

Baltic Sea Research Institute Warnemünde

Cruise report
No. 44/02/02

r/v „A.v.Humboldt“

Monitoring Cruise

02 May – 11 May 2002

Kiel Bight to northern Gotland Sea

This report is based on preliminary data.

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GERMANY

Monitoring Cruise: Cruise No. 44/02/02
r/v „A.v.Humboldt“

Warnemünde
13.05.2002

The third monitoring cruise in 2002 performed by the Baltic Sea Research Institute Warnemünde in the frame of the HELCOM COMBINE programme was carried out with r/v „A.v.Humboldt“ between May 2nd and May 11th 2002.

Scientific staff participating:

G. Nausch (scientist in charge)	02.05. – 11.05.2002
J. Donath	02.05. – 11.05.2002
I. Petersohn	02.05. – 11.05.2002
G. Plüschke	02.05. – 11.05.2002
B. Sadkowiak	02.05. – 11.05.2002
D. Setzkorn	02.05. – 11.05.2002
I. Schuffenhauer	02.05. – 11.05.2002
S. Walter	02.05. – 11.05.2002

Master: G. Herzig

The area under investigation covered the Baltic Sea between Kiel Bight and northern Gotland Sea. Marine meteorological, hydrographic, hydrochemical and hydrobiological investigations were performed according to COMBINE programme of HELCOM: The station map is attached to this report. Additionally to the standard programme 2 sediment traps and 3 current meters were recovered and layed out again in the eastern Gotland Basin.

The weather situation was dominated by a high pressure cell reaching from southern Scandinavia to western Russia causing air pressure between 1025 and 1030 hPa during most time of the cruise. Calm weather with wind speed up tp 4 Bft from NE to E prevailed except May 5th where wind speed increased shortly up to 8 Bft. Air temperature was low, lying between 5 and 8 °C in the first part of the cruise. From May 8th onwards air temperature increased up to around 10 °C.

The following hydrographic, hydrochemical and hydrobiological characteristics have been observed during the cruise (c.f. Tables 1 and 2 and Figs. 3 and 4):

- Surface temperatures varied between 4.98 °C (Farö Deep) and 8.51 °C in the Pomeranian Bight.

- The bottom layer temperatures are still lying over the long-term average 1971-1990 (in brackets):

Bornholm Deep	8.80 °C (6.12 °C)
Gotland Deep	6.62 °C (5.62 °C)
Farö Deep	6.13 °C (5.20 °C)
Landsort Deep	5.55 °C (4.76 °C)
Karlsö Deep	5.23 °C (4.18 °C)

The recent inflow of November 2001 caused an increase in temperature by more than 2 °C in December in the Bornholm Deep. Despite the temperature had decreased since that it is still high.

- The inflow had caused in the Bornholm Deep also an increase in salinity from November 2001 to February 2002 by around 0.5 PSU to 16.09 PSU. Between February and March salinity decreased again to 15.46 PSU and remains on the same level until May.

In the Gotland Deep and Farö Deep area the effects of this inflow were detected in February and March respectively, Since then, the signal is again fading what can be shown also by the oxygen conditions.

Salinity (PSU)	Oct./Nov. 2001	February 2002	March 2002	May 2002
Gotland Deep	12.03	12.33	12.22	12.18
Farö Deep	11.53	11.31	11.48	11.45
Landsort Deep	10.42	10.23	10.16	10.15

In the western Gotland Basin the slowly decreasing salinity indicates the uninterrupted continuation of the stagnation period.

- This development is supported by the measured redox conditions in the deeper basins. Whereas in the Landsort Deep the hydrogen sulphide content is continuously increasing in the near bottom layer (-0.95 ml O₂/l in November 2001 to -1.29 ml O₂/l in May 2002), this trend was interrupted in the Gotland Deep in January and February. These effects were, however, only of short duration. The situation in May suggests that the long stagnation period which started in 1995 is continuing.

Also in the Bornholm Basin, the effects of the inflow in November 2001 were fading. The inflow caused extremely high oxygen concentrations in December (4.68 ml/l). In May 2002, the system starts to shift to anoxic conditions again.

In Fig. 4 the oxygen concentrations in the near bottom layer are shown. Hydrogen sulphide is expressed as negative oxygen concentrations.

- In the SE Gotland Basin a tongue of higher saline oxygen rich water is moving towards the eastern Gotland Basin. This tongue will penetrating most probably only into an intermediate layer and cannot replace hydrogen sulphide in the depth.
- The nutrient situation in the bottom layers of the main deep basins reflects the oxygen situation. With exception of the Bornholm Basin, high phosphate and ammonia values were detected whereas nitrate concentrations were logically zero.

- The nutrient situation in the surface layer is characterized by low phosphate and nitrate concentrations in the western Baltic Sea due to the spring bloom earlier in the year. In the central Baltic Sea a remarkable situation was observed. In the eastern and western Gotland Basin nitrate concentrations were depleted and a certain phosphate pool remains in the surface layer as usual for that time of the year. In the Bornholm Basin, however, high phosphate concentrations were still measured despite the nitrate reservoir is also exhausted. In addition, Secchi depth was high (10 – 11 m).

Attachments

- Tables 1 and 2: Preliminary results for selected parameters in the surface layer and the near bottom layer (unvalidated results)
- Figs. 1-2: Track charts
- Fig. 3: Transsect from the Kiel Bight to the northern Gotland Basin for temperature, salinity and oxygen (unvalidated data)
- Fig. 4: Oxygen /hydrogen sulphide concentrations in the bottom near layer for selected stations

Günther Nausch
Scientist in charge

Table 1: Surface water layer (about 1 m depth)

Area	Stat.	Temp.	Sal.	PO ₄ ³⁻	NO ₃₂ ⁻ *	
SiO ₄	Name/No. **	°C	PSU		μmol/l	
Date						
Kiel Bight 2.2 02.05.2002	360/0006	8.53	10.94	0.11	0.02	
Meckl. Bight 3.7 03.05.2002	012/0010	8.25	10.12	0.06	0.07	
Lübeck Bight 3.2 02.05.2002	023/0005	8.35	10.41	0.03	0.38	
Arkona Basin 4.5 04.05.2002	113/0033	6.83	7.52	0.07	0.35	
Pom. Bight 8.3 04.05.2002	162/0046	8.61	6.60	0.02	18.62	
Bornholm Deep 05.05.2002	213/0051	5.18	7.10	0.53	0.01	13.4
Stolpe Channel 09.05.2002	222/0072	6.10	7.16	0.48	0.02	13.7
SE Gotland Basin 12.2 09.05.2002	259/0070	6.64	7.12	0.22	0.06	
Gotland Deep 07.05.2002	271/0063	6.49	7.05	0.13	0.04	10.4
Fårö Deep 10.6 07.05.2002	286/0060	4.98	7.03	0.34	0.01	
Landsort Deep 06.05.2002	284/0058	5.55	6.25	0.14	0.02	7.4
Karlsö Deep 13.4 06.05.2002	245/0055	5.23	6.99	0.48	0.02	

* $\sum \text{NO}_2^- + \text{NO}_3^-$

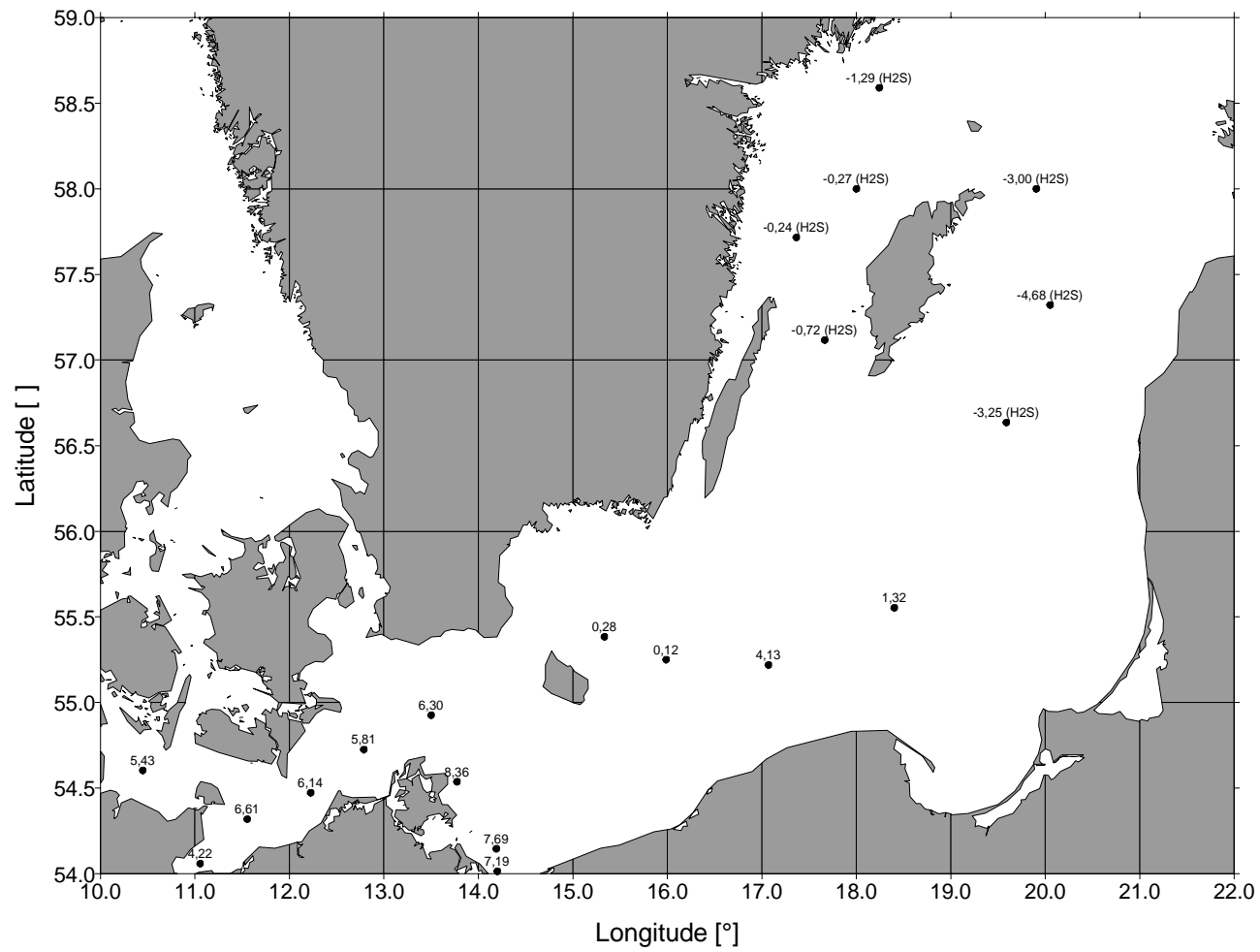
** see attached map

Table 2: Bottom near water

Area	Stat.	Depth	Temp	Sal.	O ₂	PO ₄ ³⁻	NO ₃ ⁻ *	
SiO ₄	Name/No. **	m	°C	PSU	ml/l		μmol/l	
Date								
Kiel Bight 5.4 02.05.2002	360/0006	17	5.51	18.11	5.43	0.33	2.61	
Meckl. Bight 7.5 03.05.2002	012/0010	24	5.02	17.92	6.61	0.23	3.42	
Lübeck Bight 17.2 02.05.2002	023/0005	23	4.70	17.04	4.42	0.94	5.92	
Arkona Basin 10.0 04.05.2002	113/0033	46	5.00	14.32	6.30	0.27	2.66	
Pom. Bight 7.7 04.05.2002	162/0040	15	7.56	7.20	7.69	0.03	6.77	
Bornholm Deep 05.05.2002	213/0051	87	8.80	15.60	0.12	2.54	5.12	56.4
Stolpe Channel 09.05.2002	222/0072	88	6.22	12.37	4.13	1.30	7.56	28.4
SE Gotland Basin 40.1 09.05.2002	259/0070	87	5.79	11.09	1.32	2.56	7.27	
Gotland Deep 07.05.2002	271/0063	233	6.62	12.18	-4.68	5.40	0	75.5
Fårö Deep 07.05.2002	286/0060	188	6.13	11.45	-3.00	5.35	0	63.9
Landsort Deep 06.05.2002	284/0058	431	5.23	10.15	-1.29	4.45	0	53.3
Karlsö Deep 06.05.2002	245/0055	107	4.82	9.46	-0.72	4.70	0	53.9

* $\sum \text{NO}_2^- + \text{NO}_3^-$

** see attached map

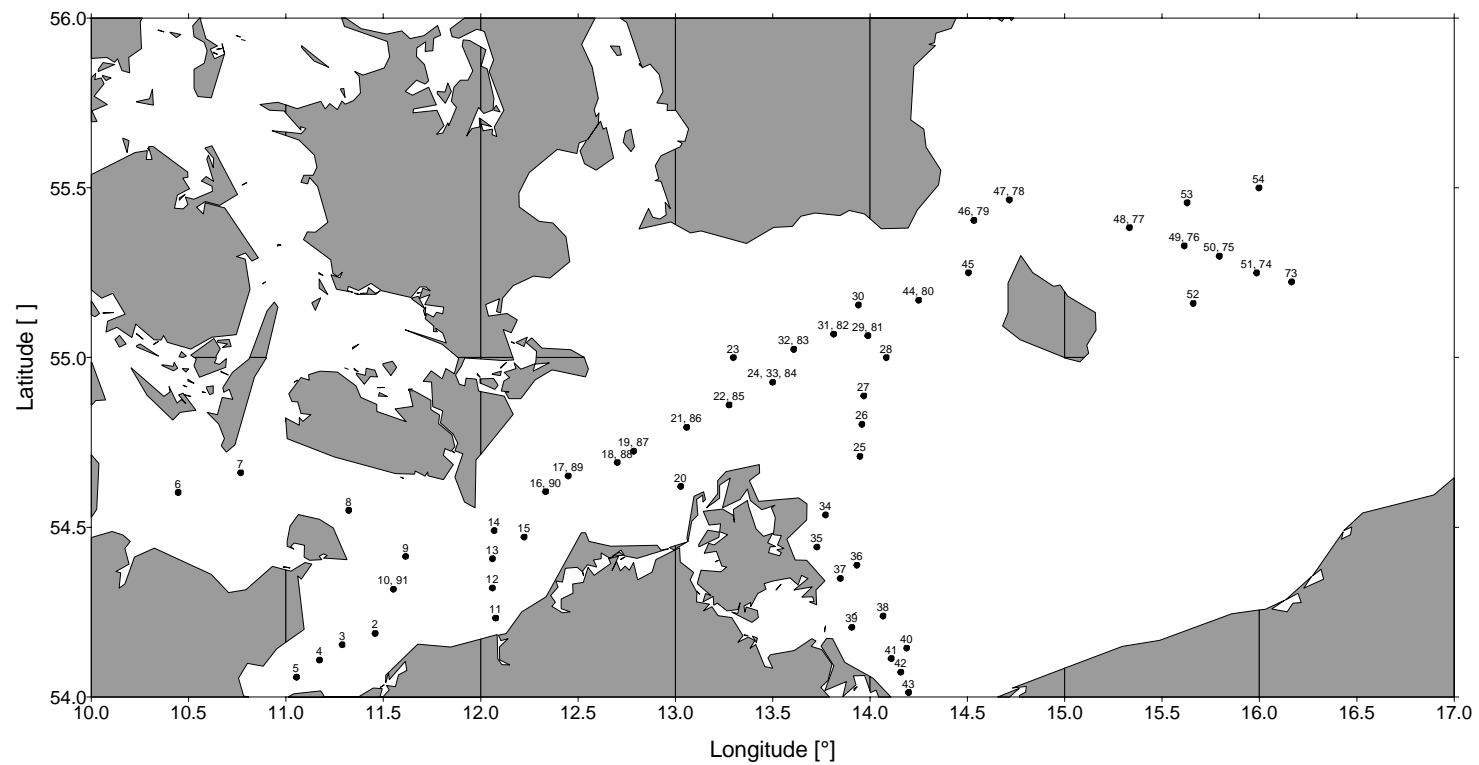


Station map
Monitoring 2002

TF 440202

Oxygen bottom
concentration

02.05.02 - 13.05.02

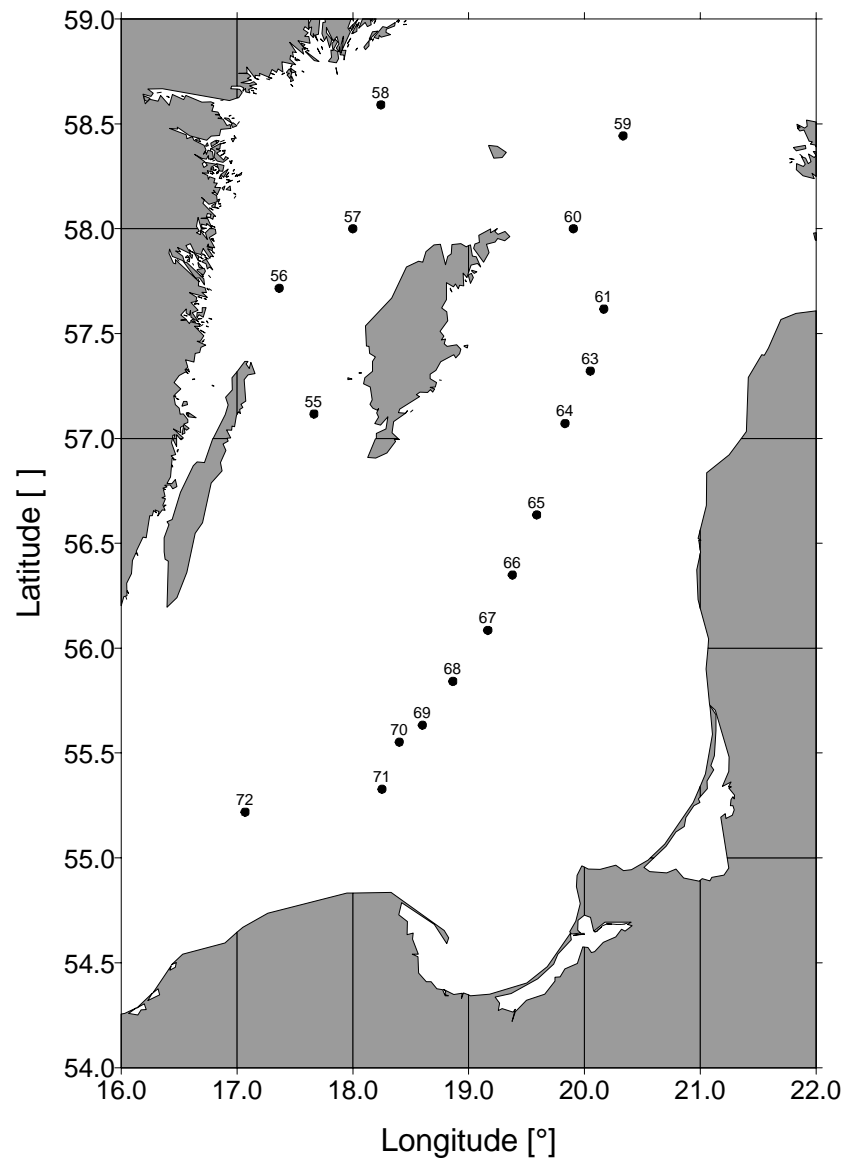


Station map
Monitoring 2002

TF 440202

72 stations (part 1)

02.05.02 - 13.05.02



Station map

Monitoring 2002

TF 2002 / 11

17 stations (part 2)

02.05.02 - 13.05.02

440202

Gesamte Ostsee

02.05.02 22:31 - 09.05.02 13:53 UTC

