58LA1504	016	01	MOR	092804	1826	BE	74 00.79 N	13 52.52 W	GPS	2191			Sonar search for Mooring HH3-02
58LA1504	016	01	MOR	092804	1900	EN	74 00.79 N	13 52.52 W	GPS	2191			negative
58LA1504	017	01	ROS/CTD	092804	1947	BE	73 59.82 N	14 01.78 W	GPS	2106			Calibration of Echo sounder
58LA1504	017	01	ROS/CTD	092804	2028	BO	73 59.39 N	14 01.81 W	GPS	2129	2140	9	
58LA1504	017	01	ROS/CTD	092804	2110	EN	73 58.97 N	14 02.50 W	GPS	2130			
58LA1504	018	01	MOR	092904	0950	BE	73 57.72 N	13 59.34 W	GPS	2201			Deployment Mooring HH3-04
58LA1504	018	01	MOR	092904	1152	EN	73 59.59 N	14 01.78 W	GPS	2120			
58LA1504	019	01	MOR	092904	1343	BE	74 00.10 N	15 00.29 W	GPS	1172			Recovery of Mooring HH5-04
58LA1504	019	01	MOR	092904	1448	EN	73 59.76 N	15 01.52 W	GPS	1195			
58LA1504	020	01	MOR	092904	1807	BE	73 58.54 N	14 58.74 W	GPS	1309			Redeployment of Mooring HH5-04
58LA1504	020	01	MOR	092904	1912	EN	73 59.60 N	14 59.72 W	GPS	1188			Sonar sweep positive
58LA1504	021	01	ROS/CTD	093004	0410	BE	74 00.01 N	10 00.01 W	GPS	3068			
58LA1504	021	01	ROS/CTD	093004	0515	BO	73 59.96 N	10 02.61 W	GPS	3068	3054		
58LA1504	021	01	ROS/CTD	093004	0617	EN	73 59.84 N	10 04.90 W	GPS	3059			
58LA1504	022	01	ROS/CTD	093004	0655	BE	74 00.02 N	10 20.49 W	GPS	3036			
58LA1504	022	01	ROS/CTD	093004	0750	BO	74 00.39 N	10 23.82 W	GPS	3055	3041		
58LA1504	022	01	ROS/CTD	093004	0839	EN	74 00.67 N	10 26.79 W	GPS	3063			
58LA1504	023	01	ROS/CTD	093004	0911	BE	74 00.12 N	10 40.26 W	GPS	3046			
58LA1504	023	01	ROS/CTD	093004	1005	BO	74 00.28 N	10 43.36 W	GPS	3042	3099	8	
58LA1504	023	01	ROS/CTD	093004	1101	EN	74 00.42 N	10 46.01 W	GPS	3036			
58LA1504	024	01	ROS/CTD	093004	1133	BE	74 00.03 N	11 00.23 W	GPS	3014			
58LA1504	024	01	ROS/CTD	093004	1230	BO	74 00.00 N	11 02.01 W	GPS	3013	3067	7	
58LA1504	024	01	ROS/CTD	093004	1328	EN	73 59.85 N	11 03.32 W	GPS	2999			
58LA1504	025	01	ROS/CTD	093004	1402	BE	73 59.96 N	11 20.28 W	GPS	2975			
58LA1504	025	01	ROS/CTD	093004	1502	BO	73 59.92 N	11 21.69 W	GPS	2966	3027	10	
58LA1504	025	01	ROS/CTD	093004	1553	EN	74 00.00 N	11 23.65 W	GPS	2957			
58LA1504	026	01	ROS/CTD	093004	1632	BE	73 59.99 N	11 40.06 W	GPS	2884			
58LA1504	026	01	ROS/CTD	093004	1723	BO	73 59.95 N	11 41.66 W	GPS	2878	2928	8	
58LA1504	026	01	ROS/CTD	093004	1814	EN	73 59.96 N	11 43.33 W	GPS	2876			
58LA1504	027	01	ROS/CTD	093004	1848	BE	74 00.05 N	11 59.86 W	GPS	2873			
58LA1504	027	01	ROS/CTD	093004	1942	BO	74 00.27 N	12 01.90 W	GPS	2869	2918	9	
58LA1504	027	01	ROS/CTD	093004	2034	EN	74 00.54 N	12 04.30 W	GPS	2857			
58LA1504	028	01	ROS/CTD	093004	2109	BE	73 59.99 N	12 20.14 W	GPS	2805			
58LA1504	028	01	ROS/CTD	093004	2200	BO	74 00.28 N	12 22.59 W	GPS	2803	2848	10	
58LA1504	028	01	ROS/CTD	093004	2238	EN	74 00.69 N	12 24.24 W	GPS	2805			
58LA1504	029	01	ROS/CTD	093004	2323	BE	74 00.02 N	12 40.04 W	GPS	2745			
58LA1504	029	01	ROS/CTD	100104	0014	BO	74 00.38 N	12 41.19 W	GPS	2759	2784	9	
58LA1504	029	01	ROS/CTD	100104	0105	EN	74 00.64 N	12 41.29 W	GPS	2758			
58LA1504	030	01	MOR	100104	0130	BE	74 04.57 N	12 46.89 W	GPS	2771			Sonar search and listening
58LA1504	030	01	MOR	100104	0240	EN	74 04.57 N	12 46.89 W	GPS	2771			for Mooring HH1-02 negative
58LA1504	031	01	ROS/CTD	100104	0329	BE	74 00.00 N	13 00.05 W	GPS	2686			
58LA1504	031	01	ROS/CTD	100104	0421	BO	74 00.26 N	13 00.02 W	GPS	2687	2726	8	
58LA1504	031	01	ROS/CTD	100104	0508	EN	74 00.28 N	13 00.26 W	GPS	2687			
58LA1504	032	01	ROS/CTD	100104	0547	BE	74 00.02 N	13 19.97 W	GPS	2558			
58LA1504	032	01	ROS/CTD	100104	0635	BO	74 00.09 N	13 19.15 W	GPS	2565	2595	10	
58LA1504	032	01	ROS/CTD	100104	0720	EN	74 00.00 N	13 18.08 W	GPS	2575			

58LA1504	033	01	ROS/CTD	100104	0804	BE	73 59.89 N	13 39.91 W	GPS	2379			
58LA1504	033	01	ROS/CTD	100104	0847	BO	73 59.13 N	13 40.20 W	GPS	2383	2409	8	
58LA1504	033	01	ROS/CTD	100104	0928	EN	73 58.51 N	13 40.18 W	GPS	2396			
58LA1504	034	01	ROS/CTD	100104	1015	BE	73 59.95 N	14 00.01 W	GPS	2126			
58LA1504	034	01	ROS/CTD	100104	1053	BO	73 59.31 N	14 00.42 W	GPS	2149	2145	8	
58LA1504	034	01	ROS/CTD	100104	1130	EN	73 58.86 N	14 01.29 W	GPS	2149			
58LA1504	035	01	ROS/CTD	100104	1211	BE	73 59.96 N	14 20.09 W	GPS	1844			
58LA1504	035	01	ROS/CTD	100104	1246	BO	73 59.91 N	14 19.52 W	GPS	1852	1865	9	
58LA1504	035	01	ROS/CTD	100104	1323	EN	73 59.96 N	14 18.61 W	GPS	1861			
58LA1504	036	01	ROS/CTD	100104	1404	BE	74 00.08 N	14 40.06 W	GPS	1463			
58LA1504	036	01	ROS/CTD	100104	1435	BO	73 59.75 N	14 39.62 W	GPS	1487	1484	9	
58LA1504	036	01	ROS/CTD	100104	1503	EN	73 59.58 N	14 38.80 W	GPS	1510			
58LA1504	037	01	ROS/CTD	100104	1548	BE	73 59.96 N	14 58.82 W	GPS	1202			
58LA1504	037	01	ROS/CTD	100104	1608	BO	73 59.75 N	14 58.81 W	GPS	1228	1220	10	
58LA1504	037	01	ROS/CTD	100104	1632	EN	73 59.46 N	14 58.50 W	GPS	1261			
58LA1504	038	01	ROS/CTD	100104	1713	BE	74 00.03 N	15 20.08 W	GPS	934			
58LA1504	038	01	ROS/CTD	100104	1729	BO	73 59.87 N	15 19.70 W	GPS	949	937	8	
58LA1504	038	01	ROS/CTD	100104	1747	EN	73 59.67 N	15 19.53 W	GPS	963			
58LA1504	039	01	ROS/CTD	100104	1847	BE	73 59.96 N	15 40.02 W	GPS	263			
58LA1504	039	01	ROS/CTD	100104	1854	BO	73 59.90 N	15 40.12 W	GPS	270	263	9	
58LA1504	039	01	ROS/CTD	100104	1902	EN	73 59.82 N	15 40.26 W	GPS	281			
58LA1504	040	01	ROS/CTD	100104	1942	BE	73 59.91 N	16 00.15 W	GPS	221			pump problems during down cast
58LA1504	040	01	ROS/CTD	100104	1947	BO	73 59.79 N	16 00.48 W	GPS	221	212	9	
58LA1504	040	01	ROS/CTD	100104	2004	EN	73 59.60 N	16 00.95 W	GPS	221			
58LA1504	041	01	ROS/CTD	100104	2045	BE	74 00.00 N	16 20.20 W	GPS	208			
58LA1504	041	01	ROS/CTD	100104	2052	BO	73 59.98 N	16 20.41 W	GPS	211	201	7	
58LA1504	041	01	ROS/CTD	100104	2057	EN	73 59.92 N	16 20.41 W	GPS	207			
58LA1504	042	01	ROS/CTD	100104	2145	BE	74 00.11 N	16 39.85 W	GPS	228			
58LA1504	042	01	ROS/CTD	100104	2151	BO	74 00.09 N	16 39.65 W	GPS	229	219	9	
58LA1504	042	01	ROS/CTD	100104	2157	EN	74 00.09 N	16 39.59 W	GPS	230			
58LA1504	043	01	ROS/CTD	100104	2250	BE	74 00.00 N	16 59.86 W	GPS	213			
58LA1504	043	01	ROS/CTD	100104	2256	BO	74 00.00 N	16 59.90 W	GPS	210	204	8	
58LA1504	043	01	ROS/CTD	100104	2301	EN	74 00.00 N	16 59.96 W	GPS	209			
58LA1504	044	01	ROS/CTD	100104	2353	BE	74 00.08 N	17 20.11 W	GPS	159			
58LA1504	044	01	ROS/CTD	100104	2357	BO	74 00.08 N	17 20.11 W	GPS	160	150	8	
58LA1504	044	01	ROS/CTD	100204	0002	EN	74 00.07 N	17 20.09 W	GPS	161			
58LA1504	045	01	ROS/CTD	100204	0054	BE	74 00.03 N	17 40.35 W	GPS	176			
58LA1504	045	01	ROS/CTD	100204	0100	BO	74 00.00 N	17 40.23 W	GPS	176	169	8	
58LA1504	045	01	ROS/CTD	100204	0106	EN	73 59.98 N	17 40.20 W	GPS	176			
58LA1504	046	01	ROS/CTD	100204	0152	BE	73 59.99 N	18 00.09 W	GPS	210			
58LA1504	046	01	ROS/CTD	100204	0158	BO	73 59.89 N	18 00.09 W	GPS	207	196	9	
58LA1504	046	01	ROS/CTD	100204	0204	EN	73 59.80 N	18 00.07 W	GPS	206			
58LA1504	047	01	ROS/CTD	100204	0253	BE	74 00.04 N	18 19.93 W	GPS	362			
58LA1504	047	01	ROS/CTD	100204	0301	BO	73 59.99 N	18 19.98 W	GPS	365	354	9	
58LA1504	047	01	ROS/CTD	100204	0310	EN	73 59.94 N	18 19.90 W	GPS	365			
58LA1504	048	01	ROS/CTD	100204	0357	BE	73 59.98 N	18 39.93 W	GPS	447			
58LA1504	048	01	ROS/CTD	100204	0407	BO	73 59.84 N	18 39.84 W	GPS	441	434	9	
58LA1504	048	01	ROS/CTD	100204	0417	EN	73 59.73 N	18 39.94 W	GPS	437			
58LA1504	049	01	ROS/CTD	100204	0507	BE	73 59.96 N	19 00.10 W	GPS	169			
58LA1504	049	01	ROS/CTD	100204	0512	BO	73 59.85 N	19 00.09 W	GPS	166	154	10	
58LA1504	049	01	ROS/CTD	100204	0518	EN	73 59.73 N	19 00.12 W	GPS	170			
58LA1504	050	01	ROS/CTD	100204	0627	BE	73 59.89 N	19 19.93 W	GPS	139			
58LA1504	050	01	ROS/CTD	100204	0631	BO	73 59.86 N	19 19.98 W	GPS	139	129	7	
58LA1504	050	01	ROS/CTD	100204	0637	EN	73 59.83 N	19 20.12 W	GPS	139			
58LA1504	051	01	ROS/CTD	100204	0739	BE	74 00.05 N	19 40.14 W	GPS	287			
58LA1504	051	01	ROS/CTD	100204	0746	BO	74 00.00 N	19 40.07 W	GPS	288	277	9	
58LA1504	051	01	ROS/CTD	100204	0753	EN	73 59.91 N	19 39.99 W	GPS	286			
58LA1504	052	01	ROS/CTD	100204	0856	BE	74 00.09 N	19 59.99 W	GPS	286			
58LA1504	052	01	ROS/CTD	100204	0903	BO	74 00.07 N	19 59.87 W	GPS	291	281	9	
58LA1504	052	01	ROS/CTD	100204	0912	EN	74 00.05 N	19 59.74 W	GPS	289			
58LA1504	053	01	ROS/CTD	100404	2135	BE	74 30.05 N	18 17.38 W	GPS	169			
58LA1504	053	01	ROS/CTD	100404	2141	BO	74 30.01 N	18 17.21 W	GPS	167	156	9	
58LA1504	053	01	ROS/CTD	100404	2145	EN	74 30.01 N	18 17.04 W	GPS	164			
58LA1504	054	01	ROS/CTD	100404	2236	BE	74 29.78 N	17 59.77 W	GPS	192			
58LA1504	054	01	ROS/CTD	100404	2242	BO	74 29.62 N	17 59.49 W	GPS	187	176	13	
58LA1504	054	01	ROS/CTD	100404	2248	EN	74 29.43 N	17 59.32 W	GPS	190			
58LA1504	055	01	ROS/CTD	100404	2328	BE	74 30.00 N	17 40.07 W	GPS	235			
58LA1504	055	01	ROS/CTD	100404	2334	BO	74 29.91 N	17 40.02 W	GPS	239	227	7	
58LA1504	055	01	ROS/CTD	100404	2340	EN	74 29.82 N	17 40.00 W	GPS	241			
58LA1504	056	01	ROS/CTD	100504	0022	BE	74 29.94 N	17 19.97 W	GPS	220			
58LA1504	056	01	ROS/CTD	100504	0029	BO	74 29.79 N	17 19.66 W	GPS	222	211	9	
58LA1504	056	01	ROS/CTD	100504	0036	EN	74 29.65 N	17 19.58 W	GPS	220			
58LA1504	057	01	ROS/CTD	100504	0119	BE	74 29.95 N	16 59.94 W	GPS	248			
58LA1504	057	01	ROS/CTD	100504	0127	BO	74 29.79 N	16 59.82 W	GPS	250	241	9	
58LA1504	057	01	ROS/CTD	100504	0134	EN	74 29.63 N	16 59.72 W	GPS	250			
58LA1504	058	01	ROS/CTD	100504	0214	BE	74 29.95 N	16 39.86 W	GPS	274			
58LA1504	058	01	ROS/CTD	100504	0223	BO	74 29.75 N	16 39.86 W	GPS	287	272	9	
58LA1504	058	01	ROS/CTD	100504	0231	EN	74 29.73 N	16 39.86 W	GPS	289			
58LA1504	059	01	ROS/CTD	100504	0325	BE	74 29.98 N	16 20.12 W	GPS	310			
58LA1504	059	01	ROS/CTD	100504	0333	BO	74 29.84 N	16 19.95 W	GPS	308	299	10	
58LA1504	059	01	ROS/CTD	100504	0343	EN	74 29.80 N	16 19.90 W	GPS	307			
58LA1504	060	01	ROS/CTD	100604	0015	BE	74 29.99 N	15 59.86 W	GPS	317			
58LA1504	060	01	ROS/CTD	100604	0023	BO	74 29.93 N	15 59.55 W	GPS	316	311	7	
58LA1504	060	01	ROS/CTD	100604	0032	EN	74 29.87 N	15 59.44 W	GPS	316			
58LA1504	061	01	ROS/CTD	100604	0108	BE	74 30.02 N	15 39.93 W	GPS	302			
58LA1504	061	01	ROS/CTD	100604	0118	BO	74 29.86 N	15 39.57 W	GPS	307	299	5	
58LA1504	061	01	ROS/CTD	100604	0127	EN	74 29.67 N	15 39.29 W	GPS	308			

58LA1504	062	01	ROS/CTD	100604	0204	BE	74 29.99 N	15 20.01 W	GPS	297			
58LA1504	062	01	ROS/CTD	100604	0212	BO	74 29.90 N	15 19.72 W	GPS	294	288	8	
58LA1504	062	01	ROS/CTD	100604	0218	EN	74 29.81 N	15 19.63 W	GPS	293			
58LA1504	063	01	ROS/CTD	100604	0256	BE	74 30.02 N	15 00.09 W	GPS	302			
58LA1504	063	01	ROS/CTD	100604	0305	BO	74 29.95 N	14 59.96 W	GPS	303	294	8	
58LA1504	063	01	ROS/CTD	100604	0313	EN	74 29.97 N	15 00.07 W	GPS	303			
58LA1504	064	01	ROS/CTD	100604	0352	BE	74 30.00 N	14 39.90 W	GPS	263			
58LA1504	064	01	ROS/CTD	100604	0358	BO	74 29.96 N	14 39.96 W	GPS	261	256	7	
58LA1504	064	01	ROS/CTD	100604	0404	EN	74 29.88 N	14 39.84 W	GPS	264			
58LA1504	065	01	ROS/CTD	100604	0442	BE	74 30.00 N	14 20.01 W	GPS	227			
58LA1504	065	01	ROS/CTD	100604	0447	BO	74 29.96 N	14 19.84 W	GPS	231	223	8	
58LA1504	065	01	ROS/CTD	100604	0454	EN	74 29.88 N	14 19.76 W	GPS	227			
58LA1504	066	01	ROS/CTD	100604	0535	BE	74 29.98 N	13 59.97 W	GPS	895			
58LA1504	066	01	ROS/CTD	100604	0553	BO	74 29.82 N	13 59.59 W	GPS	914	901	9	
58LA1504	066	01	ROS/CTD	100604	0610	EN	74 29.72 N	13 59.12 W	GPS	936			
58LA1504	067	01	ROS/CTD	100604	0649	BE	74 29.92 N	13 40.21 W	GPS	1680			
58LA1504	067	01	ROS/CTD	100604	0719	BO	74 29.52 N	13 41.08 W	GPS	1666	1681	9	
58LA1504	067	01	ROS/CTD	100604	0745	EN	74 29.11 N	13 41.14 W	GPS	1667			
58LA1504	068	01	ROS/CTD	100604	0843	BE	74 29.95 N	13 19.95 W	GPS	2154			
58LA1504	068	01	ROS/CTD	100604	0925	BO	74 29.31 N	13 21.20 W	GPS	2149	2169	10	
58LA1504	068	01	ROS/CTD	100604	1006	EN	74 28.72 N	13 22.77 W	GPS	2133			
58LA1504	069	01	ROS/CTD	100604	1056	BE	74 29.93 N	13 00.02 W	GPS	2419			
58LA1504	069	01	ROS/CTD	100604	1142	BO	74 29.67 N	13 00.83 W	GPS	2420	2450	10	
58LA1504	069	01	ROS/CTD	100604	1228	EN	74 29.30 N	13 00.72 W	GPS	2428			
58LA1504	070	01	ROS/CTD	100604	1307	BE	74 29.99 N	12 39.99 W	GPS	2570			
58LA1504	070	01	ROS/CTD	100604	1358	BO	74 29.89 N	12 41.22 W	GPS	2564	2602	9	
58LA1504	070	01	ROS/CTD	100604	1446	EN	74 29.58 N	12 43.27 W	GPS	2552			
58LA1504	071	01	ROS/CTD	100604	1531	BE	74 29.98 N	12 19.95 W	GPS	2734			
58LA1504	071	01	ROS/CTD	100604	1623	BO	74 29.83 N	12 21.23 W	GPS	2726	2774	9	
58LA1504	071	01	ROS/CTD	100604	1706	EN	74 29.63 N	12 23.40 W	GPS	2717			
58LA1504	072	01	ROS/CTD	100604	1749	BE	74 29.98 N	11 59.96 W	GPS	2862			
58LA1504	072	01	ROS/CTD	100604	1841	BO	74 29.88 N	12 00.34 W	GPS	2860	2907	10	
58LA1504	072	01	ROS/CTD	100604	1930	EN	74 29.84 N	11 59.85 W	GPS	2866			
58LA1504	072	02	ROS/CTD	100604	1943	BE	74 29.68 N	11 59.67 W	GPS	2867	152		Calibration of MICROCATS
58LA1504	072	02	ROS/CTD	100604	2015	EN	74 29.90 N	11 59.15 W	GPS	2869			
58LA1504	073	01	ROS/CTD	100604	2110	BE	74 29.95 N	11 30.01 W	GPS	2977			
58LA1504	073	01	ROS/CTD	100604	2200	BO	74 30.20 N	11 28.95 W	GPS	2979	3028	10	
58LA1504	073	01	ROS/CTD	100604	2250	EN	74 30.39 N	11 27.59 W	GPS	2983			
58LA1504	074	01	ROS/CTD	100604	2342	BE	74 29.95 N	10 59.88 W	GPS	3056			
58LA1504	074	01	ROS/CTD	100704	0040	BO	74 30.36 N	10 58.49 W	GPS	3057	3109	9	
58LA1504	074	01	ROS/CTD	100704	0135	EN	74 30.75 N	10 57.55 W	GPS	3060			
58LA1504	075	01	ROS/CTD	100704	0226	BE	74 30.10 N	10 29.94 W	GPS	3116			
58LA1504	075	01	ROS/CTD	100704	0321	BO	74 30.78 N	10 28.77 W	GPS	3118	3171	10	
58LA1504	075	01	ROS/CTD	100704	0414	EN	74 31.53 N	10 27.44 W	GPS	3122			
58LA1504	076	01	ROS/CTD	100704	0508	BE	74 30.03 N	10 00.04 W	GPS	3172			
58LA1504	076	01	ROS/CTD	100704	0609	BO	74 30.68 N	09 58.00 W	GPS	3178	3236	8	
58LA1504	076	01	ROS/CTD	100704	0705	EN	74 31.01 N	09 55.27 W	GPS	3181			
58LA1504	077	01	ROS/CTD	100704	1911	BE	74 59.86 N	02 17.66 W	GPS				no Echosounder
58LA1504	077	01	ROS/CTD	100704	2023	BO	74 59.19 N	02 16.88 W	GPS		3685	10	
58LA1504	077	01	ROS/CTD	100704	2128	EN	74 58.74 N	02 16.09 W	GPS				
58LA1504	077	02	FLOAT	100704	2145	DE	74 59.97 N	02 17.40 W	GPS				APEX Float No.1736
58LA1504	078	01	ROS/CTD	100804	0049	BE	75 19.93 N	00 59.56 W	GPS				no Echosounder
58LA1504	078	01	ROS/CTD	100804	0156	BO	75 19.48 N	00 58.31 W	GPS		3755	7	
58LA1504	078	01	ROS/CTD	100804	0259	EN	75 18.89 N	00 56.60 W	GPS				
58LA1504	078	02	FLOAT	100804	0318	DE	75 19.98 N	00 59.86 W	GPS				APEX Float No.1737
58LA1504	079	01	ROS/CTD	100804	0517	BE	74 59.99 N	00 59.89 W	GPS				no Echosounder
58LA1504	079	01	ROS/CTD	100804	0618	BO	74 59.40 N	00 59.58 W	GPS		3580	10	
58LA1504	079	01	ROS/CTD	100804	0715	EN	74 58.88 N	01 00.07 W	GPS				
58LA1504	079	02	FLOAT	100804	0739	DE	74 59.95 N	01 00.07 W	GPS				APEX Float No.1738
58LA1504	080	01	ROS/CTD	100804	0943	BE	75 00.03 N	00 17.45 E	GPS				no Echosounder
58LA1504	080	01	ROS/CTD	100804	1052	BO	74 59.50 N	00 18.46 E	GPS		3734	54	near end of cable
58LA1504	080	01	ROS/CTD	100804	1154	EN	74 59.00 N	00 19.07 E	GPS				
58LA1504	080	02	FLOAT	100804	1210	DE	75 00.08 N	00 17.67 E	GPS				APEX Float No.1739
58LA1504	081	01	ROS/CTD	100804	1500	BE	74 39.97 N	00 59.95 W	GPS				no Echosounder
58LA1504	081	01	ROS/CTD	100804	1605	BO	74 39.34 N	01 00.19 W	GPS		3537		
58LA1504	081	01	ROS/CTD	100804	1705	EN	74 38.65 N	01 00.33 W	GPS				
58LA1504	081	02	FLOAT	100804	1718	DE	74 39.97 N	00 59.91 W	GPS				APEX Float No.1740