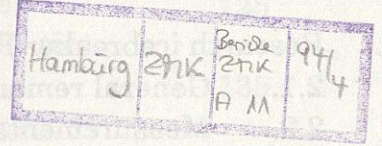


Nr. 11



# ARKTIS 1993

Report on the Field Phase  
with Examples of Measurements

Edited by

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Meteorologisches Institut  
- BIBLIOTHEK -



### 3.6. *Oceanographic measurements*

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#### 3.6.1. *Remarks*

The oceanographic measurements were performed with a CTD probe, recording the conductivity, temperature and pressure. Additional water samples and temperatures were taken by means of a nansen-bottle and two reversing-thermometers, respectively.

The measurements started on 3 March 1993 at 1030 UT with a cycle of four hours to a depth of 1800 meters. They were planned to be performed until 24 March 1993. Therefore, it was expected to get about 130 profiles. The time range itself could be kept, but unfortunately there are a lot of gaps in between due to sea conditions. This finally did yield 68 profiles. From these, stations 32 and 44 are the heaved profiles of stations 31 and 43, respectively.

In the beginning, the measurements were made with a ME73 Kiel-Multisonde. At station 45 the probe was damaged while getting it aboard. Stations 46 and 47 were tests of the repaired probe with respect to its confidence, which failed. Afterwards a Bathy 2000 LS was used, which came out to be aboard by accident.

Although the positions of the stations were more or less scattered, in the next paragraph the attempt is made to structure them.

#### 3.6.2. *Examples of measurements*

Table 3.6.1 shows the positions, at which the observations were performed. According to Figure 3.6.1 these are mainly divided into 6 parts, i.e. 4 sections (S1 to S4) and 2 time series (Z1, Z2). The time series (see Figure 3.6.2) are a sequence of profiles in time at a fixed position, the sections (see Figure 3.6.3) are a sequence of profiles along a horizontal path.

The first two sections are covered by the stations 7 to 12 and 12 to 16, respectively, where the first time series starts. This consists of the stations 16, 17, 19, 21 to 25, and 26. The subsequently following sections 3 and 4 are covered by the stations 26 to 34 and 34 to 39, respectively. Here the second time series begins consisting of the stations 39 to 42, 45, 48 to 50, 52 to 55, 58 to 60, 63, and 65 to 68.

The criterion for the selection of the stations with regard to the time series was a

Table 3.6.1: List of oceanographic stations.

Station	Latitude	Longitude	Time UTC	Date	Station	Latitude	Longitude	Time UTC	Date
1	68° 33.93' N	008° 06.20' E	0930	03 March 1993	35	73° 57.36' N	007° 11.18' E	1659	14 March 1993
2	69° 34.75' N	006° 56.57' E	1302	04 March 1993	36	73° 58.36' N	007° 57.38' E	2029	14 March 1993
3	70° 06.36' N	006° 59.29' E	1703	04 March 1993	37	73° 58.44' N	008° 35.03' E	0455	15 March 1993
4	72° 57.70' N	008° 06.96' E	1300	05 March 1993	38	73° 52.96' N	009° 43.80' E	0829	15 March 1993
5	74° 45.21' N	008° 53.48' E	0100	06 March 1993	39	73° 59.67' N	009° 57.12' E	1255	15 March 1993
6	75° 55.00' N	009° 25.86' E	1304	06 March 1993	40	74° 01.81' N	010° 03.20' E	1657	15 March 1993
7	75° 33.69' N	009° 17.14' E	1701	06 March 1993	41	74° 03.19' N	010° 04.95' E	2030	15 March 1993
8	75° 13.84' N	010° 00.92' E	2102	06 March 1993	42	74° 05.51' N	010° 09.98' E	0054	16 March 1993
9	74° 55.84' N	010° 48.38' E	0102	07 March 1993	43	74° 16.10' N	010° 13.75' E	0827	16 March 1993
10	74° 35.13' N	011° 26.89' E	0501	07 March 1993	44	74° 17.45' N	010° 15.63' E	0940	16 March 1993
11	74° 18.53' N	012° 05.24' E	0858	07 March 1993	45	74° 02.33' N	009° 59.84' E	1257	16 March 1993
12	74° 14.94' N	012° 13.33' E	1309	07 March 1993	46	74° 06.46' N	009° 55.77' E	1815	16 March 1993
13	72° 58.07' N	011° 12.01' E	0900	08 March 1993	47	74° 07.52' N	009° 52.57' E	2029	16 March 1993
14	72° 37.58' N	010° 40.56' E	1256	08 March 1993	48	73° 55.50' N	009° 47.79' E	0900	18 March 1993
15	72° 14.23' N	010° 14.70' E	1658	08 March 1993	49	73° 59.11' N	009° 58.16' E	1300	18 March 1993
16	71° 59.78' N	010° 00.42' E	2059	08 March 1993	50	74° 03.51' N	010° 06.85' E	1659	18 March 1993
17	71° 57.82' N	010° 01.06' E	0102	09 March 1993	51	74° 06.03' N	010° 08.02' E	2029	18 March 1993
18	71° 49.12' N	010° 00.26' E	0857	09 March 1993	52	74° 02.53' N	010° 03.35' E	0059	19 March 1993
19	72° 01.57' N	009° 54.08' E	0832	10 March 1993	53	73° 56.32' N	009° 59.53' E	0830	19 March 1993
20	72° 00.88' N	009° 35.39' E	1301	10 March 1993	54	74° 00.70' N	010° 07.74' E	1257	19 March 1993
21	72° 00.99' N	009° 43.07' E	1658	10 March 1993	55	74° 02.19' N	010° 09.54' E	1658	19 March 1993
22	71° 59.81' N	009° 56.69' E	2026	10 March 1993	56	74° 02.73' N	010° 21.35' E	2030	19 March 1993
23	72° 00.25' N	010° 04.36' E	0055	11 March 1993	57	74° 01.39' N	010° 08.85' E	0059	20 March 1993
24	72° 03.78' N	010° 28.42' E	1255	11 March 1993	58	74° 01.91' N	010° 05.50' E	0457	20 March 1993
25	72° 03.35' N	010° 03.26' E	1756	11 March 1993	59	74° 05.85' N	010° 18.03' E	0830	20 March 1993
26	72° 00.39' N	009° 59.78' E	2025	11 March 1993	60	74° 00.14' N	009° 57.67' E	1258	20 March 1993
27	72° 01.67' N	010° 27.48' E	0834	12 March 1993	61	74° 06.29' N	010° 16.89' E	1658	20 March 1993
28	73° 05.98' N	008° 38.50' E	1657	13 March 1993	62	73° 54.54' N	010° 57.13' E	1658	22 March 1993
29	73° 21.48' N	007° 54.11' E	2030	13 March 1993	63	74° 00.13' N	010° 08.88' E	0459	23 March 1993
30	73° 39.07' N	007° 05.62' E	0056	14 March 1993	64	73° 58.53' N	010° 20.25' E	0831	23 March 1993
31	73° 41.98' N	007° 06.33' E	0456	14 March 1993	65	73° 59.46' N	010° 08.78' E	1658	23 March 1993
32	73° 42.88' N	007° 09.88' E	0600	14 March 1993	66	73° 59.27' N	010° 18.38' E	2029	23 March 1993
33	73° 51.83' N	006° 29.64' E	0830	14 March 1993	67	74° 00.96' N	010° 00.43' E	0100	24 March 1993
34	73° 59.08' N	006° 07.52' E	1256	14 March 1993	68	74° 00.14' N	009° 57.49' E	0458	24 March 1993

diameter of 20 kilometers. Comparison with a diameter of 10 kilometers did result in very similar pictures.

Before plotting, the profiles were calculated for oceanographic standard depths, which are at 0, 10, 20, 25, 30, 40, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1750, and 2000 meters.

As well the sections as the time series show Atlantic Surface Water (ASW), which lies above Norwegian Sea Deep Water (NSDW). The ASW, defined as water with temperatures greater than 3° Celsius and salinities greater than 34.0 ‰, does reach down to a depth of about 400 meters. It is carried by the northward flowing Norwegian Current (NC) and its extension, the West Spitsbergen Current (WSC). The NSDW does reach up to a depth of about 800 meters, characterized by temperatures of -0.9° Celsius and salinities of 34.9‰. In between the main thermocline and halocline can be found.

The strong variations in the time series and in sections 1 and 2 indicate the well known high temporal and spatial variability of the NC, i.e. its banded structure and the abundance of eddies in its flow field.

Sections 3 and 4 show a general cooling and freshening of the whole water column from east to west due to the transition from the Norwegian Sea to the Greenland Sea. At kilometers 20 and 40 in sections 3 and 4, respectively, a front in the upper layer occurs. This is due to melting water from the ice edge, which was just near by in the west and also the reason to “escape” to the fixed position at 74 N, 10 E.

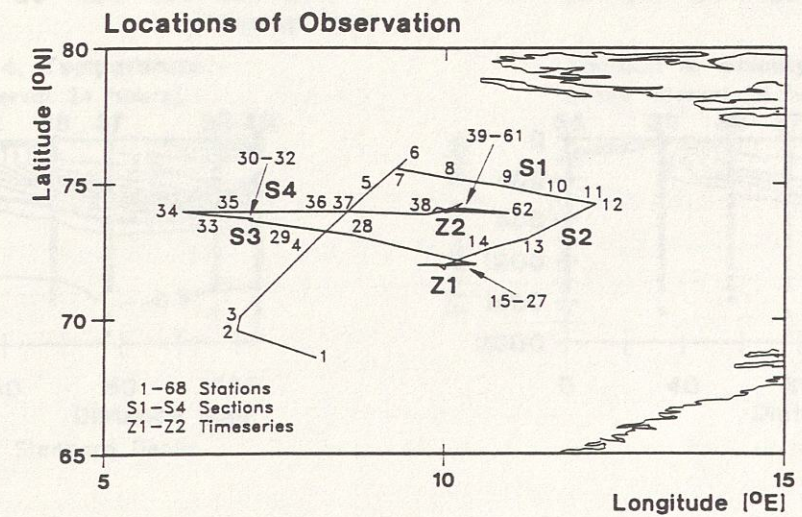


Figure 3.6.1: Stations of oceanographic measurements.

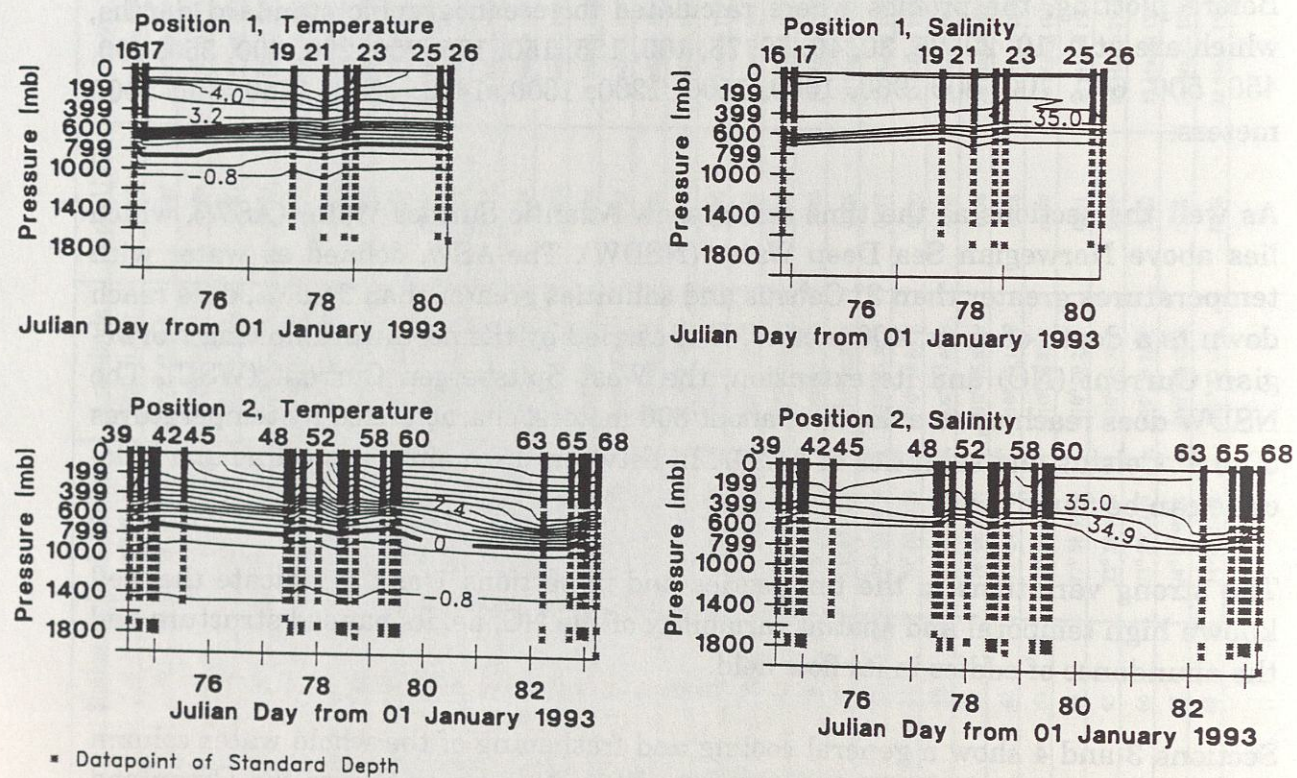


Figure 3.6.2: Time series at 72 N, 10 E (Position 1, Stations 16, 17, 19, 21-23, 25, 26) and 74 N, 10 E (Position 2, Stations 39-42, 45, 48-50, 52-55, 58 to 60, 63, 65-68).

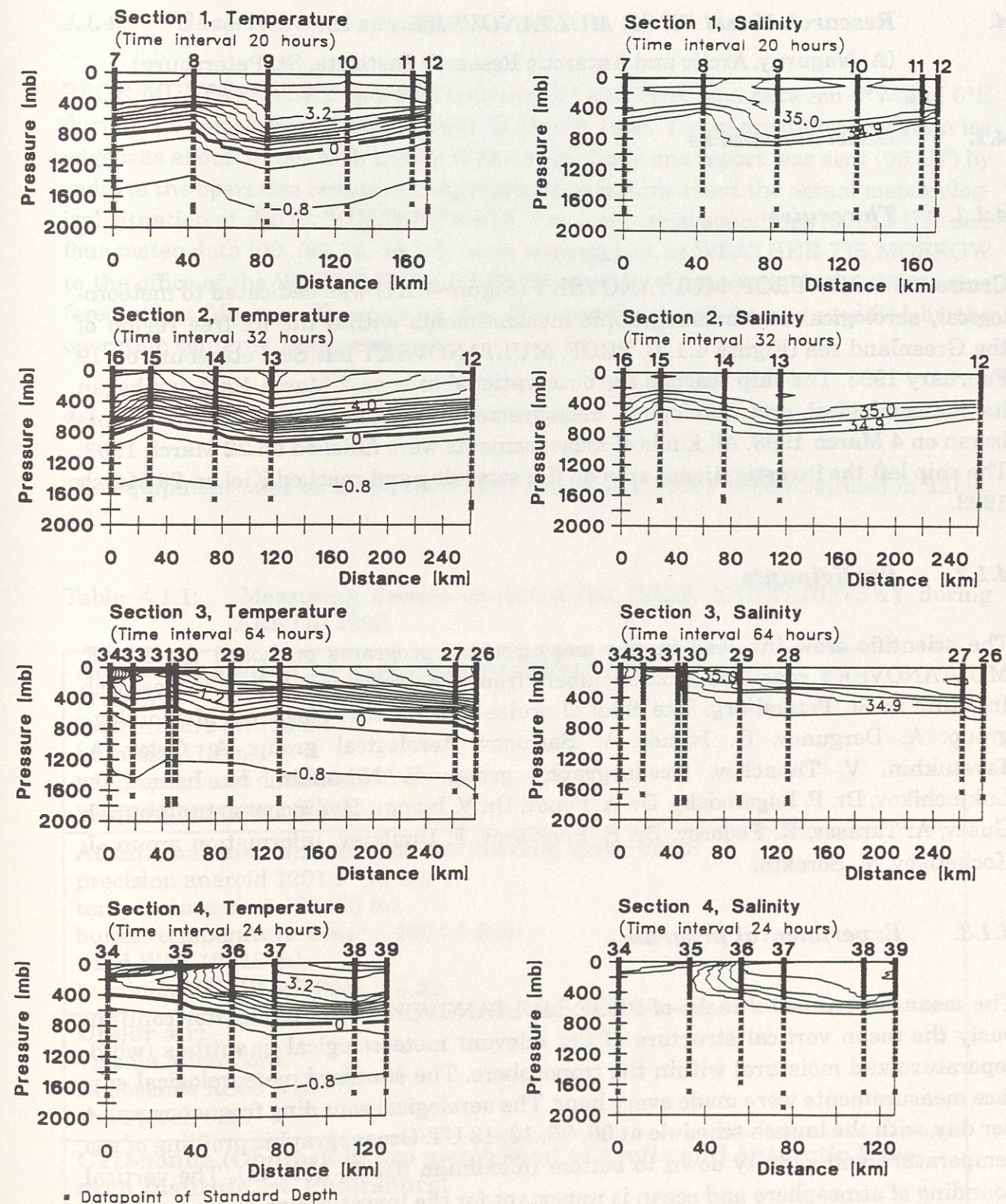


Figure 3.6.3: Section 1 (75.6 N, 09.3 E - 84.3 N, 12.2 E),  
Section 2 (74.3 N, 12.2 E - 72.0 N, 10.0 E),  
Section 3 (72.0 N, 10.0 E - 74.0 N, 06.1 E),  
Section 4 (74.0 N, 06.1 E - 74.0 N, 10.0 E).