Ödsmål, Kville sn, Bohuslän

Hällristning
Fiskare från bronsåldern

Rock carving
Bronze age fishermen

MEDDELANDE från HAVSFISKELABORATORIET · LYSEKIL nr 219

Hydrografiska avdelningen, Göteborg

Observations along the Swedish coast and in the Deep Basins in the Baltic, 1976.

Hydrography of the Kattegat and the Skagerrak Area, Swedish Observations, 1976.

(Contribution to ICES "Annales Biologiques")

by Stig Fonselius and Artur Svansson

July 1977

Hydrography of the Kattegat and the Skagerrak Area 1976..

In the Figures 2 and 3 results of daily measurements at Bornö station in the Gullmar Fiord (Fig. 1) are presented as deviations in temperature and salinity from the mean values 1931 - 1960.

Temperature, salinity and total phosphorus were measured at a position N 58° 17′, E 11° 02′ at 10 depths. Data will be published during 1976.

The Skagerrak Deep (M 6) was visited 3 times (Table 1). Deep salinity and oxygen increased from February to June indicating a certain renewal of water (cf Ljøen and Svansson 1972).

Table 2 shows the oxygen saturation values at station Fladen in N Kattegat. The deep minimum occured in August, which is rather early but values were really low also in December.

Since August 1974 there is a project of determining transports of water and matter through a section Frederikshavn - Göteborg. The measuring activity was particularly frequent during the international project JONSDAP 76 in March and April. In connection with this project total phosphorus was measured once a day at the Danish lightvessel Läsö Trindel, simultaneously with the ordinary hydrographic work. Table 3 presents monthly means.

Reference:

Ljøen, R. and Svansson, A., 1972: Long-term variations of subsurface temperatures in the Skagerrak. Deep-Sea Research, V. 19, 277-288.

Artur Svansson

Table 1.

M 6 58°10′N 09°30′E

Depth m	Temp. °C	S ‰	O_2 ml/l
	February 18		
200	7.64	35.112	6.09
300	6.66	35.133	6.09
400	6.34	35.129	6.04
500	6.14	35.122	6.11
600	6.02	35.122	6.09
	June 22		
200	6.43	35.080	6.36
300	6.06	35.120	6.56
400	5.96	35.142	6.80
500	6.00	35.169	6.95
600	6.04	35.194	6.94
	September 14		
200	6.40	35.139	6.02
300	6.12	35.134	6.24
400	5.94	35.144	6.56
500	5.98	35.166	6.61
600	6.03	35.169	6.65

Table 2.

Percentage Oxygen Saturation at 57°11.5'N 11°40'E (Fladen O_2%)

Depth m	Jan. 02	Feb. 05	Feb. 08	Mar. 10	Mar 21	Apr. 21	June 12
30	99	98	94	96	89	97	94
40	99	98	95	96	91	95	93
50	99	97	94	95	88	94	90
60	100	98	93	94	89	89	87
70	99	96	94		89	90	86

,,	June 16	July 11	Aug. 20	Sep. 09	Sep. 21	Oct. 29	Dec. 10
30	101	81	72	84	89	80	79
40	96	76	68	78	79	81	69
50	96	74	66	77	74	80	80
60	90	74	63	77	72		67
70		74	63		72	80	62

Table 3.

LIGHTVESSEL LASO TRINDEL

TOTAL PHOSPHORUS, MICROGRAMATOMS/L

MEAN VALUE, STANDARD DEVIATION AND COEFF OF VARIATION (NO=NUMBER OF SAMPLES).

PERIOD		00 M	05 M	10 M	15 M	20 M	28 M
760101 - 760131	MV	0.86	0.86	0.86	0.87	0.86	0.86
	SD	0.06	0.06	0.06	0.07	0.05	0.06
	CV	7	6	7	8	6	7
	NO	20	21	21	20	21	21
760201 - 760229	MV	0.99	0.97	0.95	0.90	0.84	0.88
	SD	0.08	0.09	0.08	0.09	0.08	0.07
	CV	8	10	9	10	9	8
	NO	21	21	21	21	21	20
760301 - 760331	MV	0.51	0.53	0.60	0.72	0.79	0.81
	SD	0.12	0.10	0.12	0.13	0.08	0.08
	CV	22	19	20	18	10	10
	NO	28	28	28	28	28	28
760401 - 760430	MV	0.55	0.57	0.60	0.59	0.62	0.70
	SD	0.08	0.08	0.11	0.10	0.10	0.17
	CV	14	15	19	17	15	25
	NO	28	27	28	28	28	27
760501 - 760531	MV	0.53	0.55	0.56	0.53	0.60	0.65
	SD	0.07	0.10	0.11	0.08	0.13	0.12
	CV	13	18	20	15	22	19
	NO	31	30	30	31	30	31

Table 3.

LIGHTVESSEL LASO TRINDEL

TOTAL PHOSPHORUS, MICROGRAMATOMS/L

MEAN VALUE, STANDARD DEVIATION AND COEFF OF VARIATION (NO=NUMBER OF SAMPLES).

PERIOD		00 M	05 M	10 M	15 M	20 M	28 M
760601 - 760630	MV	0.54	0.60	0.56	0.54	0.56	0.53
	SD	0.07	0.10	0.09	0.06	0.11	0.09
	CV	13	17	16	12	19	16
	NO	29	29	28	29	28	28
760701 - 760731	MV	0.46	0.45	0.47	0.44	0.46	0.60
	SD	0.06	0.08	0.09	0.10	0.09	0.10
	CV	13	18	20	22	19	16
	NO	29	29	30	29	30	30
760801 - 760831	MV	0.47	0.48	0.46	0.43	0.44	0.63
	SD	0.06	0.09	0.07	0.08	0.09	0.15
	CV	13	19	16	18	20	25
	NO	31	31	30	31	29	30
760901 - 760930	MV	0.53	0.52	0.49	0.42	0.42	0.47
	SD	0.09	0.10	0.11	0.08	0.10	0.13
	CV	16	20	23	19	23	28
	NO	29	29	28	28	28	28
761001 761031	MV	0.59	0.61	0.58	0.51	0.48	0.62
	SD	0.09	0.11	0.12	0.11	0.11	0.16
	CV	16	17	20	21	23	26
	NO	30	31	31	30	31	31

Table 3.

LIGHTVESSEL LASO TRINDEL

TOTAL PHOSPHORUS, MICROGRAMATOMS/L

MEAN VALUE, STANDARD DEVIATION AND COEFF OF VARIATION (NO=NUMBER OF SAMPLES).

PERIOD		00 M	05 M	10 M	15 M	20 M	28 M
761101 - 761130	MV	0.64	0.65	0.65	0.66	0.65	0.71
	SD	0.11	0.11	0.11	0.12	0.12	0.13
	CV	17	16	17	18	19	19
	NO	30	29	29	29	30	30
761201 - 761231	MV	0.77	0.76	0.75	0.75	0.82	0.92
	SD	0.07	0.09	0.09	0.09	0.10	0.13
	CV	9	12	12	12	12	14
	NO	12	12	12	12	11	11

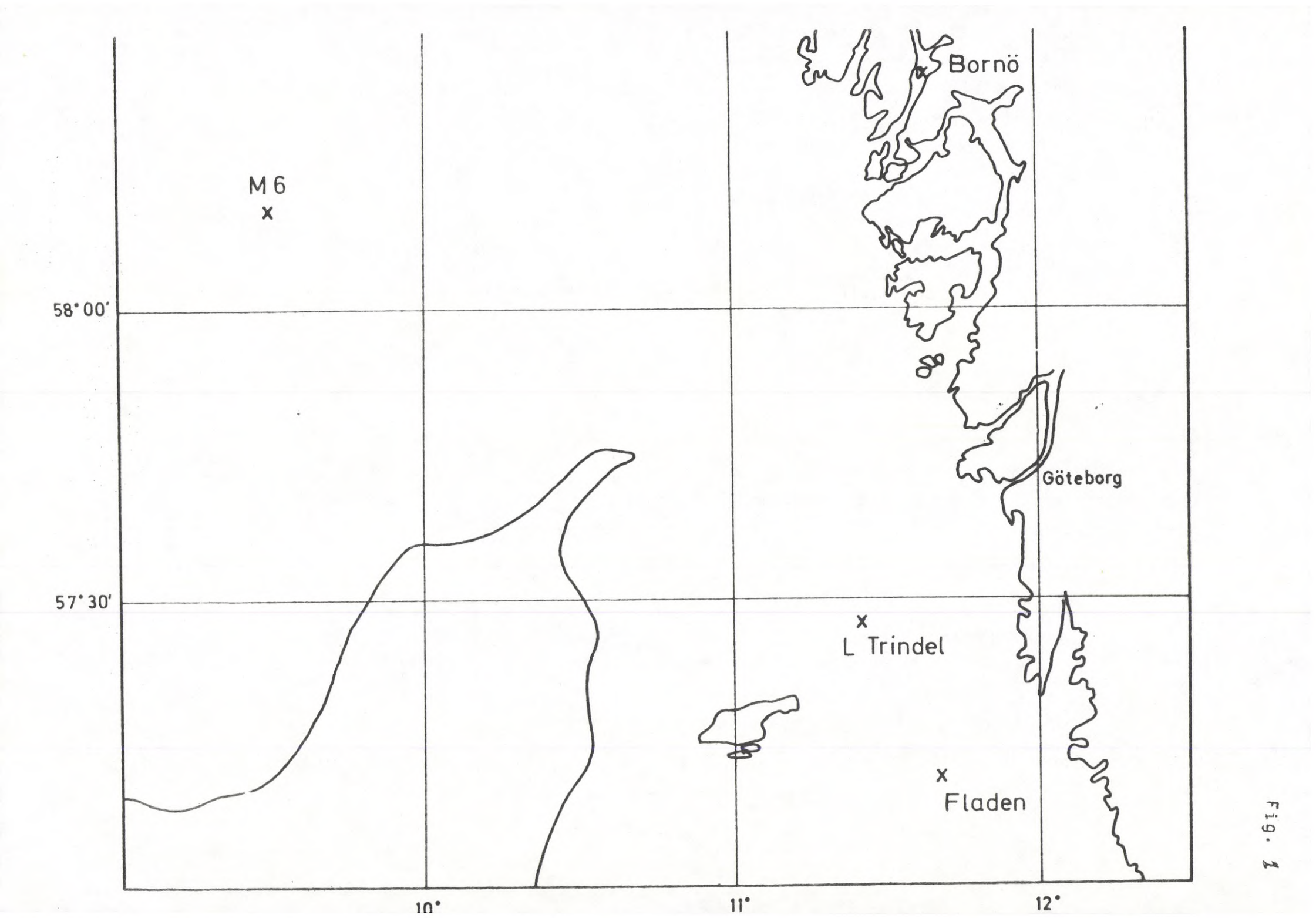
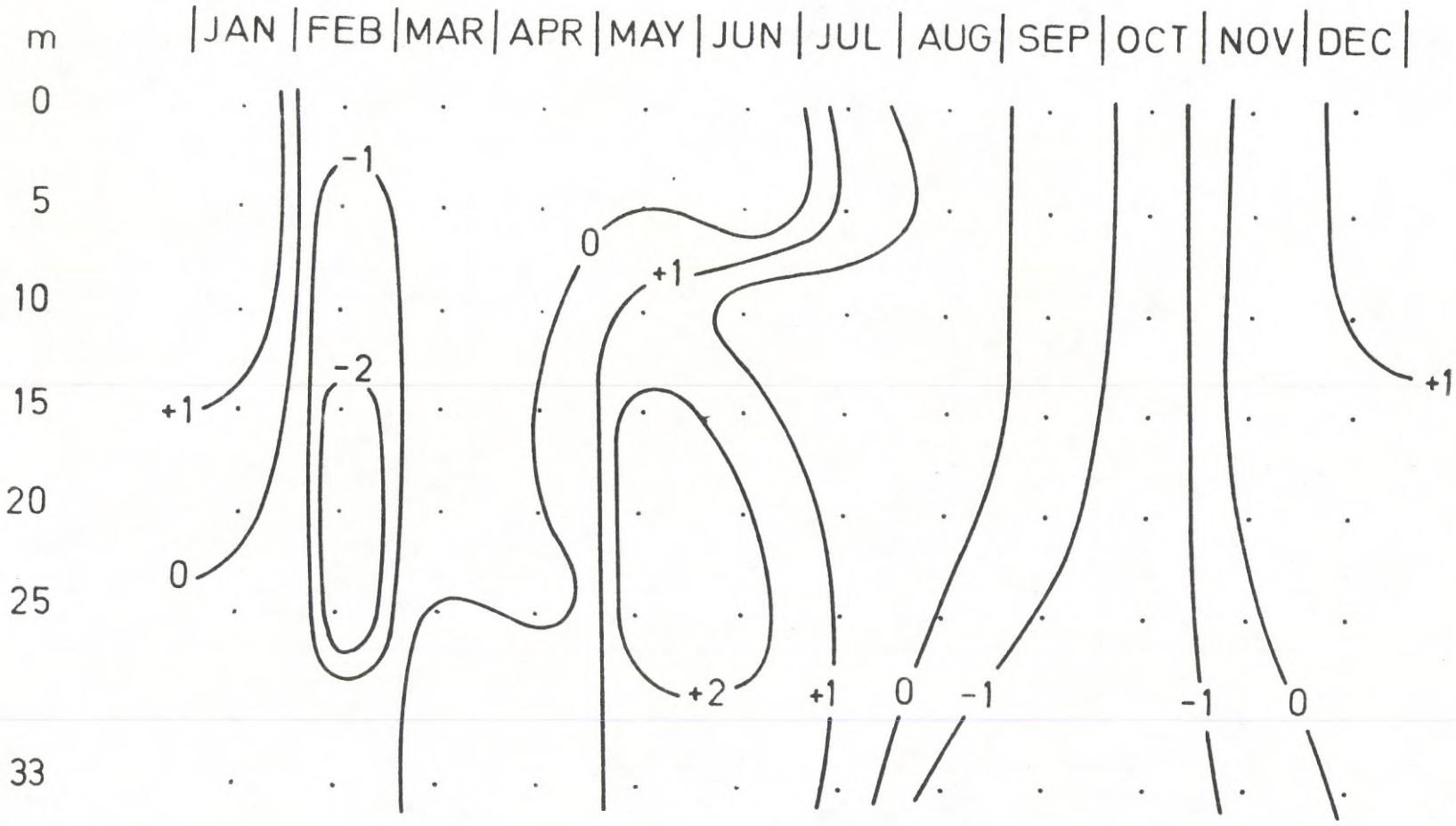


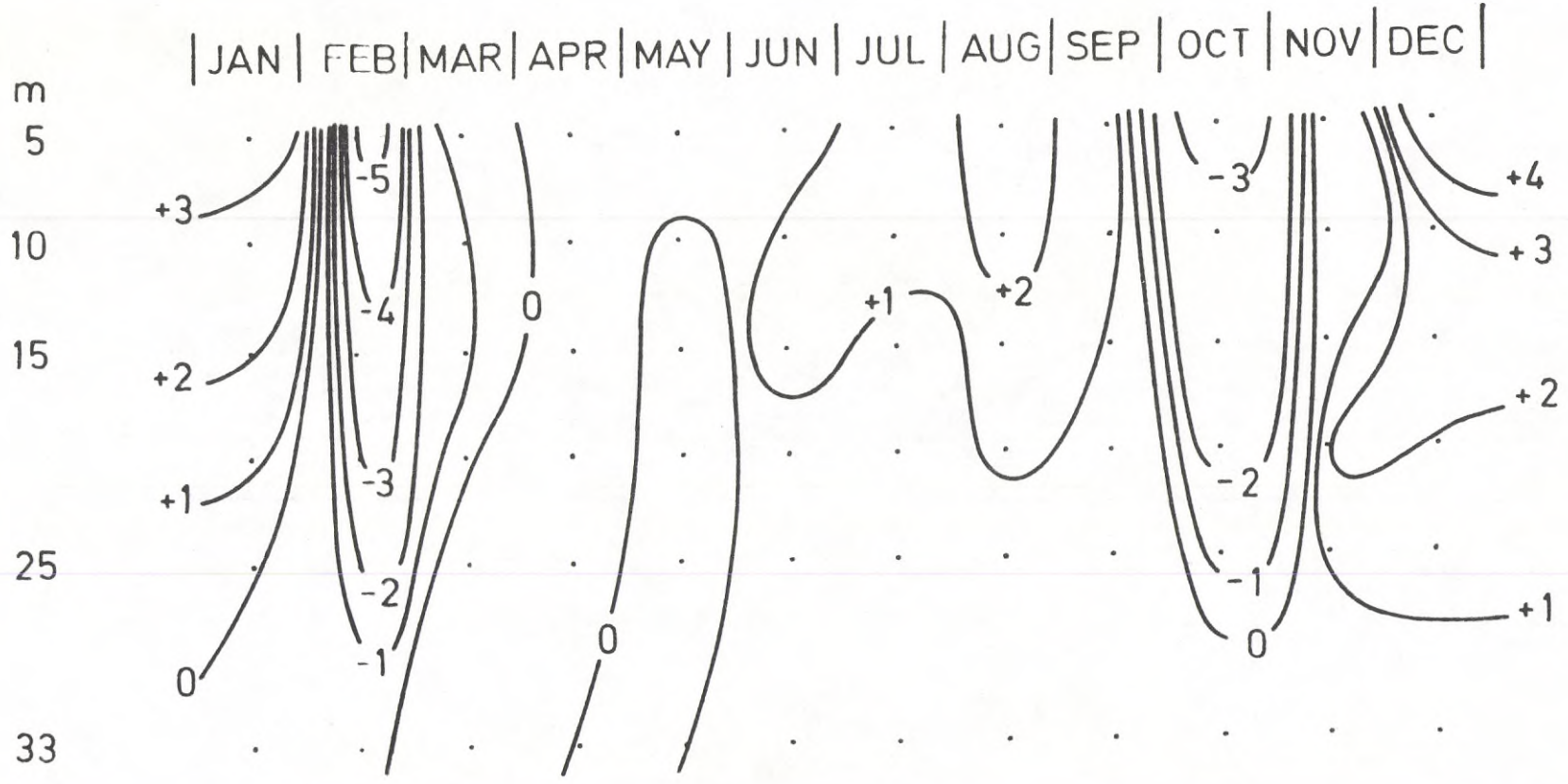
Fig. 1



BORNÖ 1976

Temperature Deviations °C

Fig. 2



BORNÖ 1976

Salinity Deviations ‰

Fig. 3

Observations along the Swedish coast and in the deep basins of the Baltic 1976

Because our department has been moving to a new laboratory building, the coast guard data have not yet been processed and therefore these have not been used in the present paper.

As has been shown in the previous report (Engström and Fonselius 1977), an inflow of new water begun during the winter 1975-1976. In May the new water had entered into the Gotland basin, renewing the deep water there. The oxygen concentration at 240 m was found to be 1.06 ml/l. The oxygen values decreased again fast and in August hydrogen sulfide was found close to the bottom. Also in November hydrogen sulfide was found in the sampler closest to the bottom, but at the other depths there was still around 0.5 ml/l oxygen.

The new water reached the Landsort Deep sometimes during the summer. In September the oxygen conditions in the deep water had improved. At 440 m the oxygen value had increased from 0.04 ml/l in June to 0.21 ml/l. In December the oxygen value had still increased to 0.61 ml/l.

In the Arkona basin an unusually high salinity (20.5‰) was found at 49 m in December. In August the salinity at 48 m was 17.1‰. The oxygen at the corresponding depths had increased from 2.38 ml/l to 5.56 ml/l during the same period. This indicates the beginning of a new inflow of salt water. Unfortunately the Bornholm basin was visited in the beginning of the expedition in November and not in December. Therefore it is not possible to tell if the observed new inflow had penetrated into the Bornholm basin and also not if it is large enough to influence the conditions in the central Baltic.

The figures 1, 2, 3 and 4 show the oxygen and hydrogen sulfide conditions in the deep areas of the Baltic during 1976. From these it can be seen that there was hydrogen sulfide only in the eastern Gotland basin in March and that it had disappeared from the Gotland Deep, but not from the Fårö Deep in June. In August-September hydrogen sulfide was again found both in the Gotland Deep and the Fårö Deep and also in the northern Central Basin. In November-December the hydrogen sulfide had disappeared from the Fårö Deep, but instead hydrogen sulfide was found in the Norrköping Deep, indicating decreasing oxygen values in the western Gotland basin.

References

Engström S. and S. Fonselius, 1977: Observations along the Swedish coast and in the deep basins of the Baltic 1975. Ann. Biolog. Vol. XXXII, 1975.

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Arkona Deep

55°00′N 14°05′E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l
						22 January						
000	3.92	9.195	8.69			0.95						
010	3.96	9.195	8.68									
030	3.86	9.771	8.63									
047	4.92	20.577	7.15			1.77						
						28 January						
000	3.13	8.746	8.88			0.93						
010	3.15	8.746	8.22									
030	3.76	8.781	7.87									
048	4.69	17.220	8.16			1.35						
						9 March						
000	1.28	8.771	9.43	8.12		1.04	1.607	20.0				
010	1.51	8.928	9.55	8.11		1.06	1.607	19.0				
030	1.56	9.151	9.40	8.11		1.06	1.634	18.5				
049	2.11	17.668	8.54	8.06		1.23	1.902	9.5				
						23 June						
000	13.03	8.239	7.47	8.26	0.23	0.70	1.565	11.8	0.07	0.02	0.74	
010	11.91	8.273	7.63	8.39	0.19		1.589	11.7	0.05	0.01	0.48	6
030	11.34	11.701	6.34	8.17	0.33		1.731	10.3	0.17	0.03	1.07	7
045	8.84	14.364	5.90		0.59		1.813	18.3	0.53	0.09	1.78	13

Arkona Deep

55°00′N 14°05′E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l
					24 August							
000	18.31	8.151	6.51	8.33	0.17	0.81	1.591	16.5	0.12	0	0.50	9
010	18.06	8.151	6.39	8.39	0.18	0.76	1.611	15.0	0	0	0.34	11
030	14.29	11.516	5.25	8.06	0.45	0.67	1.705	13.0	0.16	0.26	0.32	12
048	11.99	17.114	2.38	7.65	1.14	1.51	1.899	47.5	7.07	0.06	0.66	16
					4 December							
000	6.59	9.506	7.68	7.98	0.36	0.71	1.476	10.5	1.28	0.56	0.70	
010	6.55	9.506	7.68	8.06	0.38	0.65	1.484	7.5	1.12	0.56	0.85	
030	6.91	15.314	7.33	8.04	0.31	0.67	1.512	12.0	0.71	0.07	0.91	
049	7.95	20.504	5.56	7.92	1.41	1.51	1.560	19.0	4.02	0.11	1.99	

Bornholm Deep

55°15′N 15°59′E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l	H_2S µgat/l
					21 January								
000	4.13	8.409	8.56			1.06							
010	4.10	8.403	8.54										
030	4.11	8.411	8.55										
050	4.30	8.515	8.46										
070	6.15	14.247	5.89										
092	6.05	16.684	6.28			3.52							
					2 March								
000	1.96	8.157	9.19	8.11	0.75	1.02	1.556	18.5	3.88	0.12	0.61	17	
010	2.02	8.151	9.35	8.12	0.76	1.05	1.554	20.5	3.50	0.10	0.30	16	
030	2.03	8.157	9.29	8.11	0.79	1.04	1.564	20.0	3.75	0.10	0.20	13	
050	2.57	8.586	9.24	8.10	0.74	1.09	1.571	17.5	4.75	0.13	0.18	16	
070	6.36	14.185	5.67	7.79	1.41	1.59	1.788	23.5	8.50	0.03	0.27	26	
092	5.25	16.796	5.69	7.88	1.37	1.07	1.875	22.5	8.53	0.04	0.04	24	
						13 May							
000	5.10	7.905	9.70	8.29	0.36	0.82		15.0					
010	5.01	7.905	9.70	8.32	0.37	0.68		14.0					
030	3.72	8.299	9.43	8.27	0.40	0.57		12.5					
050	2.47	9.383	8.52	8.06	0.58	0.71		14.5					
070	4.11	13.083	6.36	7.84	1.02	1.17		19.5					
088	4.68	16.752	4.87	7.73	1.05	1.45		24.0					

Bornholm Deep

55°15′N 15°59′E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l	H_2S µgat/l
					23 June								
000	10.56	7.647	7.75	8.34	0.20	0.78	1.544	13.6	0.09	0.02	0.46	6	
010	10.46	7.647	7.78	8.39	0.18	0.66	1.559	13.0	0.05	0.01	0.53	5	
030	5.98	8.000	8.03	8.26	0.43	0.72	1.582	15.3	0.05	0	0.96	6	
050	3.93	9.058	7.82	8.09	0.45	0.74	1.619	13.3	0.07	0.01	1.10	5	
070	3.78	14.560	5.25	7.76	0.83	1.20	1.783	16.8	1.07	0.08	0.81	6	
090	4.96	16.850	2.88	7.69	1.27	1.43	1.904	37.9	8.17	0.03	0.54	11	
					24 August								
000	17.66	7.712	6.74	8.34	0.07	0.66	1.550	13.0	0.04	<0.02	0.62	16	
010	17.34	7.718	6.59	8.40	0.06	0.46	1.565	11.0	0.02	<0.02	0.46	14	
030	5.15	8.123	7.60	8.02	0.49	0.75	1.587	15.0	<0.1	<0.02	0.35	8	
050	7.27	11.188	5.42	7.84	0.65	0.86	1.708	17.5	2.23	<0.02	0.43	20	
070	8.64	14.310	3.96	7.72	0.90	1.15	1.794	28.0	4.16	<0.02	0.35	17	
091	5.37	16.312	2.79	7.55	1.22	1.61	1.867	39.5	10.00	<0.02	0.76	25	
					22 November								
000	7.61	8.038	7.70	7.94	0.40	0.61	1.572	12.5	1.14	0.70	0.18		
010	7.64	8.040	7.74	8.01	0.42	0.62	1.590	12.5	1.19	0.73	0.13		
030	7.61	8.037	7.72	8.02	0.40	0.64	1.618	12.5	1.09	0.73	0.13		
050	7.56	10.575	5.16	7.69	0.83	1.04	1.676	21.0	3.92	0.19	0.11		
070	7.39	15.683	2.58	7.41	1.36	1.55	1.845	38.5	8.11	0.12	0.06		
091	5.18	16.541	1.17	7.27	1.39	1.70	1.880	52.0	10.35	0.06	0.23		

Gotland Deep

57°20'N 20°03'E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l	H_2S µgat/l
						4 March							
000	2.54	7.996	9.10	7.96	0.66	1.00	1.581	18.0	5.05	0.07	0.94	18	
070	2.58	8.012	9.07	8.05	0.61		1.594	18.5	5.17	0.07	0.89	19	
100	5.70	10.742	0.54	7.26	3.68	3.99	1.697	65.5	9.98	0.02	0.35	26	
150	5.63	11.921	0.19	7.27	4.33	4.72	1.771	78.5	0.19	0.02	3.13	18	
200	5.54	12.342	0	7.29	4.85	5.52	1.813	102.0	0.11	<0.02	5.94	19	16.8
240	5.54	12.460	0	7.34	5.71	6.53	1.851	124.0	<0.1	<0.02	9.12	27	24.0
						6 May							
000	3.12	7.967	9.99	8.35	0.33	0.88		9.5					
070	2.79	8.082	9.35	8.17	0.54	1.03		14.5					
100	5.50	10.676	0.79	7.28	2.57	3.41		56.5					
150	5.67	12.025	0.17	7.28	3.85	4.40		72.0					
200	5.71	12.483	0.73	7.34	2.96	4.13		70.0					
240	5.93	12.584	1.06	7.36	2.81	4.04		63.5					
						20 June							
000	8.94	7.68	8.30	8.31	0.09	0.60	1.646	6.3	0.06	0.02	0.41	17	
070	2.96	8.076	8.13	8.02	0.57	2.51	1.603	20.5	0.18	0.05	0.50	12	
100	5.43	10.530	1.02	7.34	2.46	3.56	1.716	53.0	5.65	0.12	0.45	20	
150	5.69	12.053	0.60	7.31	3.51	3.58	1.753	70.2	4.02	0.04	0.32	16	
200	5.68	12.420	0.15	7.32	3.84		1.792	74.7	2.97	0.09	1.61	17	
240	5.80	12.546	0.92	7.36	3.55		1.761	69.0	8.60	0.03	0.31	11	

Gotland Deep

57°20′N 20°03′E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l	H_2S µgat/l
					25 August								
000	17.37	7.323	7.00	8.39	0.09	0.53	1.600	10.5	<0.1	<0.02	0.78	17	
070	3.14	8.203	7.31	7.90	0.60	0.82	1.596	20.0	0.46	0.43	0.78	10	
100	5.12	10.897	1.67	7.34	2.44	2.80	1.695	57.5	7.50	<0.02	0.23	15	
150	5.37	12.186		7.34	3.00	3.21	1.757	73.0	4.45	<0.02	0.32	16	0
200	5.67	12.453	0.26	7.34	3.91	4.39	1.768	86.5	0.92	<0.02	1.65	16	0
240	5.85	12.581	0	7.48	6.79	7.84	1.887	101.0	0.12	<0.02	7.21	22	3.5
					23 November								
000	5.69	7.699	8.14	7.94	0.35	0.51	1.620	11.0	0.46	0.40	1.10		
070	5.56	8.005	7.65	7.90	0.44	0.63	1.653	10.0	1.45	0.15	0.26		
100	4.72	10.365	2.36	7.24	2.25	2.32	1.701	33.0	6.75	0.02	0.06		
150	5.07	11.976	1.51	7.21	2.74	2.79	1.741	43.0	5.46	0.02	0.02		
200	5.49	12.330	0.33	7.16	3.84	3.89	1.776	60.5	2.10	0.06	0.10		
240	5.72	12.514		7.24	5.52	5.57	1.855	62.5	0.09	0.02	2.21		2.0

Landsort Deep

58°31'N 18°14'E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l
						6 March						
000	0.79	7.177	9.64	8.04	0.48	0.83	1.491	20.5	4.66	0.22	1.18	26
070	4.30	8.505	5.93	7.65	1.25	1.43	1.605	28.0	5.35	0.02	1.32	18
100	4.84	9.968	1.52	7.31	2.46	2.68	1.664	56.5	4.42	0.02	0.13	14
150	4.96	10.563	0.47	7.27	2.88	3.09	1.704	62.5	3.33	0.02	0.66	12
200	5.06	10.680	0.34	7.27	2.85	3.17	1.704	63.0	3.15	0.03	0.48	11
440	5.11	10.863	0.32	7.29	3.46	3.80	1.723	70.0	0.16	0.03	1.33	2
						4 May						
000	2.69	7.403	9.96	8.28	0.19	0.81		12.0				
070	3.63	8.565	5.62	7.65	1.25	1.52		30.5				
100	4.74	9.855	1.51	7.31	2.32	2.57		52.0				
150	4.99	10.366	0.87	7.28	2.62	2.89		56.0				
200	5.07	10.537	0.62	7.26	2.71	3.07		58.0				
440	5.08	10.788	0.29	7.30	3.21	3.53		62.5				
						17 June						
000	8.98	6.700	8.69	8.47	0.12	0.72		14.7	0.09	0.02	0.50	13
070	3.07	8.217	6.04	7.74	0.77	2.47		26.8	0.44	0.04	0.25	14
100	4.88	10.054	1.02	7.35	2.20			54.4	3.35	0.02	0.35	15
150	5.12	10.597	0.30	7.28	2.49	2.69		60.5	3.05	<0.02	0.55	14
200	5.07	10.662	0.09	7.30	2.61	2.96	1.777	62.4	2.03	0.14	1.44	17
450	5.14	10.804	0.04	7.35	3.73	4.19		70.6	0.03	0	4.95	9

Landsort Deep

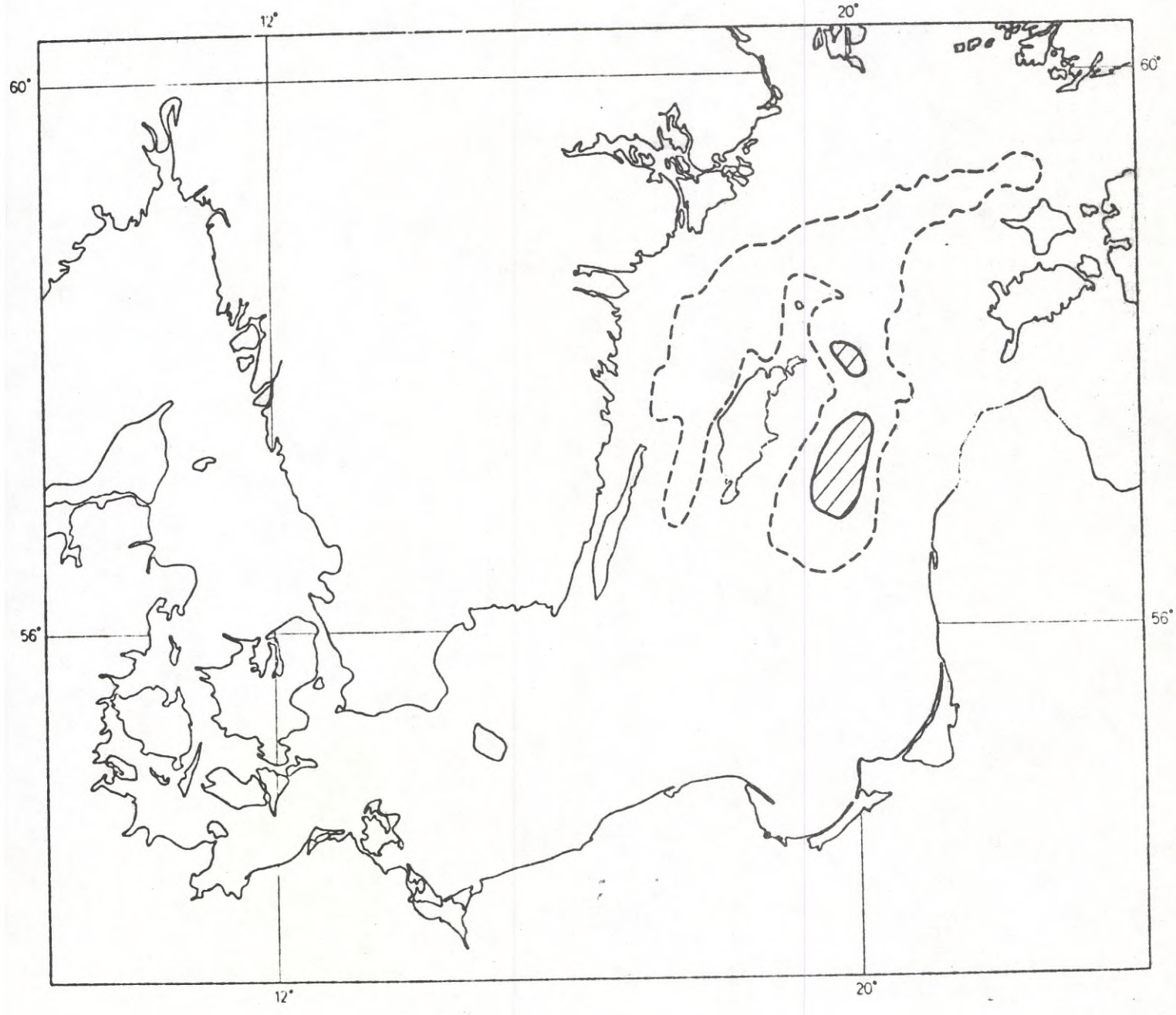
58°31′N 18°14′E

Depth m	Temp. °C	S ‰	O_2 ml/l	pH	PO_4-P µgat/l	Tot.P µgat/l	Alkal. Mval/l	Si µgat/l	NO_3-N µgat/l	NO_2-N µgat/l	NH_4-N µgat/l	Tot.N µgat/l
					7 September							
000	16.17	6.691	6.61	8.44	0.07	0.59	1.406	14.7	<0.1	<0.02	0.52	9
070	4.68	9.516	0.97	7.45	2.50	2.66	1.654	58.2	4.36	<0.02	0.15	9
100	5.01	10.340	0.52	7.40	2.76	3.15	1.684	62.8	4.13	<0.02	0.52	6
150	5.13	10.597	0.34	7.40	2.98	3.10	1.695	65.0	3.30	<0.02	0.20	8
200	5.25	10.768	0.20	7.40	3.17	3.40	1.710	66.7	2.54	0.23	0.18	7
440	5.34	10.930	0.21	7.42	3.26	3.61	1.703	67.5	3.91	0.05	0.24	9
					3 December							
000	5.86	7.142	7.93	7.81	0.37	0.53	1.307	10.5	1.10	0.34	1.21	
070	4.19	9.112	3.30	7.29	1.92	1.79	1.454	28.5	3.67	0.04	0.24	
100	4.79	9.959	1.48	7.14	2.74	2.80	1.517	35.0	4.03	0.05	0.21	
150	4.88	10.254	1.00	7.12	2.91	2.82	1.519	44.5	3.98	0.04	0.15	
200	5.18	10.691	0.34	7.09	3.29	3.23	1.522	44.5	1.77	0.05	0.52	
440	5.15	10.969	0.61	7.11	3.23	3.19	1.582	43.5	4.10	0.06	0.57	

R/V ARGOS 1976 03 01 – 1976 03 10

--- Oxygen concentration less than 2 ml/l

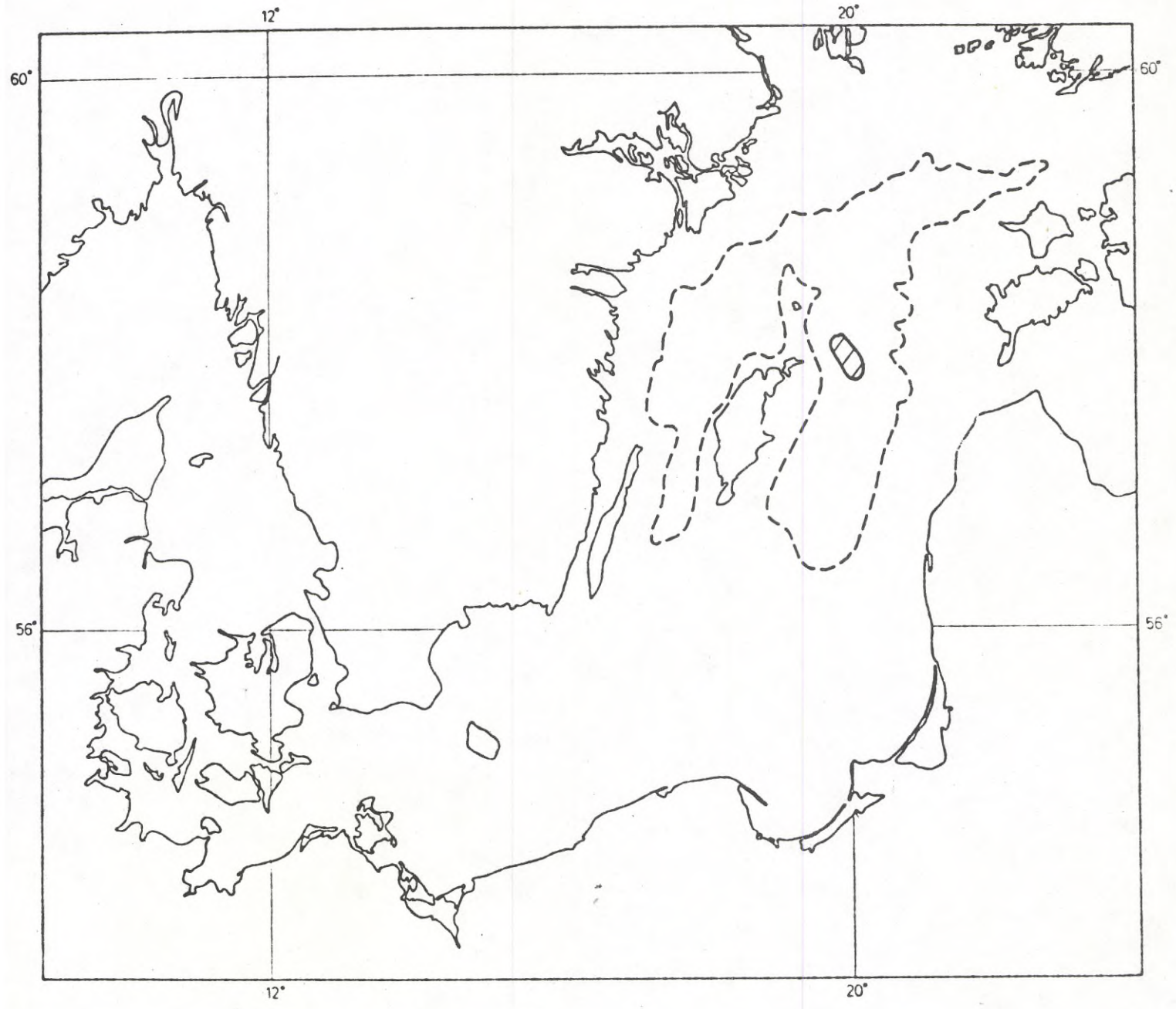
//// Area with hydrogen sulfide containing water



MUSSON 1976 06 10 – 1976 06 24

--- Oxygen concentration less than 2 ml/l

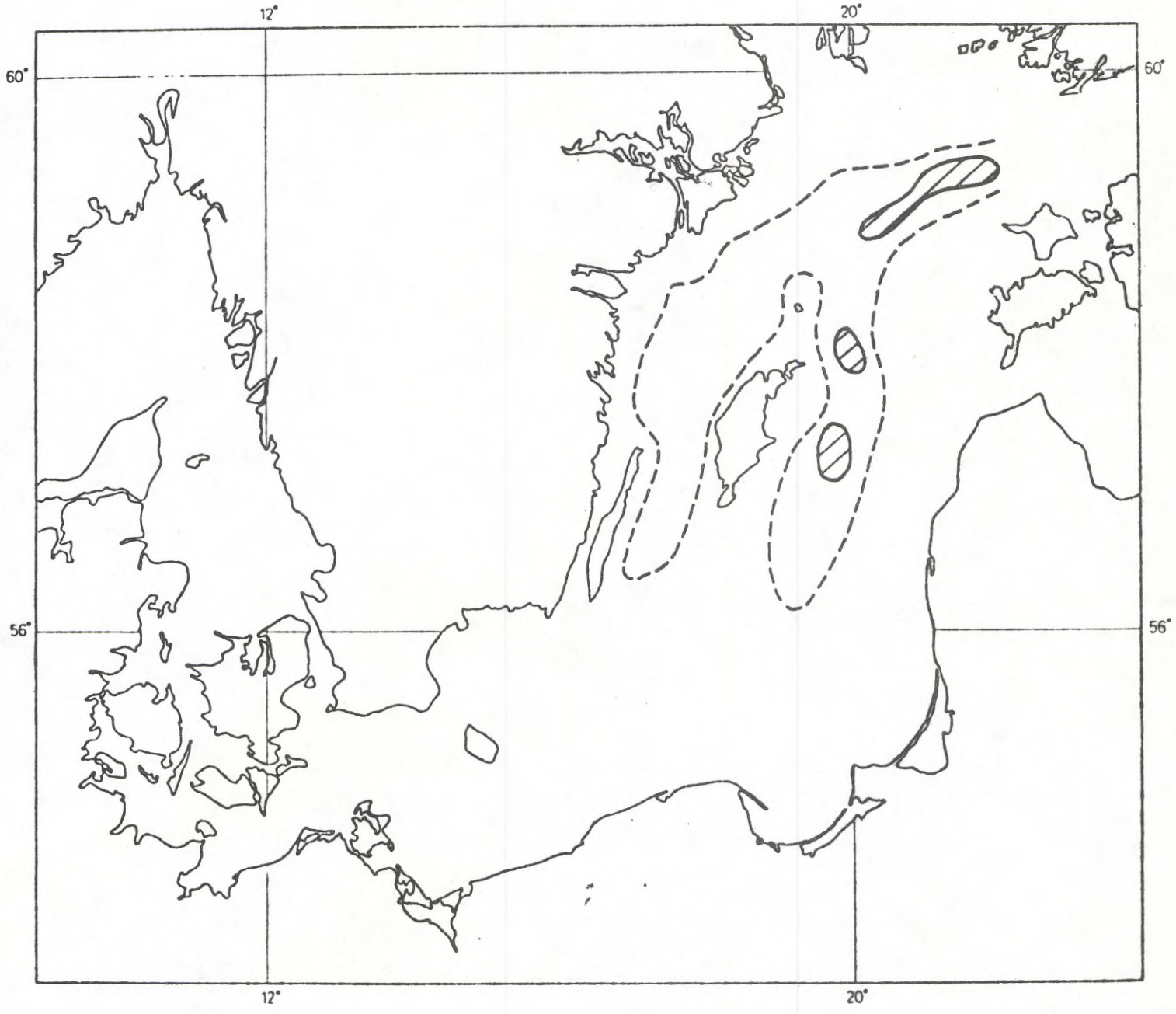
//// Area with hydrogen sulfide containing water



R/V ARGOS 1976 08 23 - 1976 09 09

--- Oxygen concentration less than 2 ml/l

//// Area with hydrogen sulfide containing water



R/V ARGOS 1976 11 22 – 1976 12 05

--- Oxygen concentration less than 2 ml / l

//// Area with hydrogen sulfide containing water