INSTITUTE OF MARINE RESEARCH
BERGEN, NORWAY

CRUISE REPORT

CRUISE NUMBER: JH1997207

VESSEL: R/V "JOHAN HJORT"

DEPARTURE: Bergen, Norway on 24th April 1997

ARRIVAL: Bergen, Norway on 26th May 1997

PORT OF CALL: Tromsø, Norway on 9th May 1997

PARTICIPANTS:

Name	Affiliation	Responsability
Leg 1 (April 24 to May 8)		
Francisco Rey	Institute of Marine Research, Bergen	Chief scientist
Johan Blindheim	Institute of Marine Research, Bergen	Hydrography
Oddvar Brønstad	Institute of Marine Research, Bergen	Hydrography
Jane Strømstad	Institute of Marine Research, Bergen	Nutrients, oxygen
Jorunn Træland	Institute of Marine Research, Bergen	Technician, sampling
Magnar Mjanger	Institute of Marine Research, Bergen	Instrument chief
Erling Molvær	Institute of Marine Research, Bergen	Instrument operator
Espen Olsen	Univ. of Oslo, Norway	Nitrogen uptake
Liv-Marit Hansen	Univ. of Oslo, Norway	Phytoplankton
Craig Neill	Brookhaven National Laboratory, USA	CFC
Fred Menzia	NOAA-PME , USA	CFC
Melissa Chierici	Univ. of Gøteborg, Sweden	CO_2
Agneta Fransson	Univ. of Gøteborg, Sweden	CO_2
Anders Olson	Univ. of Gøteborg, Sweden	SF_6
Toste Tanhua	Univ. of Gøteborg, Sweden	SF_6

Leg 2 (May 9 to May 26)

Francisco Rey	Institute of Marine Research, Bergen	Chief scientist
Thomas Noji	Institute of Marine Research, Bergen	Sediment traps
Jane Strømstad	Institute of Marine Research, Bergen	Nutrients, oxygen
Julio Erices	Institute of Marine Research, Bergen	Technician, sampling
Svein Lygren	Institute of Marine Research, Bergen	Data treatment
Magnar Mjanger	Institute of Marine Research, Bergen	Instrument chief
Erling Molvær	Institute of Marine Research, Bergen	Instrument operator
Craig Neill	Brookhaven National Laboratory, USA	CFC
Fred Menzia	NOAA-PME , USA	CFC
Melissa Chierici	Univ. of Gøteborg, Sweden	CO_2
Agneta Fransson	Univ. of Gøteborg, Sweden	CO_2
Anders Olson	Univ. of Gøteborg, Sweden	SF_6
Toste Tanhua	Univ. of Gøteborg, Sweden	SF_6
Kim Van Scoy	Univ. of Wisconsin, USA	SF_6
David Cooper	Univ. of Wisconsin, USA	SF_6
Marie-Jose Messias	Univ. of East Anglia, UK	SF_6
Fiona Carse	Univ. of East Anglia, UK	SF_6
Conrad Cooper	Univ. of Bergen, Norway	Underway CO_2

SCIENTIFIC OBJECTIVES

The cruise had several major objectives:

1) To carry out physical, chemical and biological investigations in the Greenland Sea and northern Norwegian Sea in connection with the following research projects:

• "Mixed layer dynamics, nutrient supply and primary production in the Nordic Seas". The project is supported by a grant from the Norwegian Research Council and is part of IMR´s research program "Mare Cognitum". (Legs 1 & 2)

• " Biogenic carbon production in the upper layers of the Greenland Sea as a function of vertical nutrient fluxes". The project is supported by a grant from the European Commission through its MAST-III program MAS3-CT95-0015 " European Subpolar Ocean Programme-2: Thermohaline circulation in the Greenland Sea" and it is also part of IMR´s research program "Mare Cognitum". (Legs 1 & 2)

• "New production in the Norwegian Sea". The project is supported by a grant from the Norwegian Research Council to the Biological Institute, Department of Marine Botany, University of Oslo. (Leg 1). The work being carried out under this project is in cooperation with IMR.

2) To map the distribution of the tracer sulfur hexafluoride released in September 1996 in the central Greenland Sea . This work is one of the main components of the " European Subpolar Ocean Programme-2: Thermohaline circulation in the Greenland Sea" financially supported by the European Union (MAS3-CT95-0015) (Leg 2 and partially Leg 1)

3) To carry out studies on the inorganic carbon system in the Greenland Sea. This work is also a main component of the " European Subpolar Ocean Programme-2: Thermohaline circulation in the Greenland Sea" financially supported by the European Union (MAS3-CT95-0015) (Legs 1 & 2)

3) To carry out hydrographical and chemical oceanographical observations at the standard Norwegian sections Svinøy-NW and Bear Island-W as part of the Nordic WOCE program and IMR`s own monitoring activities. (Leg 1)

4) To carry out hydrographic and biological observations at the Norwegian standard sections Gimsøy-NW and Fugløya-NW as part of IMR´s ocean monitoring program. (Legs 1 & 2)

5) To collect samples for chlorofluorcarbons (CFC) and transient tracers at selected stations in the Norwegian and Greenland Seas as part of a routine cooperative observation program between IMR and Brookhaven National Laboratory, USA.(Legs 1 & 2)

CRUISE TRACK

Figure 1 shows the cruise track and the positions of the stations where sampling was carried out. The western limits of the cruise track were extended until the ice edge at all east-west sections taken during Leg 2.

SAMPLING METHODOLOGY

HYDROGRAPHY

The hydrographic work was carried out with two independent CTD-water sampling packages from SeaBird Inc. with data being collected both during up- and downcast. The first package consisted of a SBE 911plus CTD with a 12 position SBE 32 Caroussel (CTD-12) equipped with 10 liter Niskin bottles and was used preferentially for deep water work and SF6 tracer sampling. The other package consisted of a SBE 19 Seacat with a 24 position SBE 32 Caroussel (CTD-24) equipped with 23 pcs. 2.5 liters Niskin water samplers and was used for shallow water work. In the remaining place of the 24 positions Caroussel, a Biospherical QSP-200L irradiance meter was mounted. A SeaTech fluorometer was also attached to the system. Both the irradiance meter and the fluorometer were coupled to the SBE 19 for powering and data transmission. At all stations water samples were collected from the deepest sampling level from

both CTD packs for calibration of the conductivity sensors.

During the first leg salinity samples were drawn at all sampling levels at the sections Svinøy-NW and Bear Island-W.

CHEMISTRY

• Oxygen

Oxygen concentration was measured using the Winkler method with visual determination of the titration end-point. Titration was done on whole samples (about 120 ml) using a 1 ml automatic burette (Metrohn) with a dispensing precision of 0.001 ml. Calibration of the thiosulfate (about 0.1 N) was as done on each run. The reproducibility of the method estimated as the standard deviation of ten replicates drawn from one 10 l Niskin bottle was ± 0.010 ml l^{-1} at an oxygen concentration of about 7 ml l^{-1}. Sampling procedures, reagents preparation and analyses were done following WOCE recommendations as stated in Culberson (1991). Conversion of volumetric to weight concentrations were done as recommended by WOCE using potential temperature from the CTD bottle file

• Nutrients

• Sampling and analysis procedure for nitrate, nitrite, phosphate and silicic acid.

Seawater samples were collected just after the sampling for trace gases and oxygen. After rinsing three times, samples were drawn into 15 ml high-density polyethylene test tubes with pressure caps and kept dark and refrigerated at 4 °C without preservative. All samples were analyzed within 24 hours after sampling. Tests done for effects of the delay in analysis showed variations for all nutrients not significantly different to the precision obtained for each parameter.

The nutrient analyses were performed using a system build up by the following items:

- Pump system from Ismatec, Switzerland.
- Reaction units of own fabrication
- Autosampling , detection and computing units from SAN^{plus} Segmented Flow Analyzer, Skalar Analytical B.V., The Netherlands.

The methods used were adaptations of standard methods (Strickland and Parsons, 1972) slightly modified to the autoanalyzer system (Føyn et al., 1981). The precision for the different analyses (ten samples drawn from the same Niskin sampler) at full scale was less than 0.2% for nitrite, nitrate and silicic acid and less than 2 % for phosphate. The reproducibility during the whole cruise, tested by analyzing a control solution during each run, was less than 1% for nitrite, nitrate and silicic acid and less than 3% for phosphate.

• Sampling and analysis procedure for ammonia.

Seawater samples were collected directly into the analyses flasks, usually in relation to the ^{15}N uptake experiments. The analysis was done manually following the method described by Solorzano (1969). Samples were collected only in relation to the ^{15}N uptake experiments.

• **Chlorofluorocarbons. CFC-11, CFC-12, CFC-113, CH3CCL3, and CCl4** (Craig Neill and Fred Menzia)

Sample Collection

All samples were collected using 10 liter water sampling bottles. Aliquots of seawater were transfered to 100 cm^3 precision ground-glass syringes for the CFC analysis. All the 12 bottles in use remained on the frame in the water sampling room between stations. None of them showed a CFC contamination problem during the cruise.

Equipment and Technique

Chlorofluorocarbons CFC-11, CFC-12 , CFC-113, CH3CCl3 and CCl4 were measured at most stations. The analytical technique is described in Wallace et. al. (1994) and more completely in Happell et. al. (1996). Trapping was achieved using a length of 1/8 in. o.d. ss tubing packed with Porapak N cooled to -20 C. Subsequent desorption was done by electrically heating the trap to 125 C and injecting the contents of the trap onto a megabore DB-624 precolum and column housed in a Varian ECD-GC. Water samples for analysis were drawn first from the bottles and then stored under clean sea water. The analysis was usually completed within 12 hours of the samples coming on board. Air samples were run periodically from an air intake high up on the foremast. Air was pumped from this location through a length of Dekoron tubing.

Calibration

Calibration curves used for determining CFC concentrations in air and water samples are generated by injections of known volumes of standard gas. The calibration curves spaned the range of CFC levels in the air and water analyses. The standard was contained in a Scott Aculife cylinder as recommended in WHPO 91-1. The gas standard was prepared and calibrated at Brookhaven National Laboratory using methods described in Happell and Wallace (in press).

• **Transient tracers** (Craig Neill and Fred Menzia)

Samples for Helium and Tritium were collected following closely the recomendations given by WOCE (Bullister, 1991; Jenkins et al., 1991). All samples will be analyzed ashore.

• **SF_6 tracer** (Tostue Tanhua and Anders Olson)

The analytical system is a vacuum sparge system coupled to packed column gas chromatography (GC) with detection by electron capture detector (ECD). The analytical system used a 350 ml purge chamber and a flow rate of pure nitrogen gas at 200 ml min-1 as purge gas. The SF_6 were trapped on 30 cm long 1/16" trap packed with Carboxen 1000, 45/60 mesh (Supelco). The trap was held at -10°C during the trapping step, and were then rapidly heated to approximately 200°C during the desorption step. The main analytical column was kept at ambient temperature and consisted of a 4 metre long 1/8" stainless steel tube packed with molecular sieve 5A. For further details on the analytical system see Tanhua (1997).

During the cruise several duplicate samples were run and on some occasions up to four samples from the same Niskin bottle. These tests revealed a sample to sample precision of 0.3 %. The limit of detection was estimated to 0.2 fmol L-1. Standard curves were made from multiple injections of two standards with different concentrations to produce a nine point calibration curve, which were fitted to a polynomial function of the third degree. Standard injections to control the response of the detector were performed regularly during the entire cruise.

• **Carbonate system** (Melissa Chierici and Agnetha Franson)

The carbonate system was determined by analysing water samples from the rosette for total alkalinity, AT, total dissolved inorganic carbon, CT, and the total hydrogen ion concentration, pH. These parameters are defined as

$CT = [CO_2] + [H_2CO_3] + [HCO_3^-] + [CO_3^{2-}]$
$AT = [HCO_3^-] + 2[CO_3^{2-}] + [B(OH)_4^-]$
$pH = -\log[H^+]$

From two of these parameters any species of the carbonate system can be calculated. Measurements of CT was performed by extraction of carbon dioxide gas from an acidified seawater sample using nitrogen gas. The extracted CO_2 was then coulometrically titrated. AT was measured by potentiometric titration and pH was spectrophotometrically determined using the indicator m-cresolpurple. AT is mainly affected by formation and dissolution of metal carbonates, while CT and pH is affected by air-sea exchange of CO_2 and by photosynthesis and microbial decay of organic matter as well.
During the cruise 64 stations (~1100 samples) were analysed for AT and pH, while 59 stations (~1000 samples) were analysed for CT.

• **Stable Isotope geochemistry and underway fCO2** (Conrad Cooper)

The fCO2 measurements were made using a prototype developed by David Cooper, Andrew Watson and co-workers at Plymouth Marine Laboratories. The precision of the system is +/- 0.5-1.5 µatm. The system is calibrated using three different internal standard gases with values of 200, 360, and 400 µatm to cover the natural range of fCO2 in the Greenland Sea.

Samples were also collected for analysis of $\partial^{13}C$ and $\partial^{18}O$. They were collected along two transects; one at 2° West and another at 75° North. They will be analyzed at the GMS-laboratory at University of Bergen on a Finnigan, Delta E mass-spectrometer.

BIOLOGY

• **Water sampling.** Samples for biological analyses were obtained either from the Niskin bottles on the caroussels or from a 30 liter Goflow water sampler lowered to discrete depths.

• **Biomass (BIOM)**

• **Chlorophyll**

Samples for chlorophyll analyses were collected in 263 ml plastic bottles and filtered through glassfiber type F filters. The filters were inmediately frozen and kept until their analyses ashore. In the laboratory the pigments were extracted during overnitgh with 90% acetone at 4°C and in the dark. Thereafter the extracts were centrifuged at 500 g and measured fluorometrically with a Turner Designs AU-10 filter fluorometer both before and after the addition of 5% v/v hydrochloric acid.The fluorometer was calibrated against commercial chlorophyll *a* (Sigma Inc.).

• **Particulate organic carbon and nitrogen.**

Samples were collected in 529 ml plastic bottles and filtered through pre-combusted glassfiber filters of type F. The filters were frozen inmediately after filtration and will be analyzed in the laboratory ashore using a Carlo Erba model 106 Elemental analyzer.

• **Particulate biogenic silica.**

Water samples were collected in 529 ml plastic bottles and filtered through polycarbonate filters with 0.6 μm pore size. The filters were then inmediately frozen and will be analyzed ashore.

• **Phytoplankton taxonomy**

Samples for quantitative analysis of phytoplankton were drawn from the Niskin bottles into 100 ml brown glass bottles and glutaraldehyde was added for conservation. Samples for qualitative analysis were collected by towing a 20 μm mesh size phytoplankton net for 10 minutes at 2 knots at the end of selected stations. A part of these samples was preserved with glutaraldehyde or formaldehyde for later observation and another part was observed alive in a light/epifluorescent microscope for determination of main components of phytoplankton.

• Primary productivity

• Radioactive carbon uptake (14C)

Uptake of radioactive carbon by phytoplankton was done by means of two incubation schemes. The first with a P vs E incubator equipped with a metal halide daylight lamp (OSRAM HQI-T 400/DH) providing 16 different irradiances from 0 to about 700 μmol m^{-2} s^{-1} by means of neutral filters. The incubator was cooled with subsurface seawater from the ship´s water intake. Samples aliquots from a 500 ml sample collected in a dark glass bottle were used to rinse the 25 ml incubation glass bottles. These had previously been thouroghly washed with diluted hydrochloric acid and rinsed three times with distilled water. To the remaining water sample 40 μCi $Na_2H^{14}CO_3$ was added . After thourogh mixing 20 ml of radioactive sample were dispensed on each of the 16 incubation bottles and placed inmediately in the incubator. A 200 μl aliquot, in triplicate, was also dispensed into 1 ml of phenethylamine in order to determine the actual activity in the sample. Incubation time lasted about 2 hours. After incubation the samples were inmediately filtered through membrane filters of 0.45 μm pore size and frozen for later analysis ashore. This scheme was applied to samples from four depths, usually above, at and below the pycnocline, from selected stations. The second scheme was based on incubations on a simulated *in situ* incubator with nine light levels between 100% and 1% of the surface light field. The filters used in the incubator were combinations of blue and neutral plastic sheet filters. The incubations lasted for 24 hours. After incubation the samples were inmediately filtered through membrane filters of 0.45 μm pore size and frozen for later analysis ashore. For all incubations comercially available radioactive carbon was used (DuPont NEN Sodium bicarbonate NEC-086S, 20 μCi)

• DCMU measurements

The variable chlorophyll *in vivo* fluorescence of phytoplankton, obtained by measuring chlorophyll fluorescence before and after the addition of DCMU, a blocking agent for electron transport in the photosynthesis process, provides an index of the photosynthetic activity of phytoplankton. The measurements were done on discrete samples drawn from the Niskin bottles with a Turner Designs 10000-R filter fluorometer after preconditioning of the samples in the dark for about 30 minutes.

• *In situ* phytoplankton photosynthesis

In situ phytoplankton photosynthetic rate was estimated by means of a PNF-300 Profiling Natural Fluorometer (Biospherical Instruments Inc., USA) . In addition the instrument records depth profiles of irradiance, natural fluorescence, cholorophyll concentration and temperature. Profiles were usually acquired to a depth of 75 meters at the same time as the cast with the SBE 19 CTD

• ^{15}N uptake (15N).

Uptake of different nitrogen forms (nitrate, ammonia and urea) was done by injecting the

samples with non radioactive isotopes and incubating them at different natural daylight intensities on a deck incubator cooled by running seawater (Kristiansen and Paasche 1989). The samples were immediately frozen and will be analyzed ashore.

• Dissolved organic carbon (DOC)

Samples for DOC analysis were collected at a few selected stations. The DOC concentration will be measured ashore using high temperature catalytic oxidation (HTOC).

• Zooplankton

Samples for zooplankton biomass and species composition were obtained by vertical tows at selected depth intervals by means of a 56 cm opening WP-2 plankton net with a 180 µm mesh size. The samples were split into two, one part being preserved with formaldehyde for later determination of species composition. The other part was passed through three different meshsize nets, 2000, 1000 and 180 µm, and the fractions collected into preweighted aluminium containers, dried at 60 ° C and then frozen, for later determination of dried weight ashore. For grazing studies zooplankton specimens were collected with a 90 cm opening plankton net. The grazing rates were estimated using a method based on the production of fecal pellets.

UNDERWAY MEASUREMENTS

Chlorophyll *in vivo* fluorescence (WebStar Mini fluorometer), temperature and salinity (SBE 21 Thermosalinograph, Seabird Inc.) were continously monitored on water from the ship´s water intake at 5 meters depth. Incoming irradiance (Li-Cor PAR cosine sensor) was continously logged during the whole cruise.

SEDIMENTATION

• Drifting trap experiment.

During Leg 1, on the 2nd of May at location 74°35´N, 000° 07´E, a drifting buoy with a sediment trap (Aquatec GmbH, 0.5 m2 , 21 samples) placed at 70 meter depth, well below the pycnocline, was deployed. The rig was connected to an ARGOS satellite buoy and left to drift freely. The rig was later recovered during Leg 2 on May 14 at position 74° 39´N ; 003° 50´E. Unfortunately the sampling system did not work, so no samples were obtained.

SUMMARY OF STATION WORK

Table 1 shows an overview of the work carried out at each oceanographic station. Fig. 1 shows the cruise track and stations positions.

PRELIMINARY RESULTS

The vertical distribution of salinity at the Svinøy-NW section is shown in Fig. 2. Close to the Norwegian coast and extending out to about 50 nautical miles from the coast , the upper 100 meters were dominated by low salinity waters (< 35 PSU) from the Norwegian Coastal Current. The North Atlantic water (> 35 PSU) was found in the upper 300-400 meters and spread out about 90 nm from the front towards the Norwegian Coastal Current. The rest of the section was characterized by water masses with salinities below 35 PSU, most probably originating from the East Icelandic Current. This is most conspicuous in the western end of the section, above the Icelandic Plateau. Figs. 3 and 4 show the vertical distribution of nitrate and silicic acid, respectively. Along most of the central part of the section, both nutrients showed high, typical winter values indicating that the phytoplankton spring bloom had not yet occurred. On both ends on the section nutrients, and special silicic acid, were much lower suggesting that a spring bloom of diatoms had taken place in those areas. This was confirmed by microscopical observations done onboard and by chlorophyll a values (not shown). These areas coincide also with the areas characterized by a large vertical gradient of salinity in the upper 100 meters.

Fig. 5 shows the vertical distribution of salinity across the central part of the Greenland Sea along 74°30`N during Leg 1. The depth of the vertical winter mixing in this area was about 1200 to 1300 meters as revealed by the salinity gradient and also confirmed by the temperature vertical distribution (not shown). The same conditions were found in most of the area during the more detailed cover carried out during Leg 2 . However at one particular site (Station 422 at 75°N; 0°E) a deeper mixing was observed extending down to about 2000 meter. Fairly homogeneous vertical distribution of several parameters from about 200 to 1900 meters but with fairly strong gradients in the upper 200 meters suggests that this vertical mixing was constricted to intermediate waters. Figs. 6 to 10 shows the vertical distribution of salinity, potential temperature, dissolved oxygen. nitrate and silicic acid along the 75°N transect. Tracer distributions showed also the same pattern. Extra coverage of this site at the end of the cruise (Stations 442-445) showed that this pattern was maintained for at least four days and was about 10 to 15 nm in diameter. The mechanisms behind this mixing are not yet quite clear.

The biological conditions during Leg 2 in the Central Greenland Sea were typical of a late winter situation with high nutrient concentrations and small phytoplankton and zooplankton biomass over the whole area. Only in those regions where the presence of melt water was clear, slight decreases in nutrient concentrations indicated that the biological growth season had only recently started.

REFERENCES

Bullister, J.(1991) Chlorofluorcarbons, ^{3}He-Tritium and small volume radiocarbon. In: WOCE Operations Manual. Vol.3, Section 3.1, Part 3.1.3: WHP Operations and Methods. WOCE Report No. 68/91, Woods Hole.

Cooper D.J., A.J. Watson, R.D. Ling, P.A. Goy, and J. Wood. Automated measurements of oceanic pCO2 using IR detection, Submitted to Marine Chemistry.

Culberson, C.H. (1991) Dissolved oxygen. In: WOCE Operations Manual. Vol.3, Section 3.1, Part 3.1.3: WHP Operations and Methods. WOCE Report No. 68/91, Woods Hole.

Føyn, L., M. Magnussen and K. Seglem (1981). Automatic analysis of nutrients with an on-line dataprocessing. A presentation of the building and functioning of the system used at the Institute of Marine Research. Fisken Hav., Serie B, 1981 (4) : 1-39.(In Norwegian).

Happell, J. and D. W. R. Wallace Gravimetric preparation of gas phase standards containing halogenated compounds for oceanographic applications. Deep-Sea Research, in press.

Happell, J. D., D. W. R. Wallace, K. D. Wills, R. J. Wilke, and C. C. Neill (1996) A purge-and-trap capillary gas chromatographic method for the measurement of halocarbons in water and air. Brookhaven National laboratory Informal Report, No. 63227 (19pp).

Jenkins, W.J., D.E. Lott, M.W. Davis, S.P. Birdwhistell, and M.O. Matthewson (1991). Measuring Helium isotopes and Tritium in seawater samples. In: WOCE Operations Manual..Vol.3, Section 3.1, Part 3.1.3: WHP Operations and Methods. WOCE Report No. 68/91, Woods Hole.

Kristiansen, S. and E. Paasche (1989). An improved method for determining relative ^{15}N abundance in ammonium regeneration studies by direct difussion. Mar. Ecol. Prog. Ser. 54:203-207.

Solorzano, L. (1969). A method for the determination of ammonia in seaweater. Limnol. Oceanogr. 14:799-801.

Strickland, J.D.H. and T.R. Parsons (1972) A practical handbook of seawater analysys. Bull. Fish. Res. Bd. Canada. 167: 1-311.

Tréguer et al. (1991). Production of biogenic silica in the Weddell-Scotia Seas measured with ^{32}Si. Limnol. Oceanogr. 36(6):1217-1227.

Wallace, D. W. R., A. Putzka and P. Beining (1994) Carbon Tetrachloride and chloroflourocarbons in the South Atlantic Ocean . J. Geophys. Res., 99(C4), 7803-7819.

WHPO (1991) WOCE Operations Manual. WHP Office Report WHPO 91-1 WOCE Report No. 68/91. Woods Hole Mass, USA.

Bergen, December 12, 1997

Francisco Rey
Chief Scientist

TABLE 1. OVERVIEW OF THE STATION WORK

ABREVIATIONS

CTD-12	SeaBird 911+ CTD with SBE 32 Caroussel with 12 * 10 liters Niskin bottles.
CTD-24	SeaBird 19 CTD with SBE 32 Caroussel with 24* 2,5 liters Niskin bottles.
GOFLOW	General Oceanics 10 liters Go-Flow sampling bottle
WP-2	Zooplankton Net, 58 cm opening, 180 µm mesh size.
NET-90	Zooplankton Net, 90 cm opening, 180 µm mesh size, closed end.
PHYTONET	Phytoplankton Net, 20 cm opening, 5 µm mesh size.
PNF-300	Biospherical Profiling Natural Fluorometer PNF-300
BOTTOM	Bottom depth determined acoustically with Simrad EK-500, 18 kHz.
WIND Dir	Wind direction in 10 degrees intervals (34=340 °)
WIND Speed	In knots
AIR Temp	Air temperature in degrees Celsius
W	Weather meteorological code
C	Cloudiness meteorological code
SEA	State of the sea; meteorological code
ICE	Presence of ice; meteorological code
NS	Water sampling for nutrient analyses
BIOM	Water sampling for phytoplankton biomass
14C	Productivity experiments
O2	Water sampling for oxygen analyses
CFC	Water sampling for chlorofluorocarbons
SF6	Water sampling for tracer Hexafluorosulfur
CO2	Water sampling for inorganic carbon system
SALT	Water sampling for salinity analyses

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
311	CTD-12	62	21.41	N	4	39.6	E	25-04-97	17:29	154	29	10	3.4	2	9	3	0	11-143	x	x		x	x			
311	WP-2	62	21.41	N	4	39.6	E	25-04-97	17:29	154	29	10	3.4	2	9	3	0	150-0								
312	CTD-12	62	29.08	N	4	24.9	E	25-04-97	19:01	188	25	11	2.6	2	6	3	0	10-177	x	x		x				
312	WP-2	62	29.08	N	4	24.9	E	25-04-97	19:01	188	25	11	2.6	2	6	3	0	180-0								
313	CTD-12	62	36.3	N	4	10.8	E	25-04-97	20:45	180	32	4	3	2	6	3	0	10-171	x	x		x				
313	WP-2	62	36.3	N	4	10.8	E	25-04-97	20:45	180	32	4	3	2	6	3	0	170-0								
314	CTD-12	62	43.62	N	3	58.5	E	25-04-97	22:23	435	29	9	3.3	2	6	3	0	12-401	x	x		x	x	x		x
314	WP-2	62	43.62	N	3	58.5	E	25-04-97	22:23	435	29	9	3.3	2	6	3	0	200-0								
315	CTD-12	62	51.84	N	3	43.6	E	26-04-97	00:17	749	30	12	3	2	6	3	0	10-731	x			x	x	x		x
315	WP-2	62	51.84	N	3	43.6	E	26-04-97	00:17	749	30	12	3	2	6	3	0	200-0								
316	CTD-12	62	59.68	N	3	26.3	E	26-04-97	02:29	853	24	12	4	2	6	3	0	11-831	x			x		x	x	x
316	WP-2	62	59.68	N	3	26.3	E	26-04-97	02:29	853	24	12	4	2	6	3	0	200-0								
317	CTD-12	63	16.04	N	2	44.9	E	26-04-97	05:51	1095	25	20	4	2	6	3	0	11-1077	x	x		x	x	x		x
317	PNF-300	63	16.04	N	2	44.9	E	26-04-97	05:55	1095	25	20	4	2	6	3	0	0-75								
317	GOFLOW	63	16.04	N	2	44.9	E	26-04-97	06:11	1095	25	20	4	2	6	3	0	10		x						
317	WP-2	63	16.04	N	2	44.9	E	26-04-97	06:21	1095	25	20	4	2	6	3	0	200-0								
8317	CTD-24	63	15.45	N	2	44.2	E	26-04-97	06:36	1093	25	20	4.3	2	6	3	0	5-300	x	x	x					
317	PHYTONET	63	15.45	N	2	44.2	E	26-04-97	06:51	1093	25	20	4	2	6	3	0	0		x						
318	CTD-12	63	31.92	N	2	2.39	E	26-04-97	11:02	1401	21	13	5	2	6	3	0	29-1352	x			x	x	x	x	x
318	WP-2	63	31.92	N	2	2.39	E	26-04-97	11:02	1401	21	13	5	2	6	3	0	200-0								
319	CTD-12	63	47.85	N	1	15.8	E	26-04-97	15:07	2097	26	9	5	2	6	3	0	10.-2001	x	x		x		x		x
319	WP-2	63	47.85	N	1	15.8	E	26-04-97	15:07	2097	26	9	5	2	6	3	0	200-0								
319	PHYTONET	63	47.85	N	1	15.8	E	26-04-97	16:15	2097	26	9	5	2	6	3	0	0		x						
320	CTD-12	64	2.95	N	0	31.8	E	26-04-97	19:13	2385	23	14	4	2	6	3	0	10-2350	x	x		x	x	x	x	x
320	WP-2	64	2.95	N	0	31.8	E	26-04-97	19:13	2385	23	14	4	2	6	3	0	200-0								
320	PHYTONET	64	2.95	N	0	31.8	E	26-04-97	20:35	2385	23	14	4	2	6	3	0	0		x						

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
321	CTD-12	64	17.95	N	0	10.6	W	26-04-97	23:21	2570	24	9	4	2	6	3	0	9-2502	x			x	x	x		x
321	WP-2	64	17.95	N	0	10.6	W	26-04-97	23:21	2570	24	9	4	2	6	3	0	200-0								
322	CTD-12	64	32.9	N	0	57.8	W	27-04-97	03:28	2775	23	5	4	2	6	3	0	12-2702	x	x		x	x	x	x	x
322	WP-2	64	32.9	N	0	57.8	W	27-04-97	03:28	2775	23	5	4	2	6	3	0	200-0								
323	CTD-12	64	49.15	N	1	44.7	W	27-04-97	07:47	2968	12	7	4	2	6	3	0	11-2901	x	x		x		x		x
323	WP-2	64	49.15	N	1	44.7	W	27-04-97	07:47	2968	12	7	4	2	6	3	0	200-0								
323	PNF-300	64	49.15	N	1	44.7	W	27-04-97	08:10	2968	12	7	4	2	6	3	0	0-75								
323	GOFLOW	64	49.15	N	1	44.7	W	27-04-97	08:20	2968	12	7	4	2	6	3	0	10		x						
323	PHYTONET	64	49.15	N	1	44.7	W	27-04-97	09:25	2968	12	7	4	2	6	3	0	0		x						
324	CTD-12	65	2.89	N	2	28.6	W	27-04-97	11:52	3123	14	7	5	2	6	3	0	900-3079	x			x	x	x	x	x
5324	CTD-12	65	2.89	N	2	28.2	W	27-04-97	14:33	3122	14	7	5	2	6	3	0	10-803	x			x	x	x	x	x
325	CTD-12	65	19.08	N	3	14	W	27-04-97	17:26	2998	9	12	5	2	6	3	0	11-2949	x	x		x		x		x
325	WP-2	65	19.08	N	3	14	W	27-04-97	17:26	2998	9	12	5	2	6	3	0	200-0								
325	PHYTONET	65	19.08	N	3	14	W	27-04-97	19:12	2998	9	12	5	2	6	3	0	0		x						
326	CTD-12	65	35.17	N	4	3.08	W	27-04-97	21:34	2940	9	16	4	2	6	3	0	900-2901	x			x	x	x	x	x
5326	CTD-12	65	36.63	N	4	4.19	W	28-04-97	00:22	2896	9	16	4	2	6	3	0	10-801	x			x	x	x	x	x
327	CTD-12	65	49.93	N	4	49.7	W	28-04-97	03:01	3172	7	23	3	2	6	3	0	10-3102	x			x		x		x
328	CTD-12	66	4.12	N	5	35.1	W	28-04-97	07:04	3372	7	30	2	2	6	3	0	1000-3303	x	x		x	x	x	x	x
328	GOFLOW	66	4.12	N	5	35.1	W	28-04-97	07:04	3372	7	30	2	2	6	3	0	10		x						
5328	CTD-12	66	5.35	N	5	36.3	W	28-04-97	09:52	3370	7	30	2	2	6	3	0	10-898	x			x	x	x	x	x
328	PHYTONET	66	5.35	N	5	36.3	W	28-04-97	10:30	3372	7	30	2	2	6	3	0	0		x						
329	CTD-12	66	21.04	N	6	29.9	W	28-04-97	13:18	2911	6	25	1	2	6	3	0	9-2854	x			x		x		x
330	CTD-12	66	38.24	N	7	22.6	W	28-04-97	17:48	1993	7	22	0	2	6	3	0	9.-1953	x			x	x	x	x	x
331	CTD-12	66	54.95	N	8	14.5	W	28-04-97	21:26	1698	8	22	0	2	6	3	0	10-1651	x			x		x		x

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
331	PHYTONET	66	54.95	N	8	14.5	W	28-04-97	22:25	1698	8	22	0	2	6	3	0	0		x						
332	CTD-12	67	11.08	N	9	7.32	W	29-04-97	00:53	1487	8	14	0	2	6	3	0	8-1476	x			x	x		x	x
333	CTD-12	67	26.85	N	9	57.9	W	29-04-97	04:13	1640	12	16	0	2	6	3	0	10-1600	x	x	x	x		x	x	x
334	CTD-12	67	42.89	N	10	52.2	W	29-04-97	07:39	1815	12	20	0	2	6	3	0	9-1760	x			x	x	x	x	x
334	GOFLOW	67	42.89	N	10	52.2	W	29-04-97	07:39	1815	12	20	0	2	6	3	0	10		x						
334	PHYTONET	67	42.89	N	10	52.2	W	29-04-97	08:39	1815	12	20	0	2	6	3	0	0		x						
335	CTD-12	70	51.71	N	6	0.04	W	30-04-97	04:53	2267	13	17	0	2	6	3	0	8-2202	x				x	x		
335	PNF-300	70	51.71	N	6	0.04	W	30-04-97	04:53	2267	13	17	0	2	6	3	0	0-75								
335	GOFLOW	70	51.71	N	6	0.04	W	30-04-97	05:13	2267	13	17	0	2	6	3	0	10		x						
8335	CTD-24	70	51.51	N	5	58.1	W	30-04-97	06:18	2267	13	17	0	2	6	3	0	2-200	x	x	x					
335	PHYTONET	70	51.51	N	5	58.1	W	30-04-97	06:40	2267	13	17	0	2	6	3	0	0		x						
336	CTD-12	71	29.9	N	5	0.41	W	30-04-97	11:09	2830	12	20	0	2	6	3	0	8-2750	x				x		x	
336	GOFLOW	71	29.9	N	5	0.41	W	30-04-97	11:09	2830	12	20	0	2	6	3	0	10		x						
336	PHYTONET	71	29.9	N	5	0.41	W	30-04-97	12:49	2830	12	20	0	2	6	3	0	0		x						
337	CTD-12	72	0.21	N	4	59.8	W	30-04-97	16:07	2327	9	19	0	2	6	3	0	8-2273	x				x	x		
338	CTD-12	72	29.93	N	4	59.6	W	30-04-97	20:30	2773	8	17	-1	2	6	3	0	12-2670	x					x		
339	CTD-12	72	59.93	N	4	57.8	W	01-05-97	01:00	2802	8	20	-1	2	6	3	0	9-2754	x					x		
340	CTD-12	73	29.24	N	4	59.6	W	01-05-97	06:18	3111	6	23	-2	2	6	3	0	11-3051	x				x	x	x	
340	GOFLOW	73	29.24	N	4	59.6	W	01-05-97	06:18	3111	6	23	-2	2	6	3	0	10		x						
340	PHYTONET	73	29.24	N	4	59.6	W	01-05-97	08:05	3111	6	23	-2	2	6	3	0	0		x						
341	CTD-12	73	6.02	N	3	11.7	W	01-05-97	12:20	3103	3	23	-2	2	6	3	0	11-3003	x				x	x	x	
341	GOFLOW	73	6.02	N	3	11.7	W	01-05-97	12:20	3103	3	23	-2	2	6	3	0	10		x						
341	PHYTONET	73	6.02	N	3	11.7	W	01-05-97	14:05	3103	3	23	-2	2	6	3	0	0		x						
342	CTD-12	72	46.21	N	1	34.5	W	01-05-97	18:05	2904	2	25	-1	2	6	3	0	900-2851	x				x	x	x	

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
5342	CTD-12	72	46.23	N	1	35.3	W	01-05-97	21:15	2914	2	25	-1	2	6	3	0	11-799	x				x	x	x	
343	CTD-12	72	29.95	N	0	0.73	E	02-05-97	02:11	2381	2	0	0	9	9	9	9	10-2153	x					x		
344	CTD-12	73	0.13	N	0	0.02	W	02-05-97	13:54	2491	35	31	-2	2	2	4	1	12-2602	x				x	x		
344	GOFLOW	73	0.13	N	0	0.02	W	02-05-97	13:54	2491	35	31	-2	2	2	4	1	10		x						
345	CTD-12	73	30.3	N	0	0.68	E	02-05-97	19:41	2802	35	27	-3	2	2	4	1	799-2749	x				x	x		
5345	CTD-12	73	30.59	N	0	1.16	E	02-05-97	21:54	2829	35	27	-3	2	2	4	1	11-702	x				x			
346	CTD-12	73	59.9	N	0	0.01	E	03-05-97	01:58	3162	34	27	-4	2	2	4	1	13-3002	x					x		
8347	CTD-24	74	30.09	N	2	9.11	W	04-05-97	09:18	3240	33	28	-7	2	2	4	1	3-303	x	x	x					
347	GOFLOW	74	34.3	N	2	2.34	W	03-05-97	09:18	3520	33	28	-7	2	2	4	1	10		x						
347	CTD-12	74	33.02	N	2	2.37	W	03-05-97	10:43	3549	33	28	-7	2	2	4	1	1001-3502	x			x	x	x	x	x
5347	CTD-12	74	34.3	N	2	2.34	W	03-05-97	13:35	3520	33	28	-7	2	2	4	1	10-802	x							
347	PHYTONET	74	34.3	N	2	2.34	W	03-05-97	13:35	3520	33	28	-7	2	2	4	1	0		x						
348	CTD-12	74	34.15	N	0	25.8	W	03-05-97	16:44	3147	34	20	-7	2	2	4	1	5-3101	x				x	x	x	x
348	GOFLOW	74	34.15	N	0	25.8	W	03-05-97	16:44	3147	34	20	-7	2	2	4	1	10		x						
349	CTD-12	74	34.14	N	1	7.99	E	03-05-97	21:10	3746	34	21	-7	2	2	4	1	1000-3685	x			x	x	x	x	x
5349	CTD-12	74	35.58	N	1	5.65	E	04-05-97	00:16	3733	34	21	-7	2	2	4	1	12-904	x			x	x	x	x	x
350	CTD-12	74	34.25	N	2	38	E	04-05-97	03:25	3560	34	26	-6	2	2	3	0	11-3472	x			x		x	x	x
351	CTD-12	74	34.08	N	4	9.26	E	04-05-97	13:06	2844	4	20	-1	2	2	3	0	801-3104	x			x	x	x	x	x
5351	CTD-12	74	35.59	N	4	4.7	E	04-05-97	15:46	3245	4	20	-1	2	2	3	0	11-698	x	x		x	x	x	x	x
352	CTD-12	74	34.19	N	5	41.3	E	04-05-97	19:32	3252	5	29	-1	2	2	3	0	9-3180	x			x	x	x	x	x
353	CTD-12	74	33.24	N	7	5.17	E	05-05-97	00:23	2243	7	30	0	2	2	3	0	9.-2003	x			x	x	x	x	x
354	CTD-12	74	33.07	N	8	38.4	E	05-05-97	05:03	3280	7	36	0	2	2	3	0	601-3103	x			x	x	x	x	x
5354	CTD-12	74	33.81	N	8	38.3	E	05-05-97	08:33	3111	7	36	0	2	2	3	0	7-504	x			x	x	x		x

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
355	CTD-12	74	33.04	N	10	13.6	E	05-05-97	15:03	2460	7	32	0	2	2	3	0	10-2401	x			x	x	x	x	x
356	CTD-12	74	32.95	N	11	50.9	E	06-05-97	00:23	2364	7	35	-1	2	2	5	0	7-2301	x			x	x		x	x
357	CTD-12	74	33.09	N	13	24.6	E	06-05-97	07:09	2203	6	37	-2	2	2	5	0	11-2152	x			x	x		x	x
358	CTD-12	74	33.19	N	15	3.73	E	06-05-97	12:51	1619	5	39	-2	2	2	5	0	11-1578	x			x	x			x
359	CTD-12	74	15.06	N	19	11.2	E	06-05-97	23:05	59	8	25	1	2	2	5	0	6.-52	x	x						
360	CTD-12	74	9.96	N	19	12.5	E	07-05-97	00:35	71	9	26	2	2	2	5	0	5.-61	x	x					x	
361	CTD-12	73	59.92	N	19	13.9	E	07-05-97	01:47	139	12	25	3	2	2	5	0	7-130	x	x						
361	WP-2	73	59.92	N	19	13.9	E	07-05-97	01:57	139	12	25	3	2	2	5	0	130-0								
361	WP-2	73	59.92	N	19	13.9	E	07-05-97	02:05	139	12	25	3	2	2	5	0	100-0								
362	CTD-12	73	49.98	N	19	17.1	E	07-05-97	03:08	236	11	28	4	2	2	5	0	5-227	x	x						
363	CTD-12	73	39.9	N	19	18.4	E	07-05-97	04:28	347	11	28	4	2	2	5	0	6-335	x	x						
364	CTD-12	73	30.07	N	19	20.1	E	07-05-97	07:35	475	12	24	5	2	2	5	0	5-461	x	x						
364	WP-2	73	30.07	N	19	20.1	E	07-05-97	08:00	475	12	24	5	2	2	5	0	450-100								
364	WP-2	73	30.07	N	19	20.1	E	07-05-97	08:35	475	12	24	5	2	2	5	0	100-0								
364	GOFLOW	73	30.07	N	19	20.1	E	07-05-97	08:55	475	12	24	5	2	2	5	0	10		x						
364	PHYTONET	73	30.07	N	19	20.1	E	07-05-97	09:00	475	12	24	5	2	2	5	0	0		x						
365	CTD-12	74	14.85	N	19	24.6	E	07-05-97	10:26	451	14	22	5	2	2	3	0	8-432	x	x					x	
				N																						
366	CTD-12	72	59.87	N	19	28.8	E	07-05-97	12:11	413	14	17	5	2	2	3	0	5-402	x	x						
366	WP-2	72	59.87	N	19	28.8	E	07-05-97	12:30	413	14	17	5	2	2	3	0	400-100								
366	WP-2	72	59.87	N	19	28.8	E	07-05-97	12:55	413	14	17	5	2	2	3	0	100-0								
366	PHYTONET	72	59.87	N	19	28.8	E	07-05-97	13:01	413	14	17	5	2	2	3	0	0		x						
367	CTD-12	72	44.82	N	19	32	E	07-05-97	14:32	396	17	18	5	2	2	3	0	6-386	x	x					x	

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
368	CTD-12	72	29.92	N	19	33.6	E	07-05-97	16:06	385	17	14	5	2	2	3	0	6-372	x	x						
368	WP-2	72	29.92	N	19	33.6	E	07-05-97	16:26	385	17	14	5	2	2	3	0	380-100								
368	WP-2	72	29.92	N	19	33.6	E	07-05-97	16:46	385	17	14	5	2	2	3	0	100-0								
369	CTD-12	72	14.93	N	19	37.3	E	07-05-97	18:08	399	17	13	5	2	2	3	0	5-310	x	x						
369	PHYTONET	72	14.93	N	19	37.3	E	07-05-97	18:22	399	17	13	5	2	2	3	0	0		x						
370	CTD-12	72	0.53	N	19	40.9	E	07-05-97	19:40	305	17	11	6	2	2	3	0	5-292	x	x						
370	WP-2	72	0.53	N	19	40.9	E	07-05-97	19:55	305	17	11	6	2	2	3	0	300-100								
370	WP-2	72	0.53	N	19	40.9	E	07-05-97	20:14	305	17	11	6	2	2	3	0	100-0								
371	CTD-12	71	45.06	N	19	44.3	E	07-05-97	21:30	263	14	4	6	2	2	3	0	7-256	x	x						
372	CTD-12	71	30	N	19	47.9	E	07-05-97	22:59	237	13	8	6	2	2	3	0	6-227	x	x						
372	WP-2	71	30	N	19	47.9	E	07-05-97	23:09	237	13	8	6	2	2	3	0	230-100								
372	WP-2	71	30	N	19	47.9	E	07-05-97	23:19	237	13	8	6	2	2	3	0	100-0								
373	CTD-12	71	20.07	N	19	50	E	08-05-97	00:29	211	12	9	6	2	2	3	0	7-201								
374	CTD-12	71	10.02	N	19	52	E	08-05-97	01:37	213	8	6	6	2	2	3	0	5-201	x	x						
375	CTD-12	70	59.98	N	19	54.4	E	08-05-97	02:45	183	12	17	6	2	2	3	0	6-177	x	x						
375	WP-2	70	59.98	N	19	54.4	E	08-05-97	02:55	183	12	17	6	2	2	3	0	170-100								
375	WP-2	70	59.98	N	19	54.4	E	08-05-97	03:05	183	12	17	6	2	2	3	0	100-0								
376	CTD-12	70	50.15	N	19	56.5	E	08-05-97	04:08	183	11	15	6	2	2	3	0	2-173	x	x						
377	CTD-12	70	39.71	N	19	58.2	E	08-05-97	05:09	152	10	16	7	2	2	3	0	5-141	x	x						
378	CTD-12	70	30.02	N	20	0.3	E	08-05-97	06:13	134	14	13	7	2	2	3	0	5-126	x	x						
378	WP-2	70	30.02	N	20	0.3	E	08-05-97	06:20	134	14	13	7	2	2	3	0	130-0								
379	CTD-12	68	25.85	N	14	1.02	E	10-05-97	08:44	108	7	14	8	0	0	2	0	3-100	x	x						
379	WP-2	68	25.85	N	14	1.02	E	10-05-97	08:50	108	7	14	8	0	0	2	0	100-0								

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
380	CTD-12	68	30.73	N	13	47.1	E	10-05-97	09:50	139	7	12	8	0	1	2	0	3-130	x	x						
380	WP-2	68	30.73	N	13	47.1	E	10-05-97	09:57	139	7	12	8	0	1	2	0	130-0								
381	CTD-12	68	34.82	N	13	35	E	10-05-97	10:48	131	4	9	7	0	1	2	0	6-123	x	x						
381	WP-2	68	34.82	N	13	35	E	10-05-97	10:55	131	4	9	7	0	1	2	0	120-0								
382	CTD-12	68	44.04	N	13	10	E	10-05-97	12:24	115	4	17	7	0	1	2	0	6-102	x	x						
382	WP-2	68	44.04	N	13	10	E	10-05-97	12:30	115	4	17	7	0	1	2	0	100-0								
383	CTD-12	68	51.03	N	12	48	E	10-05-97	13:41	178	4	20	8	0	1	2	0	6-651	x	x						
383	WP-2	68	51.03	N	12	48	E	10-05-97	14:05	178	4	20	8	0	1	2	0	200-0								
384	CTD-12	69	2.07	N	12	16.6	E	10-05-97	15:49	194	3	22	8	0	1	3	0	10-999	x	x	x					
384	WP-2	69	2.07	N	12	16.6	E	10-05-97	16:30	194	3	22	8	0	1	3	0	200-0								
385	CTD-12	69	13.92	N	11	36.9	E	10-05-97	18:21	2900	4	21	7	0	0	3	0	9-999	x	x						
385	WP-2	69	13.92	N	11	36.9	E	10-05-97	19:02	2900	4	21	7	0	0	3	0	200-0								
386	CTD-12	69	29.04	N	10	56.9	E	10-05-97	21:25	2920	3	24	6	0	1	3	0	9-1001	x	x						
386	WP-2	69	29.04	N	10	56.9	E	10-05-97	22:02	2920	3	24	6	0	1	3	0	200-0								
387	CTD-12	69	42.03	N	10	15.9	E	10-05-97	23:58	2901	3	22	5	0	1	3	0	11-1005	x	x						
387	WP-2	69	42.03	N	10	15.9	E	11-05-97	00:35	2901	3	22	5	0	1	3	0	200-0								
388	CTD-12	69	57.03	N	9	35.1	E	11-05-97	02:44	2847	3	25	4	2	8	3	0	12-1003	x	x						
388	WP-2	69	57.03	N	9	35.1	E	11-05-97	03:20	2847	3	25	4	2	8	3	0	200-0								
389	CTD-12	72	59.99	N	1	59.9	E	12-05-97	01:03	2486	4	21	-3	2	8	4	0	11.-2001	x					x		
8389	CTD-24	72	59.99	N	1	56.1	E	12-05-97	06:52	3082	2	23	-3	2	8	4	0	3-304	x	x	x					
389	WP-2	72	59.99	N	1	56.1	E	12-05-97	07:20	3082	2	23	-3	2	8	4	0	100-0								
389	PNF-300	72	59.99	N	1	56.1	E	12-05-97	07:30	3082	2	23	-3	2	8	4	0	0-75								
390	CTD-12	73	0.04	N	5	0.17	W	12-05-97	14:28	2830	4	24	-3	2	8	4	0	800-2701	x			x	x	x	x	
5390	CTD-12	73	0.6	N	5	0.41	W	12-05-97	16:56	2790	4	24	-3	2	8	4	0	9-800	x			x	x	x	x	

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
391	CTD-12	73	0.06	N	5	60	W	12-05-97	19:04	2599	5	21	-3	2	8	4	0	9.-2002						x		
392	CTD-12	73	0.06	N	6	59.8	W	12-05-97	22:16	2567	4	23	-3	2	8	7	0	800-2502	x			x	x	x	x	
5392	CTD-12	73	0.73	N	6	58.5	W	13-05-97	00:35	2538	4	23	-3	2	8	7	0	10-804	x			x	x	x	x	
393	CTD-12	73	30.04	N	6	40	W	13-05-97	06:38	2929	6	19	-4	2	8	4	3	775-2872	x			x	x	x	x	
8393	CTD-24	73	30.32	N	6	41.1	W	13-05-97	08:17	2929	6	19	-4	2	8	4	3	3-305	x	x	x					
393	PNF-300	73	30.32	N	6	41.1	W	13-05-97	08:35	2929	6	19	-4	2	8	4	3	0-75								
393	Net-90	73	30.32	N	6	41.1	W	13-05-97	08:40	2929	6	19	-4	2	8	4	3	100-0								
393	WP-2	73	30.32	N	6	41.1	W	13-05-97	08:45	2929	6	19	-4	2	8	4	3	100-0								
5393	CTD-12	73	29.92	N	6	38	W	13-05-97	09:19	2929	6	19	-4	2	8	4	3	10-752	x			x	x	x	x	
394	CTD-12	73	30.02	N	5	50.2	W	13-05-97	11:51	2912	5	23	-3	2	8	4	3	700-2902	x					x		
5394	CTD-12	73	30.13	N	5	50.3	W	13-05-97	14:07	2912	5	23	-3	2	8	4	3	9-703	x					x		
395	CTD-12	73	30.07	N	4	0.02	W	13-05-97	17:41	2975	6	18	-3	2	8	4	0	11-2000.						x		
396	CTD-12	73	30.02	N	3	0.04	W	13-05-97	20:36	2912	6	20	-2	2	8	4	0	10-2001.						x		
397	CTD-12	73	29.99	N	2	0.01	W	13-05-97	23:29	2702	6	16	-3	2	8	4	0	750-2653	x			x	x	x	x	
5397	CTD-12	73	29.93	N	2	0.39	W	14-05-97	01:49	2705	6	16	-3	2	8	4	0	11-701	x			x	x	x	x	
398	CTD-12	73	30.03	N	1	0	W	14-05-97	03:57	3013	5	21	-3	2	8	4	0	11-2001.						x		
399	CTD-12	73	30.01	N	1	0	E	14-05-97	08:26	3158	4	20	-3	2	8	4	0	10-2002.						x		
8399	CTD-24	73	30.11	N	1	1.54	E	14-05-97	09:37	3158	4	20	-3	2	8	4	0	5-303	x	x	x				x	
399	PNF-300	73	30.11	N	1	1.54	E	14-05-97	09:37	3158	4	20	-3	2	8	4	0	75-0								
399	Net-90	73	30.11	N	1	1.54	E	14-05-97	09:50	3158	4	20	-3	2	8	4	0	100-0								
399	WP-2	73	30.11	N	1	1.54	E	14-05-97	09:58	3158	4	20	-3	2	8	4	0	100-0								
400	CTD-12	73	30	N	2	0	E	14-05-97	12:23	3321	5	21	-3	2	8	4	0	602-3303	x			x	x	x	x	
5400	CTD-12	73	30.04	N	2	0.19	E	14-05-97	15:09	3362	5	21	-3	2	8	4	0	100-754	x			x	x	x	x	
401	CTD-12	74	0.06	N	2	59.7	E	14-05-97	18:52	3281	5	21	-2	2	8	4	0	8-2001.						x		

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
402	CTD-12	73	59.98	N	2	0	E	14-05-97	21:32	3330	5	18	-2	2	8	4	0	800-3203	x			x	x	x	x	
5402	CTD-12	74	0.25	N	2	0.63	E	15-05-97	00:15	3291	5	18	-2	2	8	4	0	11-701	x			x	x	x	x	
403	CTD-12	74	0	N	0	59.9	E	15-05-97	03:33	3045	4	15	-2	2	8	4	0	10-1975.						x		
8404	CTD-24	74	0.01	N	1	0.07	W	15-05-97	07:41	3510	4	15	-2	2	8	3	0	3-302	x	x	x				x	
404	PNF-300	74	0.01	N	1	0.07	W	15-05-97	07:41	3510	4	15	-2	2	8	3	0	0-75								
404	Net-90	74	0.01	N	1	0.07	W	15-05-97	07:50	3510	4	15	-2	2	8	3	0	100-0								
404	WP-2	74	0.01	N	1	0.07	W	15-05-97	08:00	3510	4	15	-2	2	8	3	0	100-0								
404	CTD-12	74	0.04	N	1	1.5	W	15-05-97	09:29	3520	5	15	-2	2	8	3	0	10-2002.						x		
405	CTD-12	73	59.9	N	2	0.12	W	15-05-97	12:06	3357	5	13	-2	2	8	3	0	650-3003	x			x	x	x	x	
5405	CTD-12	74	0.1	N	2	0.43	W	15-05-97	14:41	3336	5	13	-2	2	8	3	0	9-603	x			x	x	x	x	
406	CTD-12	73	59.96	N	3	0.04	W	15-05-97	16:38	3480	5	8	-2	2	8	3	0	10-2000.						x		
407	CTD-12	74	0	N	4	0.06	W	15-05-97	19:21	3565	4	7	-2	2	8	3	0	10-2001.						x		
408	CTD-12	74	0.04	N	5	0.09	W	15-05-97	22:03	2949	4	6	-2	2	8	3	0	10-1500						x		
409	CTD-12	73	59.92	N	6	0.23	W	16-05-97	00:43	3388	4	6	-3	2	8	3	0	10-1600						x		
410	CTD-12	74	0.01	N	6	50	W	16-05-97	03:15	3318	5	9	-2	2	8	3	0	700-3252	x			x	x	x	x	
8410	CTD-24	73	59.51	N	6	50.2	W	16-05-97	05:07	3318	5	9	-2	2	8	3	0	3-304	x	x	x				x	
410	PNF-300	73	59.51	N	6	50.2	W	16-05-97	05:15	3318	5	9	-2	2	8	3	0	0-75								
410	Net-90	73	59.51	N	6	50.2	W	16-05-97	05:25	3318	5	9	-2	2	8	3	0	100-0								
410	WP-2	73	59.51	N	6	50.2	W	16-05-97	05:35	3318	5	9	-2	2	8	3	0	100-0								
5410	CTD-12	74	0.15	N	6	50	W	16-05-97	06:13	3388	5	9	-2	2	8	3	0	9-701	x			x	x	x	x	
411	CTD-12	74	29.95	N	7	11.7	W	16-05-97	10:34	3360	32	5	-4	2	8	3	0	600-3302	x			x	x	x	x	
5411	CTD-12	74	30.28	N	7	10.3	W	16-05-97	13:22	3360	32	5	-4	2	8	3	0	11-603	x			x	x	x	x	
412	CTD-12	74	30.04	N	6	0.16	W	16-05-97	15:34	3431	29	9	-3	1	5	3	0	10-2001.						x		

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
413	CTD-12	74	29.96	N	4	59.9	W	16-05-97	18:10	3481	29	10	-4	1	5	3	0	10-1601						x		
414	CTD-12	74	30.02	N	3	59.5	W	16-05-97	21:07	3534	30	11	-4	1	5	3	0	12-1600						x		
415	CTD-12	74	32.96	N	2	2.39	W	17-05-97	01:08	3582	35	21	-4	1	5	3	0	999-3504	x			x	x	x	x	
5415	CTD-12	74	32.92	N	2	2.45	W	17-05-97	03:58	3584	35	21	-4	1	5	3	0	10-800	x			x	x	x	x	
416	CTD-12	74	30.04	N	0	0.04	W	17-05-97	07:32	3706	34	23	-2	1	5	4	0	11-2001.						x		
8417	CTD-24	74	39.47	N	3	53.6	W	17-05-97	18:24	3551	36	24	-2	1	5	4	0	4-302	x	x	x					
417	WP-2	74	39.47	N	3	53.6	W	17-05-97	18:24	3551	36	24	-2	1	5	4	0	100-0								
417	PNF-300	74	39.47	N	3	53.6	W	17-05-97	18:30	3551	36	24	-2	1	5	4	0	0-75								
417	CTD-12	75	0	N	5	0.01	E	17-05-97	22:33	3065	35	24	-3	8	8	4	0	11-2003.						x		
418	CTD-12	75	0.02	N	3	59.8	E	18-05-97	01:16	2987	35	23	-3	2	8	4	0	751-2902	x			x	x	x	x	
5418	CTD-12	74	59.93	N	3	59.9	E	18-05-97	03:43	2298	35	23	-3	8	8	4	0	10-753	x			x	x	x	x	
419	CTD-12	75	0.02	N	2	59.9	E	18-05-97	05:44	2452	34	22	-3	2	8	4	0	10-2001.						x		
8419	CTD-24	75	0.71	N	2	59	E	18-05-97	06:59	2452	34	22	-3	2	8	4	0	3-303	x	x	x				x	
419	PNF-300	75	0.71	N	2	59	E	18-05-97	07:10	2452	34	22	-3	2	8	4	0	0-75								
419	WP-2	75	0.71	N	2	59	E	18-05-97	07:25	2452	34	22	-3	2	8	4	0	100-0								
420	CTD-12	75	0.08	N	1	59.8	E	18-05-97	09:23	2723	0	26	-2	2	8	4	0	700-2652	x			x	x	x	x	
5420	CTD-12	74	59.81	N	1	59.9	E	18-05-97	11:38	2711	0	26	-2	2	8	4	0	12-656	x			x	x	x	x	
421	CTD-12	74	59.96	N	0	59.9	E	18-05-97	13:32	3688	35	23	-2	2	8	4	0	9-2002.					x			
422	CTD-12	75	0.04	N	0	0.14	E	18-05-97	16:10	3680	34	18	-4	2	8	4	0	792-3633	x			x	x	x	x	
5422	CTD-12	75	0.15	N	0	1.14	E	18-05-97	19:10	3680	34	18	-4	2	8	4	0	11-701	x			x	x	x	x	
423	CTD-12	74	59.99	N	1	0.08	W	18-05-97	21:05	3537	34	13	-5	2	8	4	0	12-1601						x		
424	CTD-12	74	59.99	N	2	0.17	W	18-05-97	23:44	3612	33	13	-6	2	8	3	0	900-3503	x			x	x	x	x	
5424	CTD-12	74	59.98	N	2	0.19	W	19-05-97	02:33	3597	33	13	-6	2	8	3	0	9-801	x			x	x	x	x	

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTII	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
425	CTD-12	75	0	N	3	0.01	W	19-05-97	04:32	3616	0	13	-5	2	8	3	1	10-2001.						x		
426	CTD-12	75	59.9	N	3	59.9	W	19-05-97	07:09	3577	34	10	-6	2	8	3	2	10-2002.						x		
427	CTD-12	74	59.99	N	4	41.2	W	19-05-97	09:21	3549	5	6	-6	2	8	3	2	801-3503	x			x	x	x	x	
8427	CTD-24	74	59.26	N	4	42.1	W	19-05-97	11:32	3548	5	6	-6	2	8	3	3	3-300	x	x	x				x	
427	PNF-300	74	59.26	N	4	42.1	W	19-05-97	11:40	3548	5	6	-6	2	8	3	3	0-75								
427	Net-90	74	59.26	N	4	42.1	W	19-05-97	11:50	3548	5	6	-6	2	8	3	3	100-0								
427	WP-2	74	59.26	N	4	42.1	W	19-05-97	12:00	3548	5	6	-6	2	8	3	3	100-0								
5427	CTD-12	74	59.17	N	4	42.3	W	19-05-97	12:08	3547	5	6	-6	2	8	3	2	11-777	x			x	x	x	x	
428	CTD-12	75	30.08	N	2	43.7	W	19-05-97	18:11	3634	5	8	-5	2	8	3	2	9-2001.						x		
429	CTD-12	75	30	N	2	0.08	W	19-05-97	20:28	3664	0	7	-6	2	8	3	1	1100-3612	x			x	x	x	x	
5429	CTD-12	75	29.98	N	2	0.03	W	19-05-97	23:19	3665	0	7	-6	2	8	3	1	9-950	x			x	x	x	x	
430	CTD-12	75	30.03	N	0	29.8	W	20-05-97	01:59	3688	34	5	-5	2	8	3	1	11-1600						x		
431	CTD-12	75	30.04	N	0	29.9	E	20-05-97	04:35	2560	35	11	-5	2	8	3	0	10-2001.						x		
432	CTD-12	75	30.03	N	1	59.8	E	20-05-97	07:54	2951	0	10	-4	2	8	3	0	750-2901	x			x	x	x	x	
8432	CTD-24	75	29.58	N	1	59	E	20-05-97	09:32	2951	0	10	-4	2	8	3	0	5-301	x	x	x				x	
432	PNF-300	75	29.58	N	1	59	E	20-05-97	09:40	2951	0	10	-4	2	8	3	0	0-75								
432	WP-2	75	29.58	N	1	59	E	20-05-97	09:55	2951	0	10	-4	2	8	3	0	100-0								
5432	CTD-12	75	29.37	N	1	58.5	E	20-05-97	10:19	3027	0	10	-4	2	8	3	0	10-703	x			x	x	x	x	
433	CTD-12	75	30.04	N	2	60	E	20-05-97	12:34	2468	1	10	-4	2	8	3	0	11-2003.						x		
434	CTD-12	75	29.96	N	3	59.8	E	20-05-97	15:10	3317	34	10	-3	2	8	3	0	10-2001.						x		
435	CTD-12	76	0.04	N	4	0	E	20-05-97	19:18	3063	33	11	-4	2	8	3	0	9-2001.	x				x	x	x	
436	CTD-12	75	59.9	N	3	0	E	20-05-97	21:52	3010	34	9	-5	2	8	3	0	10-1600						x		
437	CTD-12	76	0.02	N	1	59.9	E	21-05-97	00:23	2782	35	9	-5	2	8	3	0	10-2001.						x		

STNBR	OPERATION	POSITION						DATE	TIME	BOTTOM	WIND		Air	W	C	SEA	ICE	SAMPLING	PARAMETERS							
		Latitude			Longitude				(UTC)	DEPTH	Dir	Speed	Temp					RANGE	NS	BIOM	14C	O2	CFC	SF6	CO2	SALT
438	CTD-12	75	59.95	N	0	30	E	21-05-97	03:31	2928	34	8	-5	2	8	2	0	10-2001.						x		
439	CTD-12	76	0.02	N	0	31.7	W	21-05-97	06:09	1935	34	5	-5	2	8	2	1	10-1800						x		
440	CTD-12	76	0.04	N	2	0.17	W	21-05-97	09:14	3695	30	14	-4	2	8	3	1	800-3653	x			x	x	x	x	
8440	CTD-24	75	59.93	N	1	58.2	W	21-05-97	11:21	3695	30	14	-4	2	8	3	1	4-301	x	x	x				x	
440	PNF-300	75	59.93	N	1	58.2	W	21-05-97	11:30	3695	30	14	-4	2	8	3	1	0-75								
440	Net-90	75	59.93	N	1	58.2	W	21-05-97	11:40	3695	30	14	-4	2	8	3	1	100-0								
440	WP-2	75	59.93	N	1	58.2	W	21-05-97	11:51	3695	30	14	-4	2	8	3	1	100-0								
5440	CTD-12	75	59.84	N	1	57	W	21-05-97	12:24	3695	30	14	-4	2	8	3	1	8-806	x			x	x	x	x	
441	CTD-12	76	30.15	N	0	33.3	W	21-05-97	17:29	3103	14	7	-3	2	8	2	3	850-3051	x			x	x	x	x	
5441	CTD-12	76	29.93	N	0	32.8	W	21-05-97	20:03	3103	14	7	-3	2	8	2	3	10-802	x			x	x	x	x	
442	CTD-12	74	59.98	N	0	20.3	E	22-05-97	05:02	3699	22	13	-4	2	8	2	0	9-3651						x	x	
443	CTD-12	75	4.95	N	0	0.09	E	22-05-97	07:53	3693	20	10	-4	2	8	2	0	1100-3602	x			x	x	x	x	
5443	CTD-12	75	4.95	N	0	0.1	E	22-05-97	10:39	3693	20	10	-4	2	8	2	0	9-1002	x			x	x	x	x	
444	CTD-12	75	0.01	N	0	20.3	W	22-05-97	12:00	3689	19	9	-3	2	8	2	0	10-3652					x	x	x	
445	CTD-12	74	54.79	N	0	0.3	E	22-05-97	14:55	3698	17	10	-3	2	8	2	0	10-3653					x	x		
446	CTD-12	65	59.93	N	2	0.28	E	24-05-97	23:03	2010	22	24	7	2	8	2	0	10-1952.	x							
8446	CTD-24	65	59.98	N	2	0.16	E	25-05-97	00:35	2022	22	24	6.5	2	8	2	0	4-313	x	x	x					

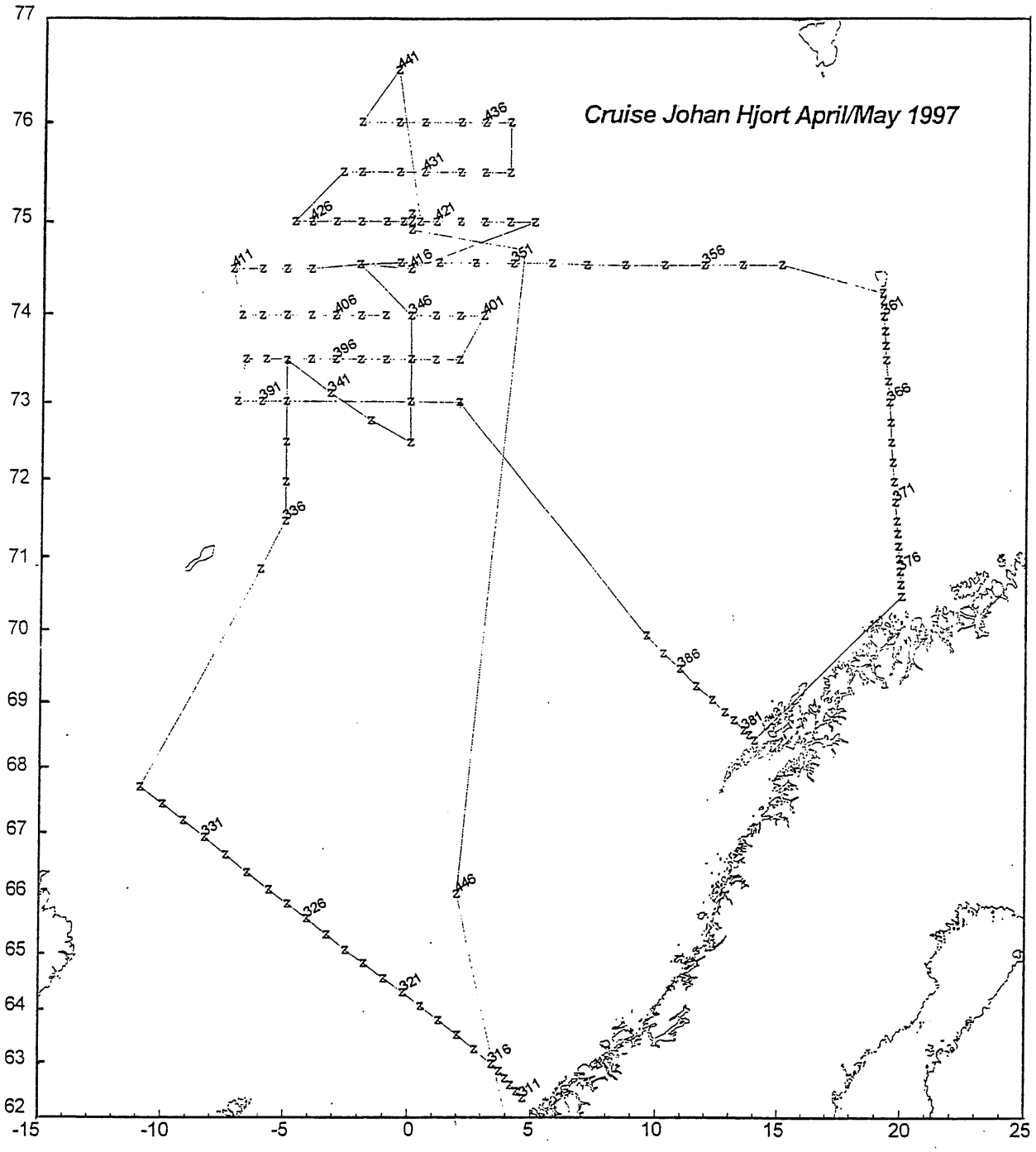

Figure 1. Cruise track and stations locations for R/V "Johan Hjort" cruise JH1997207, April 24 to May 26, 1997.

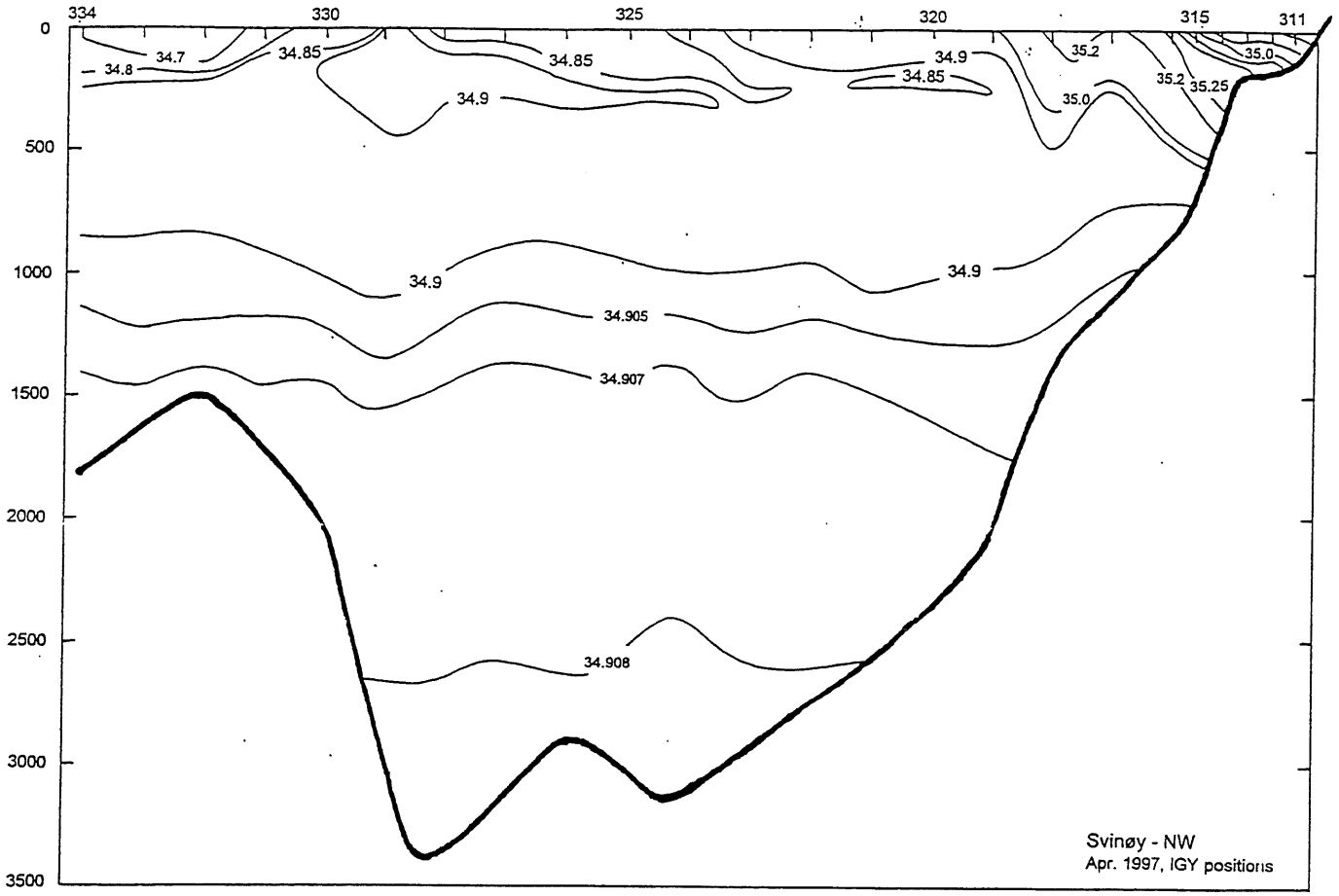

Figure 2. Vertical distribution of salinity (PSU) along the Svinøy-NW transect.

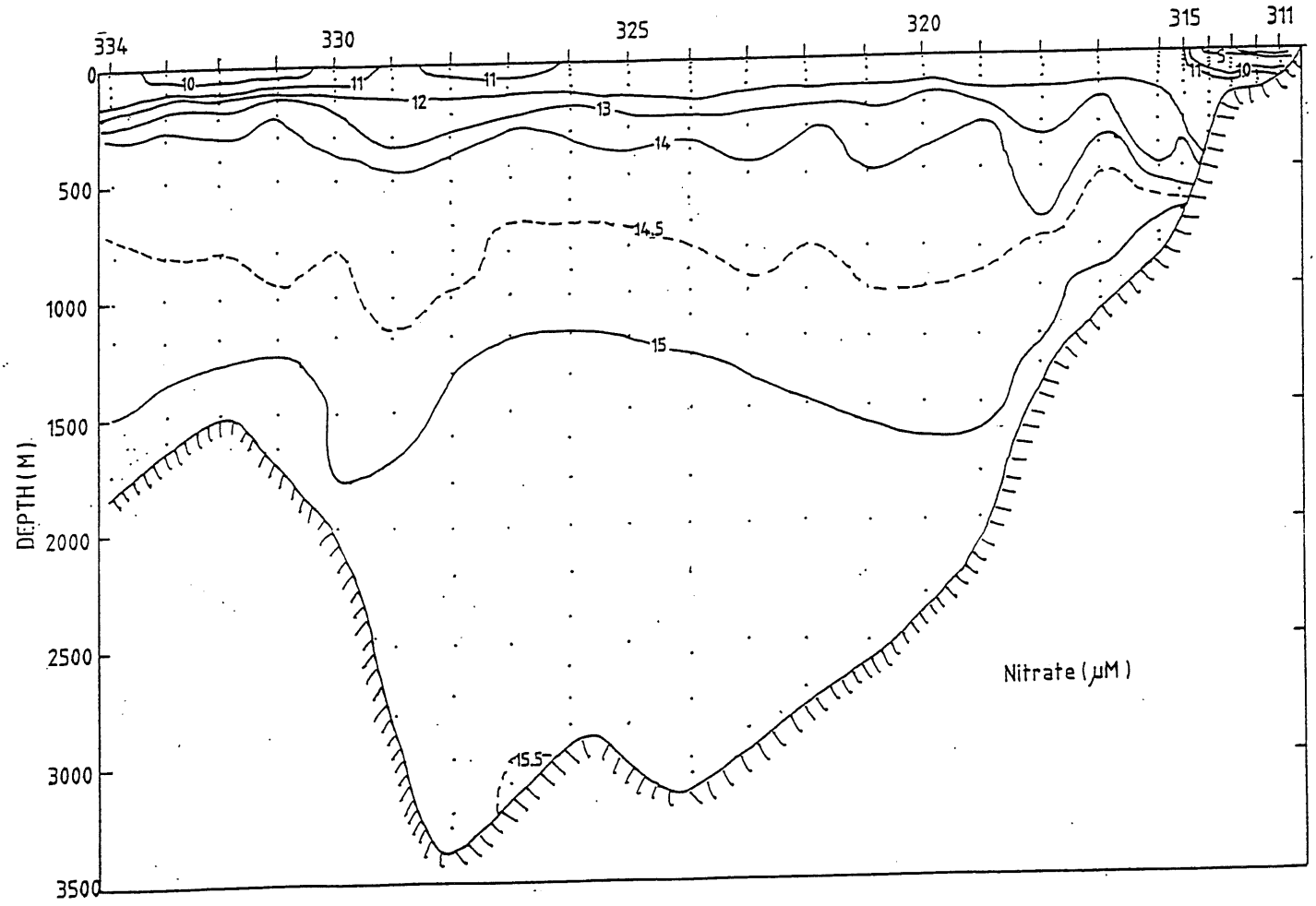

Figure 3. Vertical distribution of nitrate (μM) along the Svinøy-NW transect.

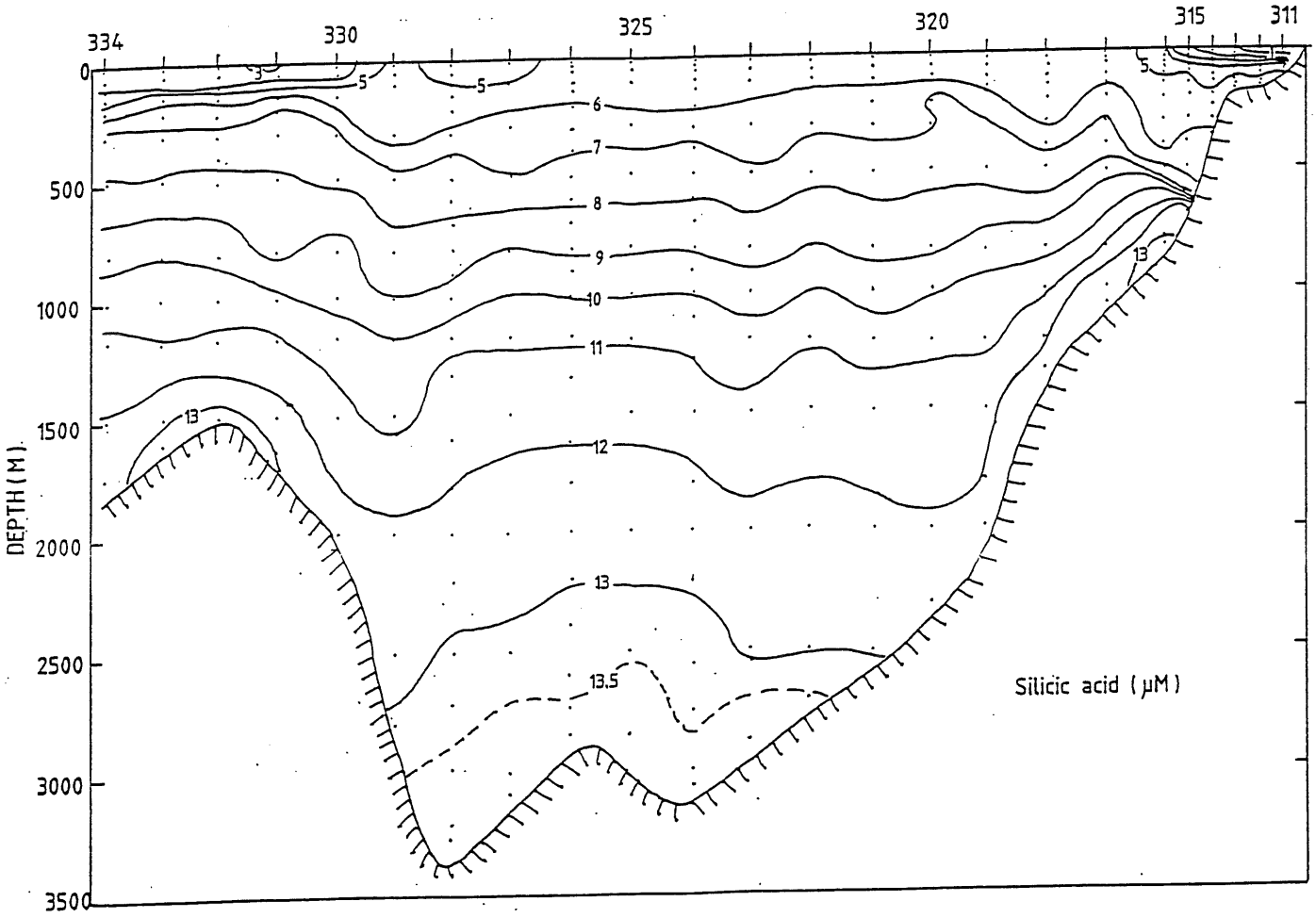

Figure 4. Vertical distribution of silicic acid (µM) along the Svinøy-NW transect.

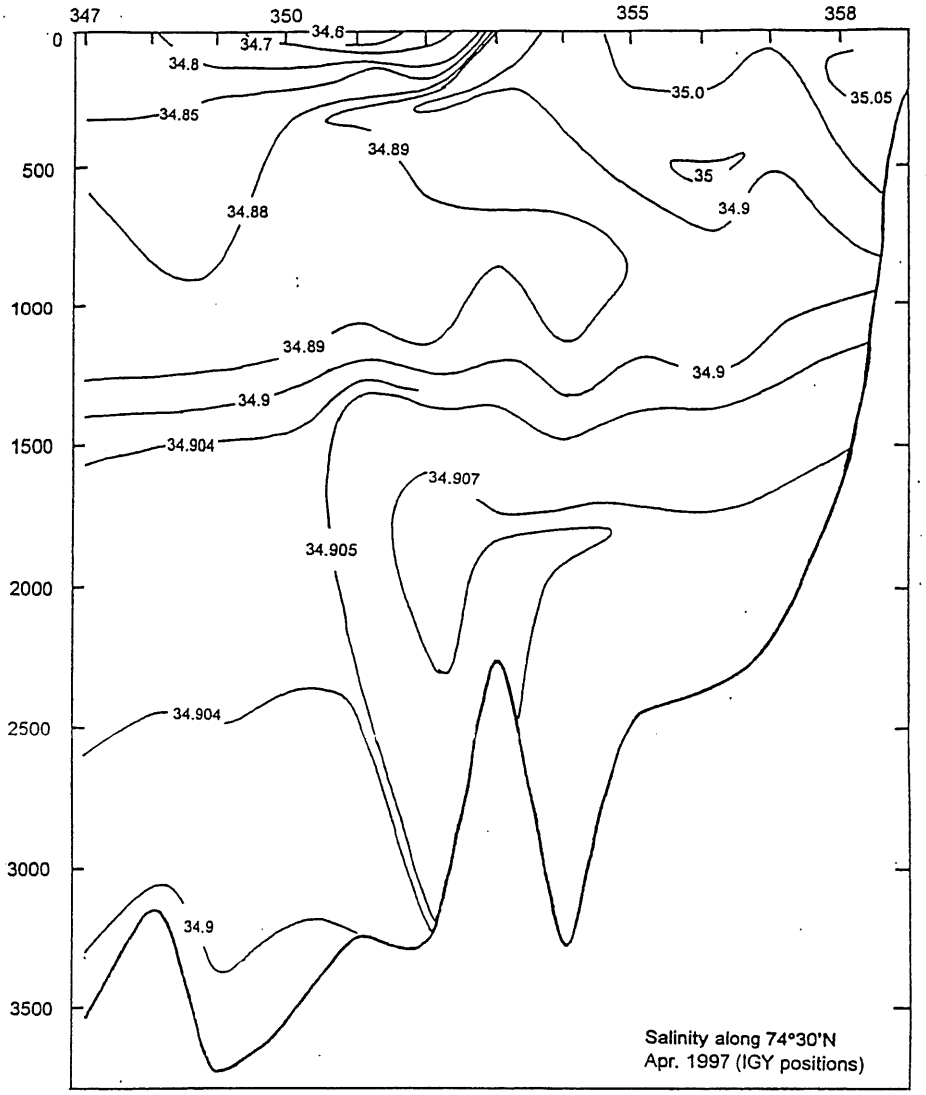

Figure 5. Vertical distribution of salinity (PSU) along the 74° 30`N transect across the central Greenland Sea.

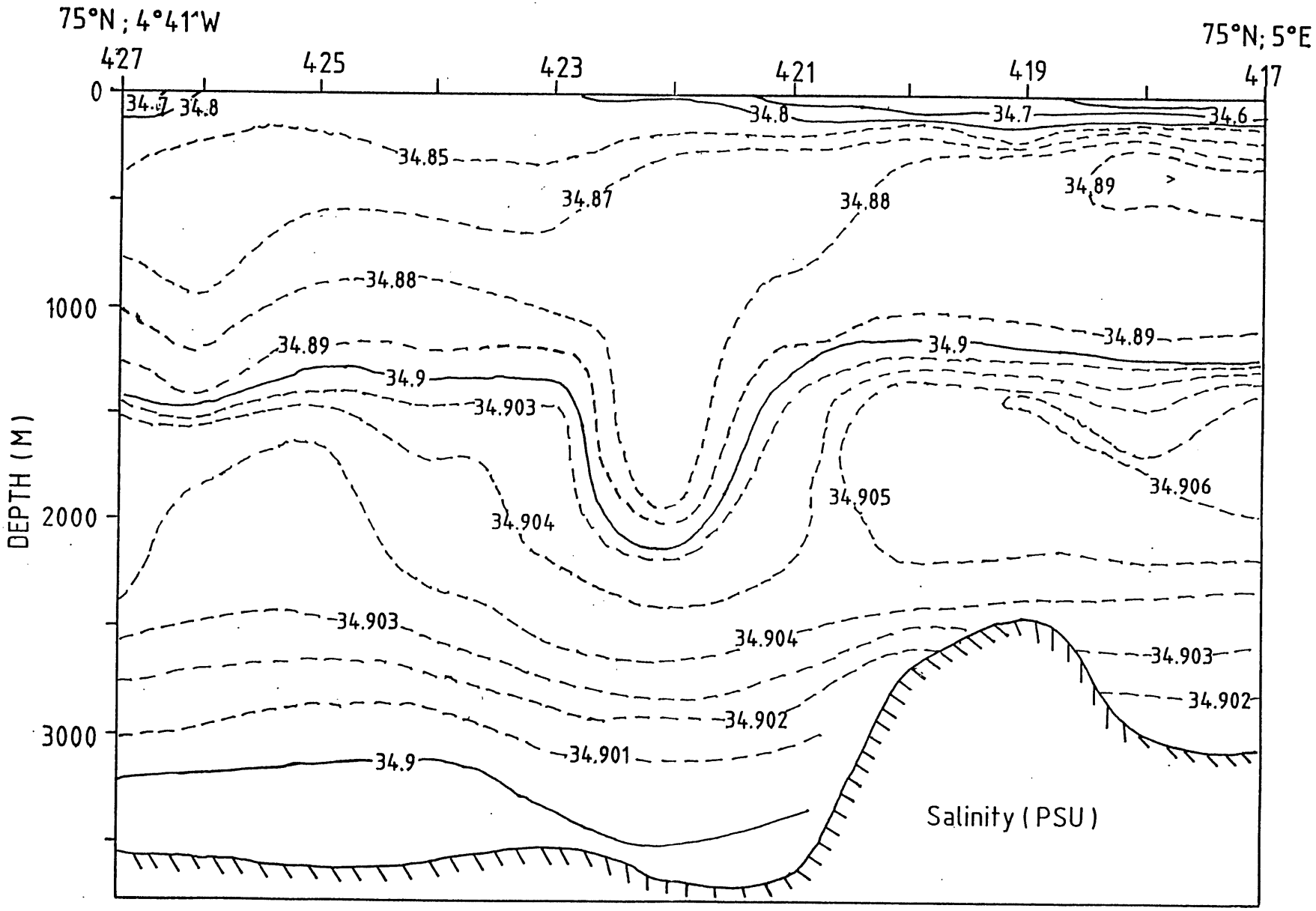

Figure 6. Vertical distribution of salinity (PSU) along the 75 °N transect across the central Greenland Sea.

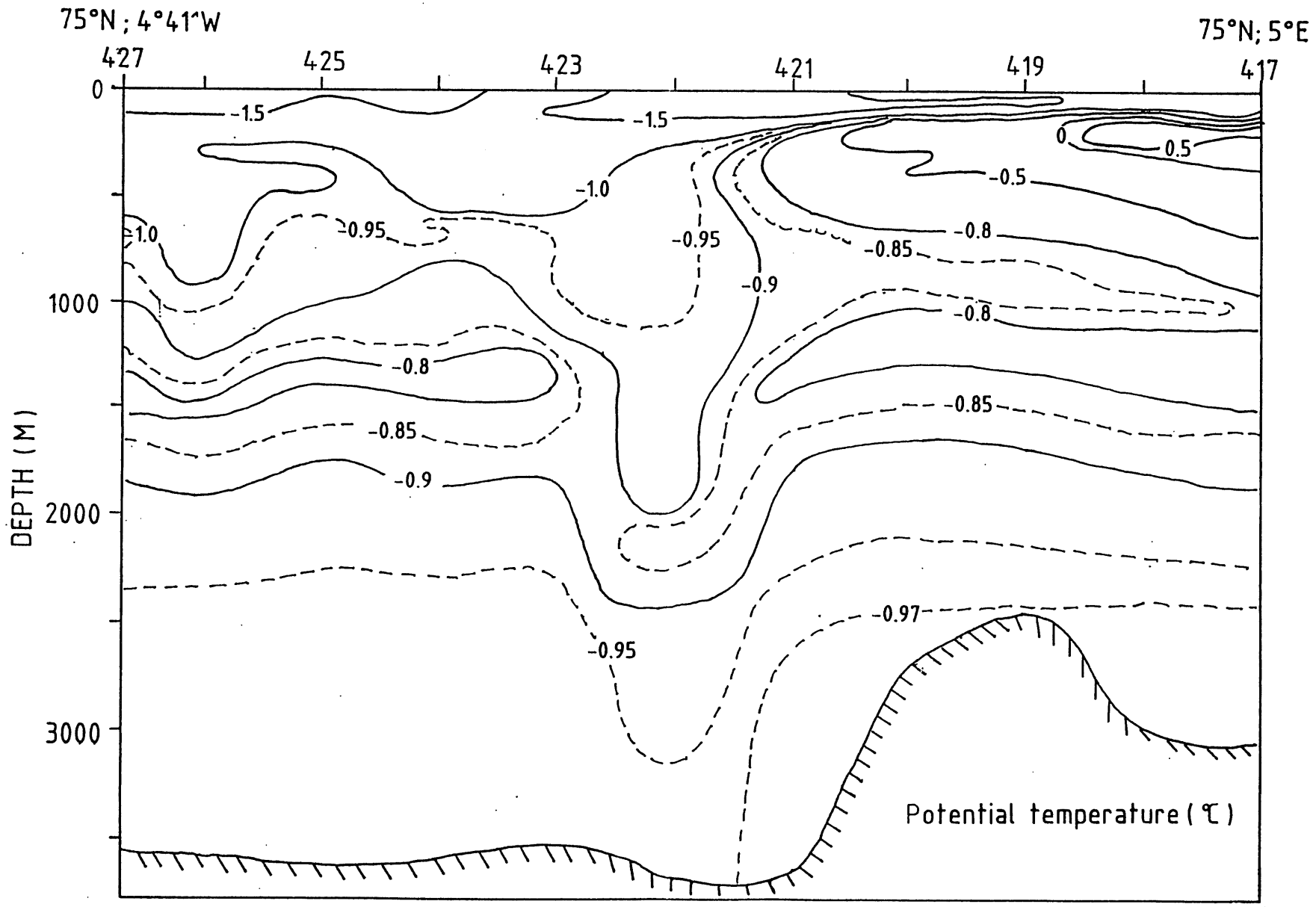

Figure 7. Vertical distribution of potential temperature (° C) along the 75 °N transect across the central Greenland Sea.

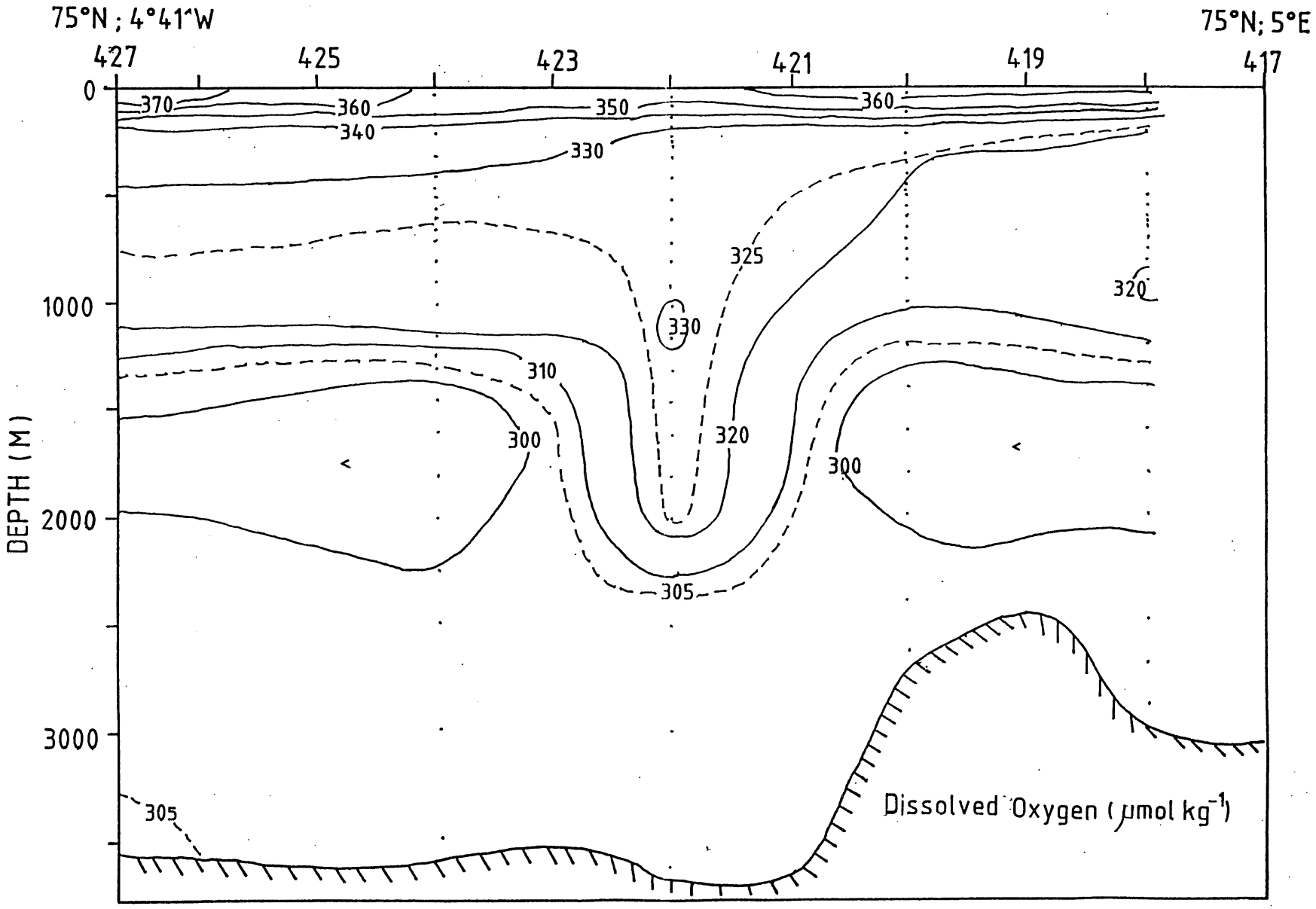

Figure 8. Vertical distribution of dissolved oxygen (µmol kg^{-1}) along the 75 °N transect across the central Greenland Sea.

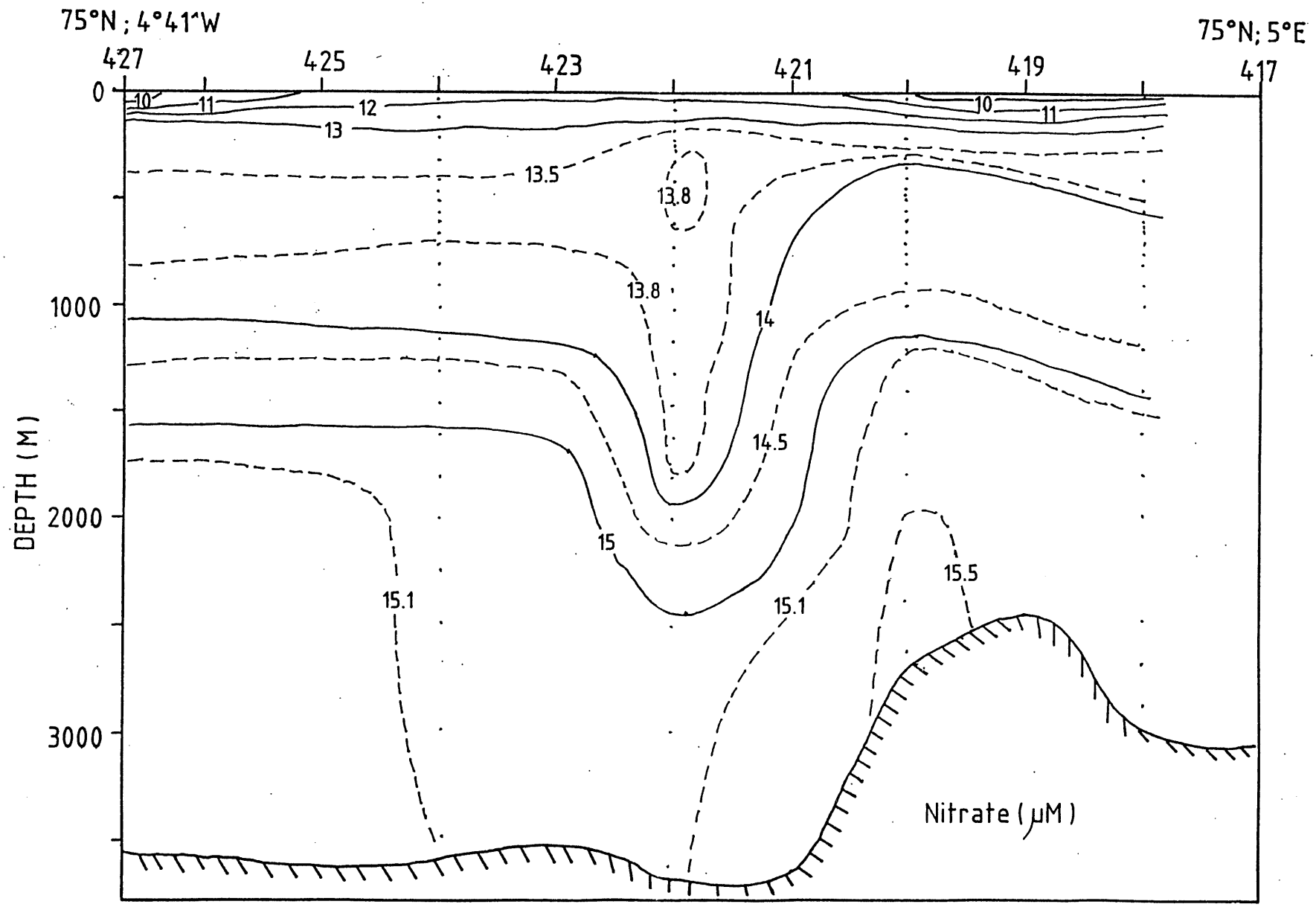

Figure 9. Vertical distribution of nitrate (µM) along the 75 °N transect across the central Greenland Sea.

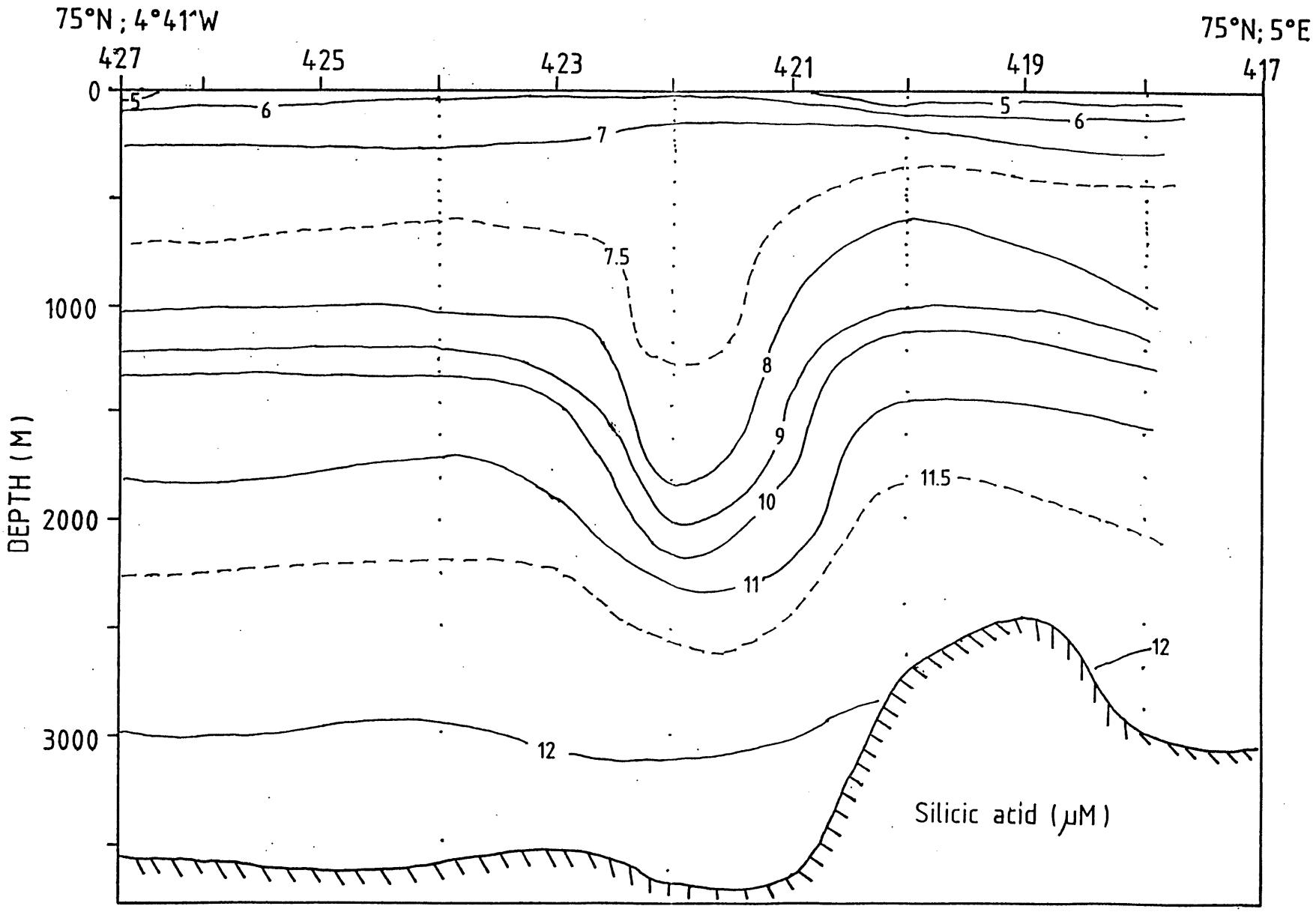

Figure 10. Vertical distribution of silcic acid (µM) along the 75 °N transect across the central Greenland Sea.

Participants Address & Mailing list

Johan Blindheim
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: johan.blindheim@imr.no

Oddvar Brønnstad
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: oddvar.broenstad@imr.no

Conrad Cooper
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: conrad.cooper@imr.no

Julio Erices
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: julio.erices@imr.no

Svein Lygren
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: svein@imr.no

Magnar Mjanger
Institute of Marine Research
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238531

Erling Molvær
Institute of Marine Research
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238531

Thomas Noji
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail; thomas.noji@imr.no

Francisco Rey
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: francisco.rey@imr.no

Jane Strømstad
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: jane.stromstad@imr.no

Jorunn Traeland
Institute of Marine Research
Department of Marine Environment
P.O. Box 1870 Nordnes
N-5024 Bergen
Norway
Phone: +47 55238500
Fax: +47 55238584
e-mail: jorunn.traeland@imr.no

Liv-Marit Hansen
Biological Institute
Dep. Marin Botany
University of Oslo
P.O. Box 1069 Blindern
N-0316 Oslo
Norway

Espen Olsen
Biological Institute
Dep. Marin Botany
University of Oslo
P.O. Box 1069 Blindern
N-0316 Oslo
Norway

Fred Menzia
NOOA/PMEL/OCRD
7600 Sand Point Way NE
Seattle, WA 98115
USA
Phone: +1-206-526-6791
Fax: +1-206-526-6744
e-mail: menzia@pmel.noaa.gov

Craig Neill
913 NE 73rd St.
Seattle, WA 98115
USA
Phone: +1-206-522-3142
e-mail: craig.neill@accessone.com

Melissa Chierici
Analytical and Marine Chemistry
Göteborg University
S-412 96 Gøteborg
Sweden
Phone: +46 317722777
e-mail: melissa@amc.chalmers.se

Agneta Fransson
Analytical and Marine Chemistry
Göteborg University
S-412 96 Gøteborg
Sweden
Phone: +46 317722777
e-mail: agneta@amc.chalmers.se

Anders Olsson
Analytical and Marine Chemistry
Göteborg University
S-412 96 Gøteborg
Sweden
Phone: +46 317722787
e-mail: andols@amc.chalmers.se

Toste Tanhua
Analytical and Marine Chemistry
Göteborg University
S-412 96 Gøteborg
Sweden
Phone: +46 317722781
e-mail: toste@amc.chalmers.se

Fiona Carse
School of Environmental Sciences
University of East Anglia Norwich
NR4 7TJ UK
Phone: +44 1603-593-395
e-mail: f.carse@uea.ac.uk

Marie José Messias
School of Environmental Sciences
University of East Anglia Norwich
NR4 7TJ UK
Phone: +44 1603-593-395
e-mail: m-j.messias@uea.ac.uk

David Cooper
Atmosspheric and Oceanic Science
University of Wisconsin
1225 W Dayton St.
Madison WI 53706
Phone: +1-608-265-5438
e-mail: djcoopel@facstaff.wisc.edu

Kim Van Scoy
Atmosspheric and Oceanic Science
University of Wisconsin
1225 W Dayton St.
Madison WI 53706
Phone: +1-608-265-8759
e-mail: kvs@greenland.meteor.wisc.edu