INSTITUT FÜR OSTSEEFORSCHUNG WARNEMÜNDE
an der Universität Rostock BALTIC SEA RESEARCH INSTITUTE

Leibniz Institute for Baltic Sea Research Warnemünde

C r u i s e R e p o r t

r/v "Professor Albrecht Penck"

Cruise- No. 07PE / 08 / 10

Monitoring Cruise
29 April – 7 May 2008
Kiel Bight to northern Gotland Sea

This report is based on preliminary data

Leibniz-Institut für Ostseeforschung Warnemünde
an der Universität Rostock
Seestraße 15
D-18119 Rostock- Warnemünde
GERMANY
☎ +49-381-5197-0
🗐 +49-381-5197 440

1. **Cruise No.:** 07PE / 08 / 10

2. **Dates of the cruise:** from 29 April to 07 May 2008

3. **Particulars of the research vessel:**
   Name: "Professor Albrecht Penck"
   Nationality: Germany
   Operating Authority: Baltic Sea Research Institute (IOW)

4. **Geographical area in which ship has operated:**
   Kiel Bight to Northern Gotland Sea

5. **Dates and names of ports of call**
   no port of call

6. **Purpose of the cruise**
   Baltic monitoring in the frame of the COMBINE Programme of HELCOM

7. **Crew:**
   Name of master: Gunnar Kasch
   Number of crew: 10

8. **Research staff:**
   Chief scientist: Dr. N. Wasmund

   Participants: Donath, Jan
   Weinreben, Stefan
   Busch, Susanne
   Hagenmeier, Anna
   Gottfried, Christiane
   Kilian, Meike

9. **Co-operating institutions:**
All institutions dealing with HELCOM monitoring programmes.

10. **Scientific equipment**
CTD, water samplers, plankton nets

11. **General remarks and preliminary results**
The area under investigation extended from Kiel Bight to the Northern Gotland Sea (station map see Figs. 1 and 2). In addition to the normal monitoring track, a transect along Darss Sill was carried out to study the water exchange through this "bottle-neck" of the Baltic Sea. On the way back, selected HELCOM stations in the Bornholm Sea, Arkona Sea and Mecklenburg Bight were sampled a second time. The meteorological, hydrographical, chemical and biological investigations were performed according to the Manual of the COMBINE Programme of HELCOM.

The air pressure increased continuously during the cruise from 1004 hPa on 29.4.08 to 1029 hPa on 6.5.08. The whole cruise was characterized by unusually low wind which mostly not exceeded 5 m/s. Only during the night from 30.4. to 1.5.08, easterly wind of more than 10 m/s occurred. The sky was completely covered by clouds until the 2.5.08, but later it became increasingly sunny.

Air temperature was in a range of 6-12 °C. The surface water temperature was lowest in the eastern Gotland Sea (7-7,5 °C). It increased during the cruise in the Arkona- and Bornholm Sea from about 6.7-.7.7 °C (1.-2.5.08) to 8.9-11.2 °C (5.-6.5.08) due to strong insolation during the second half of the cruise and the stratification of the surface water. As wind-induced mixing was lacking, there was almost no homogenous surface layer found. Only after the wind event from 30.4. to 1.5.08, the Arkona Sea was homogeneous in the surface layer down to 13-20 m. Later, in the Bornholm and

Gotland Seas, the highest water temperature was measured in a thin surface layer The temperatures shown in Table 1 of the attachment are means from 1, 5 and 10 m depth..
For a comparison with representative long-term mean values of earlier decades, the surface values of this cruise are not representative because of an exceptionally strong gradient in the surface layer. Thus, we compared averages of 1, 5 and 10m water depths with long-term means (1971-1990, 2 m) in the table below. The recent water temperature data are in most but not all cases higher. The trend of increasing water temperature is best seen in the deep water layers.

Sea area (station)	Surface water temperature (°C)		Near-bottom water temperature (°C)	
	29.4.-7.5.08 (0-10m)	1971-1990 (2m)	29.4.-7.5.08	1971-1990
Mecklenburg Bight (stat. TF0012)	8.4	8.2	5.5	5.2
Arkona Sea (stat. TF0113)	7.1	7.4	4.9	4.3
Bornholm Sea (stat. TF0213)	6.8	6.8	7.2	6.1
Eastern Gotland Sea (stat. TF0271)	7.7	5.7	6.4	5.6
Farö Deep (stat. TF0286)	6.5	5.6	6.2	5.2
Landsort Deep (stat. TF0284)	5.4	6.1	5.6	4.7
Karlsö Deep (stat. TF0245)	7.7	6.8	5.2	4.2

The salinity reached 26 PSU at the bottom of the deepest regions of Kiel Bight (Stat. 361) and 19 PSU in the deep water of Mecklenburg Bight. The transect along Darss Sill revealed that the halocline raised from a depth of 19 m in the north (stat. TF0076) to 12 m in the south (stat. TF 0072) but with salinities of the bottom water decreasing from 18 PSU in the north to 10 PSU at the shallower southern end. The halocline was situated at a depth of 38-42 m in the central Arkona Basin, 50-55 m in the Bornholm Basin and 60-70 m in the eastern Gotland Basin.
Oxygen was depleted at the deep stations of the Gotland Basin (stations TF0260, TF0272, TF0271) and in the Farö Deep (TF0286) below 125 m depth (at station TF0271 even in at 110 m). Fine resolution of the redoxcline in the Landsort Deep (stat. TF0284) revealed oxygen deficiency even from 90 m depth downwards (cf. Fig. 3c; "negative oxygen" due to H_2S see Fig. 4).

Due to the calm weather, the buoyant cyanobacterium *Aphanizomenon* sp. appeared at the water surface. Visually it appeared as a bloom in the upper water layer of almost the entire Baltic Proper, noticed more or less from the southern Gotland Sea (Stat. TF 0253, 2.5.08) to the Arkona Sea (stat. TF0113, 6.5.08). This is an extremely early appearance of high cyanobacteria biomass, especially for the southern Baltic Proper.
Larvae of Ctenophores (presumably the invading *Mnemiopsis leidyi*) were found at some stations mainly in the southern Baltic Proper, i.e. 16 ind. pet net haul (WP2 net of 400 µm mesh size) at station TF0259 and 150 ind. pet net haul at station TF0213 on 5.5.08.

Attachments

Tables 1& 2: Preliminary results for selected parameters in the surface layer and the near bottom layer (unvalidated results)
Figs. 1-2: Station grid
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

Dr. Norbert Wasmund
Scientist in charge

Table 1: Surface layer (0 - 10m)

Area	Station	Temperature	Salinity	PO_4^{3-}	NO_{23}^{-} *
Date	Name/ No. **	°C	PSU	µmol/dm^3	µmol/dm^3
Kiel Bight 29.4.08	TF0360/ 005	8.43	11.05	0.2	0
Meckl. Bight 30.4.08	TF0012/ 007	8.38	10.30	0.2	0.04
Lübeck Bight 29.4.08	TF0022/ 006	8.71	10.24	0.02	0.14
Arkona Basin 1.5.08	TF0113/ 026	7.12	7.99	0.25	0.01
Bornholm Deep 1.5.08	TF0213/ 036	6.76	7.55	0.29	0.08
Stolpe Channel 2.5.08	TF0222/ 038	6.23	7.44	0.32	0.48
SE Gotland Basin 2.5.08	TF0259/ 040	6.34	7.39	0.26	0
Gotland Deep 3.5.08	TF0271/ 047	7.66	7.31	0.12	0.05
Fårö Deep 3.5.08	TF0286/ 049	6.51	7.22	0.12	0
Landsort Deep 4.5.08	TF0284/ 051	5.35	6.27	0.1	0.02
Karlsö Deep 4.5.08	TF0245/ 053	7.72	7.22	0.13	0.14

* Σ NO_2^- + NO_3; NO_2 was present only in traces in most areas under investigation

** Station name see maps (Fig. 1 and 2)

Table 2: Bottom-near water layer

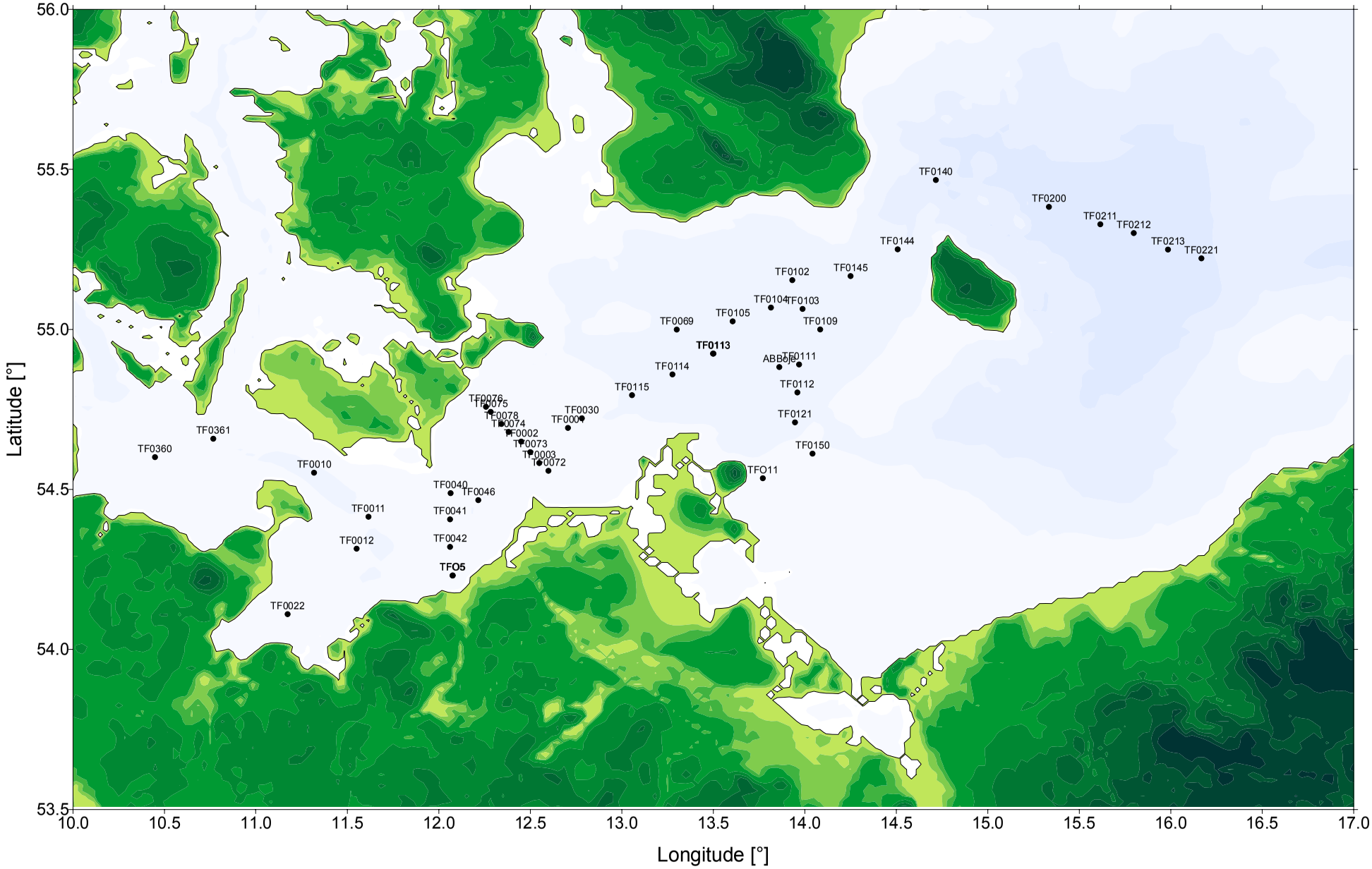
Area	Station	Sampl. Depth	Temp.	Salinity	O_2	PO_4^{3-}	NO_{23}^{-} *
Date	Name/ No. **	m	°C	PSU	cm^3/dm^3	$\mu mol/dm^3$	$\mu mol/dm^3$
Kiel Bight 29.4.08	TF0360/ 005	16	6.84	16.29	7.46	0.13	0
Meckl. Bight 30.4.08	TF0012/ 007	24	5.49	19.23	6.25	0.35	0.82
Lübeck Bight 29.4.08	TF0022/ 006	22	5.29	18.73	5.51	0.44	1.34
Arkona Basin 1.5.08	TF0113/ 026	46	4.94	17.21	3.76	1.14	7.65
Bornholm Deep 1.5.08	TF0213/ 036	87	7.15	15.76	1.56	2.08	7.12
Stolpe Channel 2.5.08	TF0222/ 038	89	7.30	13.58	2.69	1.78	7.27
SE Gotland Basin 2.5.08	TF0259/ 040	88	6.08	11.17	1.22	2.72	4.21
Gotland Deep 3.5.08	TF0271/ 047	234	6.45	12.68	- 4.25	6.35	0
Fårö Deep 3.5.08	TF0286/ 049	190	6.16	12.13	- 2.47	4.75	0
Landsort Deep 4.5.08	TF0284/ 051	436	5.61	10.91	- 1.81	4.10	0
Karlsö Deep 4.5.08	TF0245/ 053	107	5.18	9.98	- 1.57	4.33	0

* $\Sigma\ NO_2^- + NO_3$; NO_2 was present only in traces in most areas under investigation

** Station name see maps (Fig. 1 and 2)

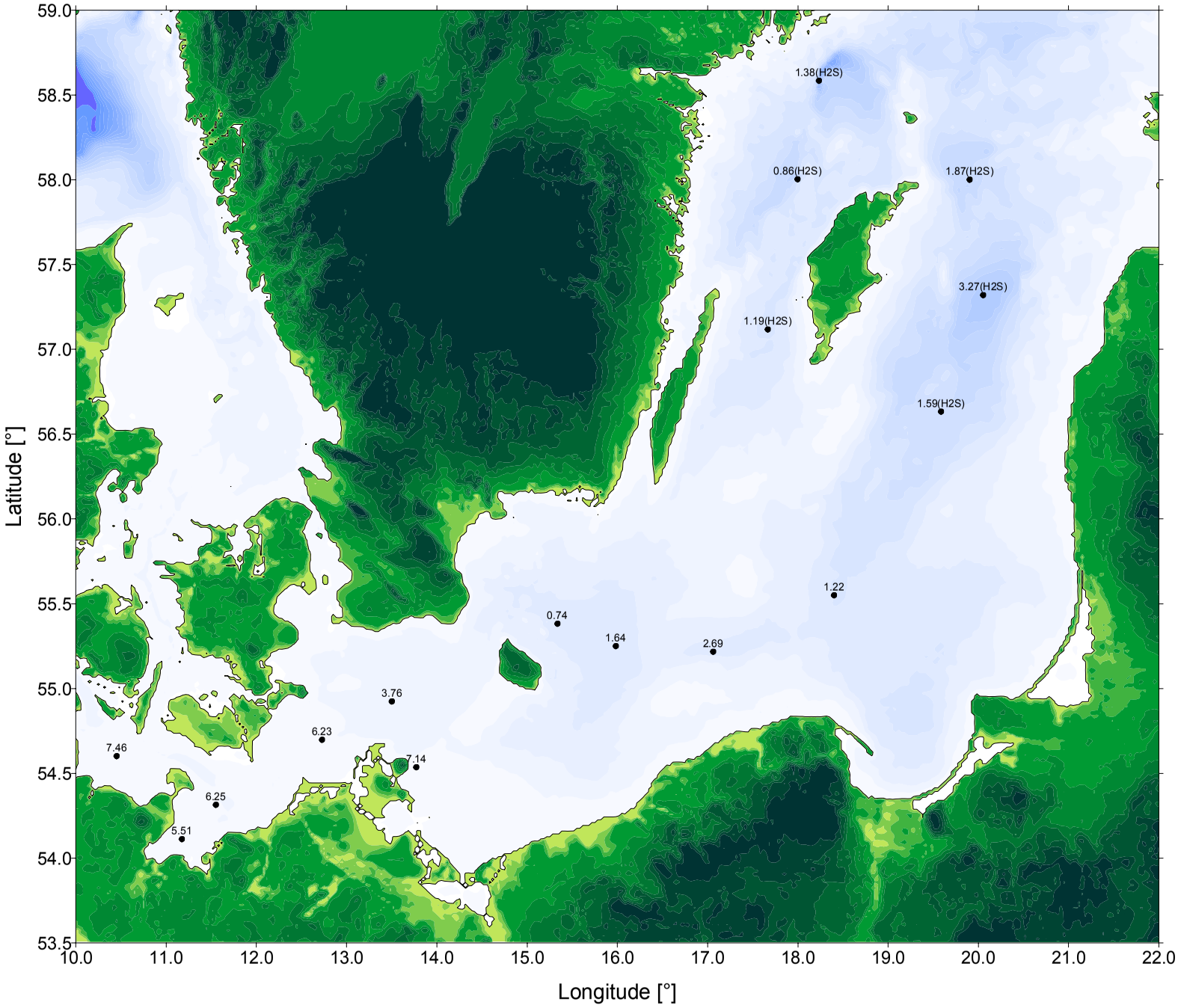
Stationmap K1

07PE0810
29.04. - 08.05.2008
46 stations + 4 repeated stations



K1.srf

IOW 2008, Sektion Physik - J.Donath



Monitoring

07PE0810

29.04. - 08.05.2008

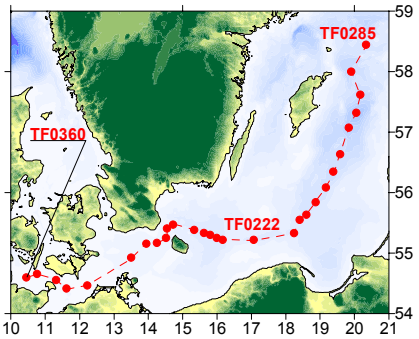
oxygen bottom concentration [ml/l]

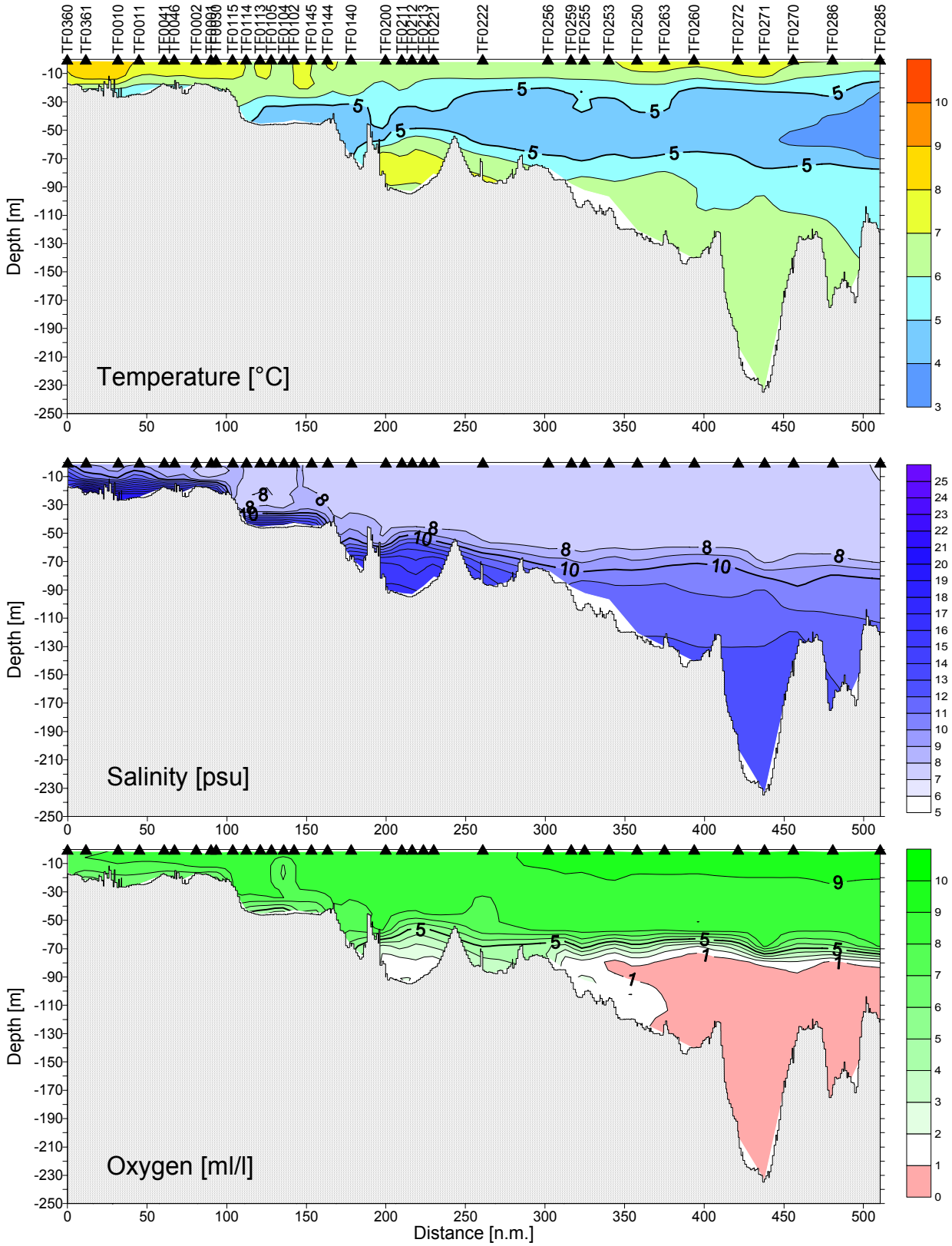
O2.srf

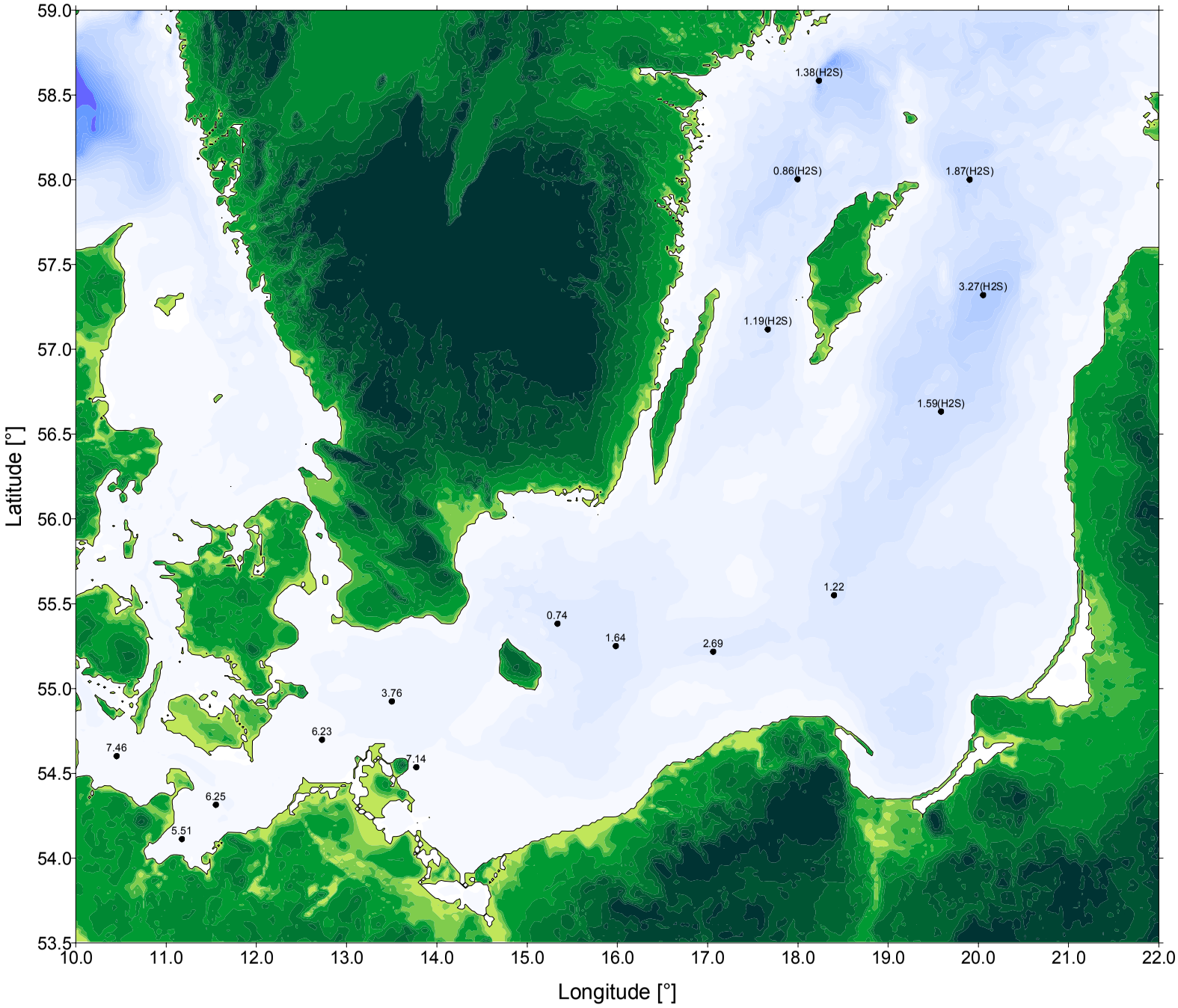
IOW 2007, Sektion Physik - J.Donath

monitoring - 07PE0810

Kiel Bight - Gotland Sea
29.04.2008 10:08 - 03.05.2008 21:23 UTC







Monitoring

07PE0810

29.04. - 08.05.2008

oxygen bottom concentration [ml/l]

O2.srf

IOW 2007, Sektion Physik - J.Donath